LODESTAR Electronics

A Subsidiary of B&K Precision Corp.

INSTRUCTION MANUAL

Model LS1130
Single Output DC Power Supply

GENERAL SAFETY SUMMARY

Review the following safety precautions to avoid injury and prevent damage to this product and any product connected to it. To avoid potential hazards, use this product only as specified.

To avoid fire or personal injury:

Use proper power cord. Use only the power cord supplied with this product or a power cord that is specified for the country of use.

Ground the product: When using the supplied three prong power cord, this product is grounded through the grounding connector of the power cord. To avoid electrical shock, the grounding connector must be connected to earth ground. Before making connections to the input or output of the terminals of the product, ensure the product is properly grounded.

Observe all terminal ratings: To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate without covers. Do not operate this product with covers and panels removed.

Do not operate in an explosive atmosphere

Do not operate in wet or damp conditions.

Use an insulated floor material or a large, insulated floor mat to stand on and an insulated work surface on which to place equipment.

Don't expose high voltage needlessly. Remove housings and covers only when necessary. Turn off equipment while making test connections in high-voltage circuits. Discharge high-voltage capacitors after removing power.

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SAFETY TERMS AND SYMBOLS

These terms and symbols may appear on the product or in the user manual.

WARNING: Warning statements identify condition or practices that could result in injury or loss of life.

CAUTION: Caution statements identify conditions or practices that could result in damage to this product or other property.

Protective Ground
(Earth) Terminal

1 PRODUCT INTRODUCTION

1.1 Description

The Lodestar Electronics model LS1130 is a high quality, general purpose Single Output Regulated DC Power Supply. It provides 0-30 Volts DC output, adjustable with both coarse and fine voltage controls for precise setting of the desired value. The current output is rated 0-3 Amps, adjustable with both coarse and fine current controls. Two large LED meters continuously monitor the output voltage and current.

This instrument may be used in constant voltage or constant current applications. The crossover from constant voltage to constant current modes is smooth and automatic. LED's indicate the "CV" (constant voltage) or "CC" (constant current) mode of operation. In constant voltage applications, a current limit may be preset. When load variations cause the current to reach the preset limit, the unit then regulates output current rather than output voltage.

The output is isolated from chassis and earth ground, which permits full flexibility of connections. When needed, the (+) or (-) polarity may be strapped to ground, or either polarity may be floated to an external voltage. Two supplies may be connected in series as a 0-to-60 volt power source, or two supplies may be connected in parallel, with suitable balancing resistors, for up to twice the output current. Reverse polarity protection prevents accidental damage to the power supply from improper connection to an external voltage.

This power supply is well suited for a wide variety of electrical and electronics applications, including s school laboratories, and home use by hobbyists, service shops, engineering labs and production testing,

1.1 Key Features

- Fully featured adjustable DC power supply
- Coarse and Fine Controls for Voltage and Current
- Two large panel mounted LED meter displays to monitor output current (red) and output voltage(green)
- Overload and reverse polarity protection
- Isolated Output. Either polarity may be floated or grounded.
- CV/CC operation. LED indication for CV (Green)/ CC (Red) mode.
- Excellent regulation and low ripple characteristics.
- Light and compact design

2. SPECIFICATIONS

Output Voltage	0 – 30V, Coarse and Fine adjustment
Output Current	0 – 3A, Coarse and Fine Adjustment

Constant Voltage Mode	Line Regulation	≤ 0.01% + 3mV
	Load Regulation	≤ 0.01% + 3mV (≤ rating current)
	Ripple & Noise	≤ 1mVrms, 5Hz to 1MHz (rating current ≤ 3A)
	Temperature Coefficient	≤ 300 ppm/°C
	Recovery Time	≤ 100μS (50% load change, minimum load 0.5A)

Constant Current Mode	Line Regulation	≤ 0.2% + 3mA
	Load Regulation	≤ 0.2% + 3mA
	Ripple & Noise	≤ 0.3mA RMS

