

Series 2260B DC Power Supplies Quick Start Guide



Safety precautions

The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

Responsible body is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

Operators use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

Maintenance personnel perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

Service personnel are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Keithley products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections

require protection for high transient overvoltages often associated with local AC mains connections. Certain Keithley measuring instruments may be connected to mains.

These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

Do not connect switching cards directly to unlimited power circuits. They are intended to be used with impedance-limited sources. NEVER connect switching cards directly to AC mains. When connecting sources to switching cards, install protective devices to limit fault current and voltage to the card.

Before operating an instrument, ensure that the line cord is connected to a properly-grounded power receptacle. Inspect the connecting cables, test leads, and jumpers for possible wear, cracks, or breaks before each use.

When installing equipment where access to the main power cord is restricted, such as rack mounting, a separate main input power disconnect device must be provided in close proximity to the equipment and within easy reach of the operator.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.

When fuses are used in a product, replace with the same type and rating for continued protection against fire hazard.


For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.


Do not exceed the maximum signal levels of the instruments and accessories.


Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.


Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.

If you are using a test fixture, keep the lid closed while power is applied to the device under test. Safe operation requires the use of a lid interlock.


If a  screw is present, connect it to protective earth (safety ground) using the wire recommended in the user documentation.

The  symbol on an instrument means caution, risk of hazard. The user must refer to the operating instructions located in the user documentation in all cases where the symbol is marked on the instrument.

The  symbol on an instrument means warning, risk of electric shock. Use standard safety precautions to avoid personal contact with these voltages.

The  symbol on an instrument shows that the surface may be hot. Avoid personal contact to prevent burns.


The  symbol indicates a connection terminal to the equipment frame.

If this  symbol is on a product, it indicates that mercury is present in the display lamp. Please note that the lamp must be properly disposed of according to federal, state, and local laws.

The **WARNING** heading in the user documentation explains hazards that might result

in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

The **CAUTION** heading with the  symbol in the user documentation explains hazards that could result in moderate or minor injury or damage the instrument.

Always read the associated information very carefully before performing the indicated procedure. Damage to the instrument may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Keithley. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keithley to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keithley office for information.

Unless otherwise noted in product-specific literature, Keithley instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F); and pollution degree 1 or 2.

To clean an instrument, use a cloth dampened with deionized water or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing. Safety precautions as of June 2018.

Power and environmental ratings

For indoor use only.

Power supply	100 V ac to 240 V ac, 50 Hz to 60 Hz, single phase.
Maximum input power	2260B-30-36, 2260B-80-13, 2260B-250-4, 2260B-800-1: 500 VA maximum. 2260B-30-72, 2260B-80-27, 2260B-250-9, 2260B-800-2: 1000 VA maximum. 2260B-30-108, 2260B-80-40, 2260B-250-13, 2260B-800-4: 1500 VA maximum.
Altitude	Maximum 2000 m (6562 ft) above sea level.
Operating temperature	0 °C to 50 °C.
Storage temperature	-15 °C to 70 °C.
Operating humidity	20% to 85% relative humidity; no condensation.
Storage humidity	90% relative humidity or less; no condensation.
Pollution degree	2.

Introduction

The 2260B series includes power supplies with 360 W, 720 W, and 1080 W power capacities.

In this document:

- 2260B-30 refers to 2260B models with a maximum voltage rating of 30 V.
- 2260B-80 refers to models with a maximum voltage rating of 80 V.
- 2260B-250 refers to models with a maximum voltage rating of 250 V.
- 2260B-800 refers to models with a maximum voltage rating of 800 V.

This document provides information on the 2260B models listed in the following table.

Model name	Model type	Voltage rating	Current rating
2260B-30-36	360 W	0 V to 30 V	0 A to 36 A
2260B-80-13	360 W	0 V to 80 V	0 A to 13.5 A
2260B-250-4	360 W	0 V to 250 V	0 A to 4.5 A
2260B-800-1	360 W	0 V to 800 V	0 A to 1.44 A
2260B-30-72	720 W	0 V to 30 V	0 A to 72 A
2260B-80-27	720 W	0 V to 80 V	0 A to 27 A
2260B-250-9	720 W	0 V to 250 V	0 A to 9 A
2260B-800-2	720 W	0 V to 800 V	0 A to 2.88 A
2260B-30-108	1080 W	0 V to 30 V	0 A to 108 A
2260B-80-40	1080 W	0 V to 80 V	0 A to 40.5 A
2260B-250-13	1080 W	0 V to 250 V	0 A to 13.5 A
2260B-800-4	1080 W	0 V to 800 V	0 A to 4.32 A

Complete documentation for the Series 2260B power supplies can be downloaded at tek.com/keithley.

The 2260B documentation includes:

- **Quick Start Guide:** This document. It provides unpacking instructions, describes basic connections, reviews basic operation information, and provides a quick test procedure to ensure the instrument is operational.
- **User Manual:** This manual provides installation information, front and rear panel descriptions, basic operation instructions, configuration instructions, and maintenance information.
- **Programming Manual:** Provides information about remote control, troubleshooting, and the programming commands of the instrument.

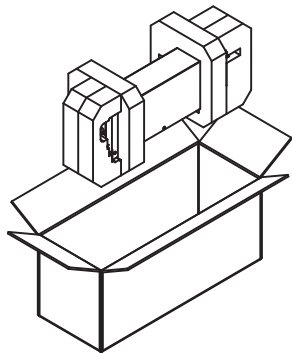
Software for the 2260B power supplies is also available for download from tek.com/keithley. You can search for the specific software you need. Available software includes:

- **Keithley KickStart Instrument Control Software:** Lets you start making measurements in minutes without complex instrument programming. Free 30-day trial.
- **LabVIEW™ Software drivers:** Drivers to communicate with National Instruments LabView Software.
- **Keithley I/O layer:** Manages communications between Keithley instrument drivers and software applications and the instrument.

Unpack and inspect the instrument

To unpack and inspect the instrument:

1. Inspect the box for damage.
2. Open the top of the box.
3. Remove the documentation and accessories.
4. Carefully lift the instrument out of the box.



5. Inspect the instrument for any obvious signs of physical damage. Report any damage to the shipping agent immediately.

You should have received:

- 2260B power supply
- Basic accessory kit
- Test lead set
- USB cable
- Power cord
- Certificate of Traceable Calibration
- Safety Precautions (document number 0713411xx)
- Software and Documentation Downloads (document number 0713527xx)

Connect the instrument

Important test system safety information

This product is sold as a stand-alone instrument that may become part of a system that could contain hazardous voltages and energy sources. It is the responsibility of the test system designer, integrator, installer, maintenance personnel, and service personnel to make sure the system is safe during use and is operating properly.

You must also realize that in many test systems a single fault, such as a software error, may output hazardous signal levels even when the system indicates that there is no hazard present.

It is important that you consider the following factors in your system design and use:

- The international safety standard IEC 61010-1 defines voltages as hazardous if they exceed $30 V_{RMS}$ and $42.4 V_{PEAK}$ or 60 V DC for equipment rated for dry locations. Keithley Instruments products are only rated for dry locations.
- Read and comply with the specifications of all instruments in the system. The overall allowed signal levels may be constrained by the lowest rated instrument in the system. For example, if you are using a 500 V power supply with a 300 V DC rated switch, the maximum allowed voltage in the system is 300 V DC.
- Cover the device under test (DUT) to protect the operator from flying debris in the event of a system or DUT failure.
- Make sure any test fixture connected to the system protects the operator from contact with hazardous voltages, hot surfaces, and sharp objects. Use shields, barriers, insulation, and safety interlocks to accomplish this.
- Double-insulate all electrical connections that an operator can touch. Double insulation ensures the operator is still protected even if one insulation layer fails. Refer to IEC 61010-1 for specific requirements.
- Make sure all connections are behind a locked cabinet door or other barrier. This protects the system operator from accidentally removing a connection by hand and exposing hazardous voltages. Use high-reliability fail-safe interlock switches to disconnect power sources when a test fixture cover is opened.
- Where possible, use automatic handlers so that operators are not required to access the DUT or other potentially hazardous areas.
- Provide training to all users of the system so that they understand all potential hazards and know how to protect themselves from injury.
- In many systems, during power up, the outputs may be in an unknown state until they are properly initialized. Make sure the design can tolerate this situation without causing operator injury or hardware damage.