Display	3 digit 0.56" LED display Red LEDs for Voltage, Green LEDs for Current	
	Accuracy	≤ 0.5% of reading + 2 digits

General:

Power Requirements	AC 110V/220V ±10% selectable, 50/60Hz, 210W
Operating Environment	Operation: 0° to +40° C, 75% R.H. Storage: -15° to +70° C, 85% R.H
Accessories included	AC Line Cord Instruction manual Fuse 1 set of test leads 1 Earth Ground bus strap
Dimensions (W x H x D):	127 x 152 x 292 mm (5 x 6 x11.5")
Weight:	4Kg (8.8 lbs.)

Specifications and information provided are subject to change without notice.
Please visit www.lodestarelectronics.com for the most current product information.

3. SAFETY INFORMATION AND INSTALLATION

3.1 Unpacking the Instrument

The product has been fully inspected and tested before shipping from the factory. Upon receiving the instrument, immediately unpack and inspect it for any damages that might have been sustained during transportation. If any sign of damage is found, notify your local distributor immediately.

3.2 Checking the Line voltage

This instrument will operate on AC 220V or 110V. Before connecting the power plug to an AC line outlet, make sure the voltage selector is set to the position corresponding to the line voltage. Note that the instrument may be damaged if it is connected to the wrong AC line voltage.

WARNING **.**To avoid electrical shock the power cord protective grounding conductor must be connected to ground.

Replace the required fuses according to this table.

Line voltage	Range	Fuse (slow blow)
AC 220V	198V to 242V	T 1A, 250V
AC 110V	100V to 120V	T 2A, 250V

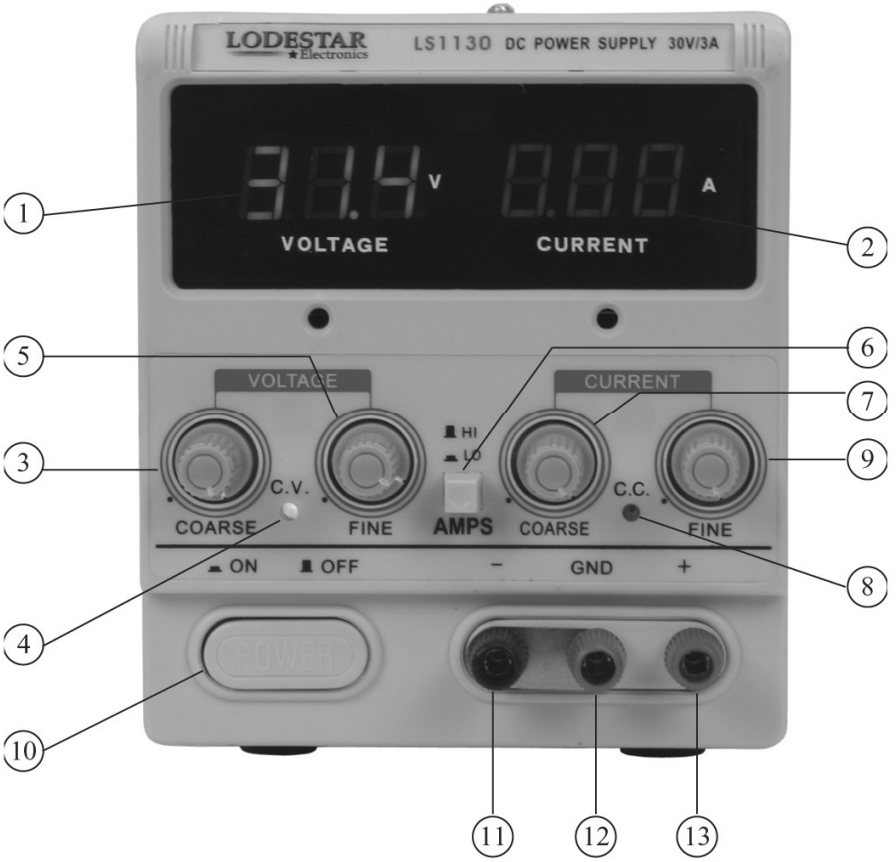
WARNING: To avoid personal injury, disconnect the power cord before removing the fuse holder.

3.3 Cooling

Before applying power to the unit, make sure that the line voltage setting is correct and the ventilation holes are not blocked. Ensure that the ventilation fan is working well (it should turn on at power on condition).

4. PANEL INTRODUCTION

4.1 Front panel



(1) green LED Display
3 digit display, continuously monitors voltage.

(2) red LED Display
3 digit display, continuously monitors current.

(3) Coarse VOLTAGE Control
Coarse adjustment of output voltage. Read value on green LED display.

(4) C.V. (Constant Voltage) Indicator.
Green LED lights when the power supply is in Constant Voltage mode. The power supply regulates the output voltage at the value set by the VOLTAGE controls.

(5) Fine VOLTAGE Control
Fine adjustment of output voltage. Read value on green LED display.

(6) Hi/Low range AMP switch
There are 2 ranges of current limiting. When the switch is disengaged (OUT), the maximum current of 3Amp can be output. Pressing this switch limits the maximum current to 1.5A.

(7) Coarse CURRENT Control
Coarse adjustment of current limit in constant voltage mode. Adjusts constant current value in constant current mode. Current can be read from red LED display.

(8) C.C. (Constant Current) Indicator
Red LED lights when the power supply is in Constant Current mode. The Power Supply regulates the output current at the value set by the CURRENT controls.

(9) Fine CURRENT Control
Fine adjustment of current limit in constant voltage mode. Adjusts constant current value in constant current mode. Current can be read from red LED display.

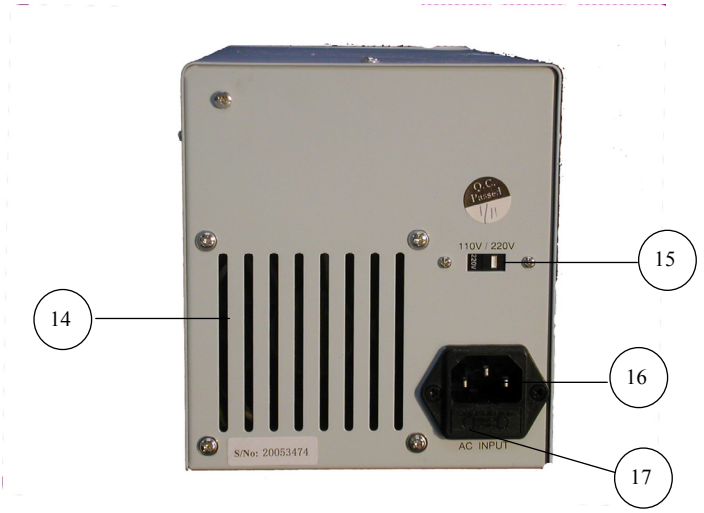
(10) POWER Switch.
Turns power on and off.

(11) "-" Terminal
Negative polarity output terminal

(12) GND
Earth and Chassis Ground.

(13) "+" Terminal
Positive polarity output terminal.

4.2 Rear Panel



(14) Ventilation fan, ventilation holes

(15) Input voltage selector
Set switch to corresponding line voltage

(16) AC Power Input Connector
Connect the AC power cord to this receptacle

(17) Fuse Compartment

5. OPERATING INSTRUCTIONS

5.1 General Precautions

Avoid using the power supply in ambient temperatures above +40° C. Always allow sufficient air space around the venting hole at the rear of the power supply for effective radiation to prevent internal heat build-up.

Do not exceed the voltage rating of the circuit being powered. Many transistors and integrated circuits will not withstand voltage of 30 volts.