NOTE

To keep users safe, always read and follow all safety warnings provided with each of the instruments in your system.

Install the filter

A filter must be inserted under the control panel before operation. The filter must be inserted for all models. The filter should be replaced at least two times a year to maintain performance and prevent overheating.

To install the filter:

1. Locate the open area below the front panel.
2. Insert the filter in the open area.

Install the instrument

You can use the 2260B on a bench.

To prevent damaging heat build-up and ensure specified performance, make sure there is adequate ventilation and airflow around the instrument to ensure proper cooling. Do not cover the fan on the rear panel of the power supply.

Position the instrument so that it is easy to reach any disconnecting devices, such as the power cord and the power switch.

Refer to the *Series 2260B User's Manual* for dimensions.

Connect line power

The 2260B operates from a line voltage of 100 V to 240 V at 50 Hz or 60 Hz. Make sure the operating voltage in your area is compatible.

WARNING

The power cord supplied with the 2260B contains a separate protective earth (safety ground) wire for use with grounded outlets. When proper connections are made, the instrument chassis is connected to power-line ground through the ground wire in the power cord. In the event of a failure, not using a properly grounded protective earth and grounded outlet may result in personal injury or death due to electric shock.

WARNING

Do not replace detachable mains supply cords with inadequately rated cords. Failure to use properly rated cords may result in personal injury or death due to electric shock.

CAUTION

Operating the instrument on an incorrect line voltage may cause damage to the instrument, possibly voiding the warranty.

Line voltage connection for 360 W and 720 W models

To connect the power cord on 360 W or 720 W models:

1. Connect the socket of the supplied power cord to the AC receptacle on the rear panel.
2. Connect the plug of the power cord to a grounded AC outlet.

Line voltage connection for 1080 W models

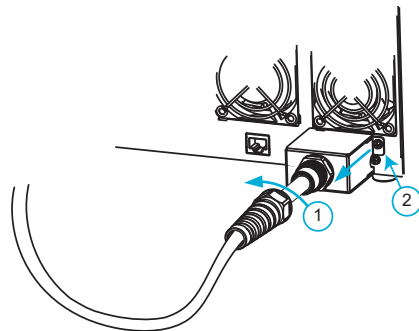
The 1080 W models (2260B-30-108, -80-40, -250-13, and -800-4) use a universal power input that can be used with 100 V AC or 200 V AC systems. To connect or replace the power cord, use the following procedure.

WARNING

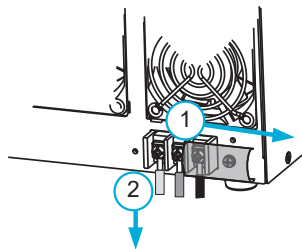
The following information is intended for qualified service personnel only, as described by the types of product users in the Safety Precautions. Do not attempt to perform this procedure unless you are qualified to do so.

To connect or replace the power cord:

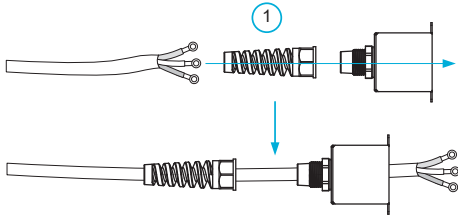
1. Ensure the AC power cord is not connected to power.
2. Turn off the power switch.
3. Unscrew the power cord strain relief, as shown by 1 in the following figure.
4. Remove the two screws (2) that fasten the power cord cover to the 2260B and remove the cover, as shown in the following figure.