5.2 Getting Started, Hook-up

1) Turn off the power supply and the equipment to be powered.
2) Connect the positive polarity of the device being powered to the red (+) terminal of the power supply. Connect the negative polarity of the device being powered to the black (-) terminal of the power supply.

   Note: If the negative polarity of the equipment or circuit being powered is also the chassis or common, it may be grounded to earth by strapping the black (-) terminal to the green GND terminal. Similarly, the positive polarity can be grounded by strapping the red (+) terminal to the green GND terminal. If an Earth GTND reference is not required, leave the GND terminal unconnected.
3) Make sure that the hook-up leads offer sufficient current capability and low resistance between the power supply and the circuits being powered.

5.3 Typical Constant Voltage Operation

1) Before connecting the device to be powered to the power supply, determine the maximum safe load current for the device to be powered and set the current limit value according to the "Setting Current Limit" procedure below.
2) Set the FINE VOLTAGE control to center and the COARSE VOLTAGE control to a minimum (fully counterclockwise).
3) Turn off power supply and connect it to the device to be powered (see "Hook-Up" procedure in this section).
4) Turn on POWER switch. The CV indicator should light.
5) Increase the VOLTAGE setting until the LED display reads the desired value. The FINE CONTROL permits easier setting to a specific value

If the load current exceeds the preset current limit, the CV indicator will go off and the CC indicator will light. In this case, the power supply automatically switches to the constant current mode and further rotation of the VOLTAGE control will not increase the output voltage.

Setting Current Limit

1) Determine the maximum safe current for the device to be powered.
2) Temporarily short the (+) and (-) terminals of the power supply together with a test lead.
3) Rotate the COARSE VOLTAGE control away from zero sufficiently for the C.C. indicator to light.
4) Adjust the COARSE and FINE CURRENT control for the desired current limit. Read the current value on the LED display.
6) Remove the short between the (+) and (-) terminals and hook up for constant voltage operation.

The current limit (overload protection) has now been preset. Do not change the CURRENT control setting after this step.

5.4 Typical Constant Current Operation

1) Before connecting the device to be powered to the power supply, determine the maximum safe voltage to be applied and set the VOLTAGE controls to obtain that voltage reading on the LED display.
2) Determine the desired constant current value. Set the COARSE and FINE CURRENT control to minimum (fully counterclockwise).
3) Turn off the power supply and connect it to the device to be powered.
4) Turn on the power supply.
5) Increase the COARSE and FINE CURRENT control setting until the desired constant current value is read on the display, or set the current limit in advance (before connecting the load) as prescribed earlier in the "Setting Current Limit" procedure.

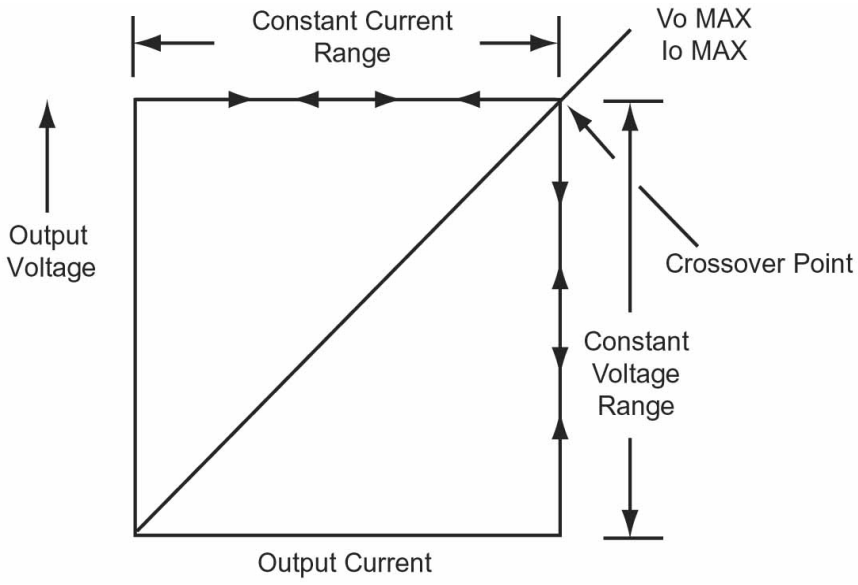
If the load current drops below the constant current value, the CC indicator will go off and the CV indicator will light. In this case, the power supply automatically switches to the constant voltage mode, and further rotation of the CURRENT controls will not increase the output current.

Constant Voltage/Constant Current Characteristic

The working characteristic of this power supply is called a constant voltage/constant current automatic crossover type. This permits continuous transition from constant current to constant voltage modes in response to the load change. The intersection of constant voltage and constant current modes is called the crossover point. The figure below shows the relationship between this crossover point and the load.

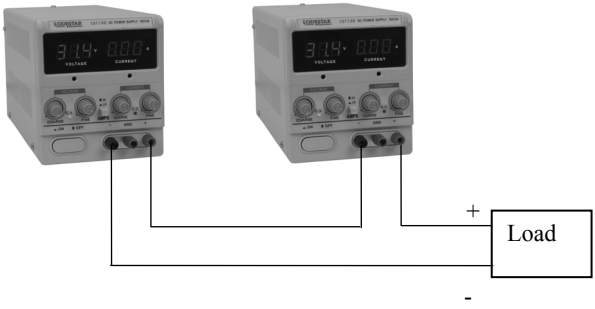
For example, if the load is such that the power supply is operating in the constant voltage mode, a regulated output voltage is provided. The output voltage remains constant as the load increases, up until the point where the preset current limit is reached. At that point, the output current becomes constant and the output voltage drops in proportion to further increases in load. The crossover point is indicated by the front panel LED indicators. The crossover point is reached when the CV indicator goes off and the CC indicator comes on.

Similarly, crossover from the constant current to the constant voltage mode automatically occurs from a decrease in load. A good example of this would be seen when charging a 12-volt battery. Initially, the open circuit voltage of the power supply may be preset for 13.8 volts. A low battery will place a heavy load on the supply and it will operate in the constant current mode, which may be adjusted for a 1 amp charging rate. As the battery becomes charged, and its voltage approaches 13.8 volts, its load decreases to the point where it no longer demands the full l amp charging rate. This is the crossover point where the power supply goes into the constant voltage mode.



5.5 Connecting Two Power Supplies in Series

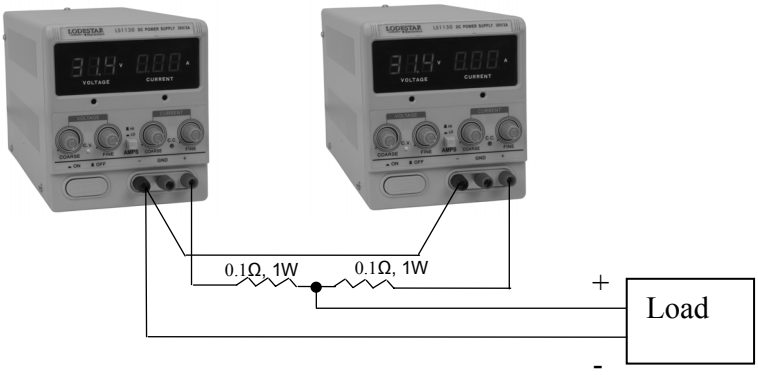
Two Model LS1130 power supplies may be connected in series to provide a variable 0-60 volt output. In this configuration the power supply can supply up to 3 amps, see figure below for hook-up.



When connected in series, the VOLTAGE controls of each power supply exercise control over a 0-30 volt range. Add the LED display readings together or connect an external voltmeter across the load to determine the total output voltage. Load current may be monitored from either supply; the readings will be identical since they are connected in series. Also, since the supplies are connected in series, it is only necessary to set the current limit on one of the supplies; the other may be set for maximum.