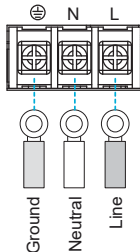
5. Slide the cover (1) off the AC terminals, as shown in the following figure.
6. Remove the AC power cord wires (2), as shown in the following figure.



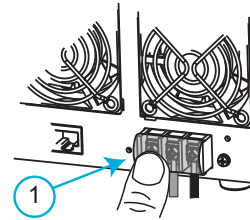
7. Thread the power cord through the strain relief (1) and through the power cord cover, as shown in the following figure.



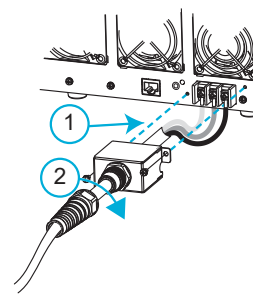
8. Connect the AC power cord wires to the AC input terminals, as shown in the following figure.
- White, blue, or black (India) to Neutral (N).
 - Green or green-yellow to GND (⊥)
 - Black, brown, or red (India) to Line (L).



9. Set the cover (1) over the AC terminals.



10. Screw the power cord cover (1) onto the rear panel using the supplied screws, as shown in the following figure.
11. Screw the strain relief (2) onto the power cord cover, as shown in the following figure.



12. Connect the plug of the power cord to a grounded AC outlet.

Turn on the instrument

CAUTION

The power supply takes approximately eight seconds to turn on and shut down. Wait for the display to turn off completely and allow at least 15 seconds between power cycles. Cycling the power on and off quickly can cause the inrush current limiting circuit to fail and will reduce the working life of the input fuse and power switch.

When the power supply switch is turned on, an inrush current is generated. Ensure there is enough power available for the power supply when turned on, especially if more than one power supply is turned on at the same time.

Turn on the instrument by pressing the front-panel POWER switch to the on position.

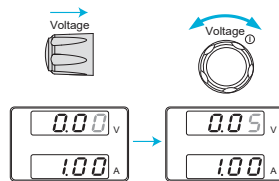
The first time the power supply is turned on, the default settings appear on the display. On subsequent power up, the power supply returns to the state it was in when the power was last turned off.

Setting values

To set parameter values, you use the Voltage and Current knobs on the front panel. You can edit parameter values at 0.01, 0.1, or 1 unit steps. The following example shows how to set a value of 10.05 V. Parameter values are saved automatically.

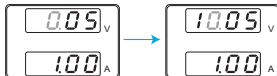
To set the value to 10.05:

1. Press the **Voltage** knob until the last digit is highlighted, as shown in the following figure. This allows the voltage to be edited in 0.01 voltage steps.



2. Turn the **Voltage** knob until 0.05 volts is shown.

3. Press the **Voltage** knob until the ones digit is highlighted, as shown in the following figure.



4. Turn the **Voltage** knob until the voltage value is 10.05.

Setting functions

Functions set operations of the power supply, such as USB control, LAN addresses, and general operation. Changes to functions must be saved by pressing the Voltage key. A complete list of functions is provided in the *Model 2260B User's Manual*.

An example of setting the beeper function is provided in the following example.

To set the beeper function:

1. Press the **Function** key. The Function key lights and the display shows F-01 on the top and the configuration setting for F-01 on the bottom.
2. Turn the **Voltage** knob to select F-10.
3. Turn the **Current** knob to select the beeper setting:
 - Disable the beeper: 0
 - Enable the beeper: 1
4. Press the **Voltage** knob to save the setting. ConF is displayed briefly when save is complete.

Test the instrument

The following test verifies basic operation of the 2260B. In this test, you use the front-panel controls to set overvoltage and overcurrent protection levels, set the constant voltage or constant current mode, and output a voltage or current.


Set the protection level


The 2260B provides the following protection modes:

- **Overvoltage protection (OVP):** Prevents a high voltage from damaging the load.
- **Overcurrent protection (OCP):** Prevents high current from damaging the load.
- **Overtemperature protection (OTP):** Protects the instrument from overheating.
- **Power Switch Trip:** When enabled, automatically shuts down the power supply when OVP, OCP, or OTP is tripped. If the trip function is not available, the instrument shuts off the output.

NOTE

Power Switch Trip is not available on all models. Check the power switch for availability.

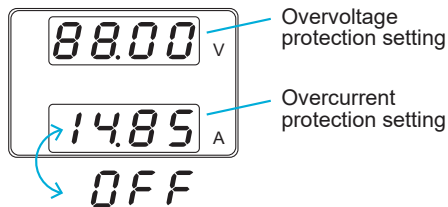
If the power switch looks like this, the trip function is available: 

If the power switch looks like this, the trip function is not available: 

When one of the protection measures is active, **ALM** is shown to the left of the displays.

To set the OVP and OCP levels:

1. Ensure the load is not connected.
2. Ensure the output is set to off.
3. Press the **OVP/OCP** key. The OVP/OCP key lights and the OVP setting is displayed on the top and the OCP setting (or **OFF**) is displayed on the bottom, as shown in the following figure.



4. Use the **Voltage** knob to set the OVP level.
5. Use the **Current** knob to set the OCP level. To set OCP off, turn the knob to the top of the range and select **OFF**.
6. Press the **OVP/OCP** key to exit. The OVP/OCP indicator turns off.

Select CV mode

When the power supply is operating in constant current (CC) mode, a constant current is supplied to the load. In CC mode, the voltage output can vary, but the current remains constant. When the load resistance increases to the point where the set current can no longer be sustained, the power supply switches to current voltage (CV) mode. The point where the power supply switches modes is the crossover point.

When the power supply is operating in CV mode, a constant voltage is supplied to the load. The current varies as the load varies. At the point where the load resistance is too low to maintain a constant voltage, the power supply switches to CC mode and maintains the set current limit.

When the power supply is set to operate in CV mode, you must set a current limit to determine the crossover point. You also set a slew rate.

The 2260B has selectable slew rates for the CC and CV modes. This allows the 2260B power supply to limit the current and voltage draw of the power supply.

You can select one of the following slew rates:

- **High Speed Priority:** Use the fastest slew rate for the instrument.
- **Slew Rate Priority:** Set a slew rate for CC or CV mode. The rising and falling slew rates can be set independently.

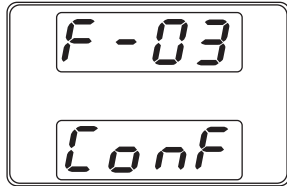
To set the power supply to operate in CV mode:

1. Ensure that the output is off (Output key is not lit).
2. Connect the load.
3. Press the **Function** key. The Function key lights up and the display shows F-01 on the top and the configuration setting for F-01 on the bottom.



4. Turn the **Voltage** knob to select F-03 (V-I Mode Slew Rate Select).

- Turn the Current knob to select the slew rate:
 - CV High Speed Priority: 0**
 - CV Slew Rate Priority: 2**
- Press the **Voltage** knob to save the setting. **ConF** is displayed briefly when save is successful, as shown in the following figure.

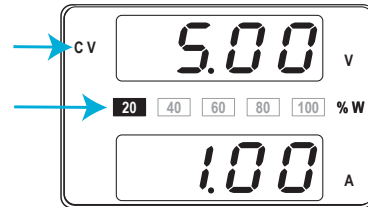


- If CV Slew Rate Priority was selected, set **F-04** (Rising Voltage Slew Rate) and **F-05** (Falling Voltage Slew Rate).
- Press the **Voltage** knob to save the settings.
- Press the **Function** key to exit the configuration settings. The Function key light turns off.
- Use the **Current** and **Voltage** knobs to set the current limit and the voltage.