5.6 Connecting two Power Supplies in Parallel

Two power supplies may be connected in parallel to double the maximum load current. In this configuration the two supplies will provide two 0-30 volt output at up to 6 amps (heavier gauge hook-up leads are advisable). Current equalizing resistors must be used as shown in the figure below; however the protective current limiting feature will prevent damage if current is temporarily unbalanced during set-up.



When connected in parallel and operating in the constant voltage mode, determine the total load current limit and preset the current limiting for each power supply to half the total load current value. Then when the load is connected, set the VOLTAGE controls on the two power supplies for equal voltage readings. This should also provide approximately equal current from each supply. Add the two current meter readings together for total load current, or connect an external amp meter in series with the load.

If the current equalizing resistors are not well matched, it is preferable that the voltages be slightly unbalanced to achieve current balance. Be sure that the supplies are adequately balanced so that both remain in the CV mode.

When connected in parallel and operating in the constant current mode, the VOLTAGE controls of both supplies should be preset to the same value. Then, when the load is connected, the CURRENT controls of the two supplies should be adjusted for approximately equal current from each unit. Be sure that both supplies remain in the CC mode.

6. MAINTENANCE

WARNING

The following instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than what's described in the operating instructions unless you are qualified to do so.

6.1 Fuse Replacement

If the fuse blows, the power lamp indicators will not light and the oscilloscope will not operate. The fuse should not normally open unless a problem has developed in the unit. Try to determine and correct the cause of the blown fuse then replace only with the correct fuse. The fuse is located in a fuse compartment which is part of the AC receptacle in the rear panel.

Replace the required fuses according to this table.

Line voltage	Range	Fuse (slow blow)
AC 220V	198V to 242V	T 1A, 250V
AC 110V	100V to 120V	T 2A, 250V

WARNING. For continued fire protection, replace fuse only with 250V fuse of the specified type and rating, and disconnect power cord before replacing fuse

6.2 Line Voltage Selection

To select the desired line voltage, simply set the slide switch on the rear panel to the appropriate voltage. Before you do so, unplug the unit and make sure the proper fuse is installed.

7 SERVICE INFORMATION

7.1 Warranty and Non-Warranty Service

Please contact your local distributor for warranty and service instructions.

7.2 Limited 90 day Warranty

The company warrants to the original purchaser that its products and the component parts thereof, will be free from defects in workmanship and materials for a period of 90 days from date of purchase from your local distributor.

The company will, without charge, repair or replace, at its option, defective product or component parts. Please contact your local distributor for instructions.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. The warranty is void if the serial number is altered, defaced or removed.

The company shall not be liable for any consequential damages, including without limitation damages resulting from loss of use.

8 APPENDIX

8.1 CE Declaration

BK PRECISION

Declaration of CE Conformity
According to EEC directives and
NF EN 45014 norm

CE

	Responsible Party Manufacturers	***Alternate Manufacturing***
Name:	B&K Precision Corporation	***Site*** B&K China 1355
Manufacturer's Address	22820 Savi Ranch Pkwy. Yorba Linda, CA 92887-4610 USA	

Declares that the below mentioned product

Product Name: Power Supply

Part Numbers: LS1330

complies with the essential requirements of the following applicable European Directives:

Low Voltage Directive 73/23/EEC (19.02.73)
amended by 93/68/EEC (22.07.93)

Electromagnetic Compatibility (EMC) 89/336/EEC (03.05.88)
amended by 92/68/EEC (22.07.93)

and conforms with the following product standards:

Safety	EN 61010-1:2001
EMC	EN 61326:1997 + A1:1998 + A2:2001 EN 50081-1, EN 50081-2

This Declaration of Conformity applies to above listed products place on the EU market after:

January 31 2007
Date

Victor Tolan
Victor Tolan
President

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Lodestar Electronics Co.
www.lodestarelectronics.com

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