NOTE

The Set key should illuminate when you set the current or voltage. If the Voltage or Current knobs are unresponsive, press the **Set** key.

- Press the **Output** key. The Output key, CV, and power bar are illuminated, as shown in the following figure.

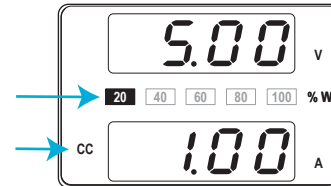
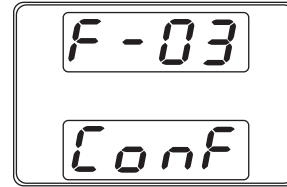


Select CC mode

When the power supply is operating in constant current (CC) mode, you must set a voltage limit to determine the crossover point. You also set a slew rate, either **High Speed Priority** or **Slew Rate Priority**.

To set the CC mode voltage limit and slew rate:

1. Turn the output off.
2. Connect the load.
3. Press the **Function** key. The Function key lights and the display shows F-01 on the top and the configuration setting for F-01 on the bottom.
4. Turn the **Voltage** knob to select F-03 (V-I Mode Slew Rate Select).
5. Turn the **Current** knob to select the slew rate:
 - **CC High Speed Priority: 1**
 - **CC Slew Rate Priority: 3**
6. Press the **Voltage** knob to save the setting. ConF is displayed briefly when save is successful, as shown in the following figure.
7. If CC Slew Rate Priority was selected, set **F-06** (Rising Current Slew Rate) and **F-07** (Falling Current Slew Rate).
8. Save the settings.
9. Press the **Function** key to exit the configuration settings. The Function key light turns off.
10. Use the **Current** and **Voltage** knobs to set the current and the voltage limit.
11. Press the **Output** key. The Output key, power bar, and CC are illuminated, as shown in the following figure.



Display modes

The 2260B power supplies allow you to view the output as:

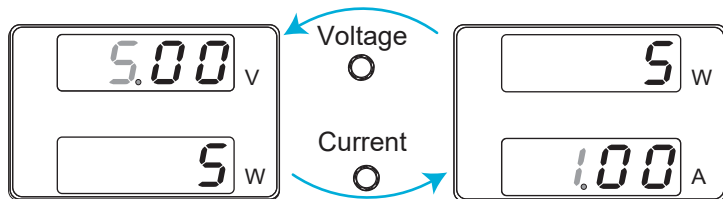
- Voltage and current
- Voltage and power
- Current and power

When **V** and **W** are displayed, you can use the Voltage knob to change the voltage level.

When **A** and **W** are displayed, you can use the Current knob to change the current level.

To change the view of the output:

1. Press the **PWR DSPL** key. The PWR DSPL key lights and the display changes to voltage and power (V and W).
2. To switch between displaying A and W and V and W, press the **Voltage** or **Current** knob. For example, if A and W are displayed, press the Voltage knob to display V and W.



To return to the normal display, press the **PWR DSPL** key. The PWR DSPL key is no longer lit.

FAQs

Where can I find updated drivers or firmware?

For the latest drivers and additional support information, see the Keithley Instruments support website.

To find software and drivers that are available for your instrument:

1. Go to tek.com/product-support.
2. Enter **2260B** and select **SEARCH**.
3. Select **Software**.

Next steps

For more information, refer to the Keithley website, tek.com/keithley, for support and additional information about the instrument, including the *Model 2260B User's Manual* and *Model 2260B Programming Manual*, which provide detailed information about all features of the instrument.



Contact information: 1-800-833-9200

For additional contacts, see [tek.com/contact-tek](https://www.tek.com/contact-tek)

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