

Keysight B2900B Series Precision Source/Measure Unit

B2901BL/B2910BL
B2901B/B2902B
B2911B/B2912B

Quick Reference



Preparing the Instrument for Use

To position the instrument:

1. Grab the handle by the sides and pull outward.
2. Rotate the handle.
3. Position the instrument.

To turn the instrument ON:

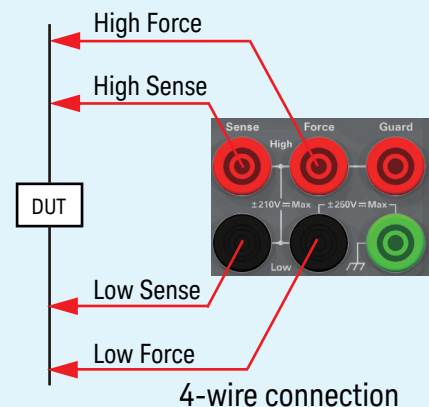
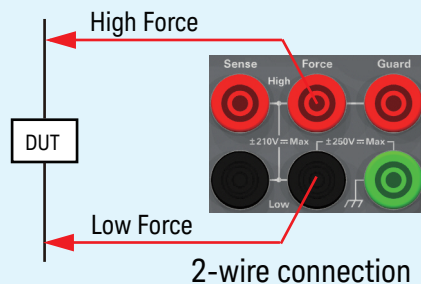
1. Connect the power cord from AC input connector to an AC power outlet at your site.
2. Press the line switch.

To set the power line cycle:

1. Press the More > System > PLC function keys.
2. Press the 50 Hz or 60 Hz key to specify the power line cycle at the site.

To connect the device under test (DUT), optional:

1. B2900 terminals use banana jacks. Prepare test leads that use banana plugs.
2. Connect the test leads as shown in the figures.



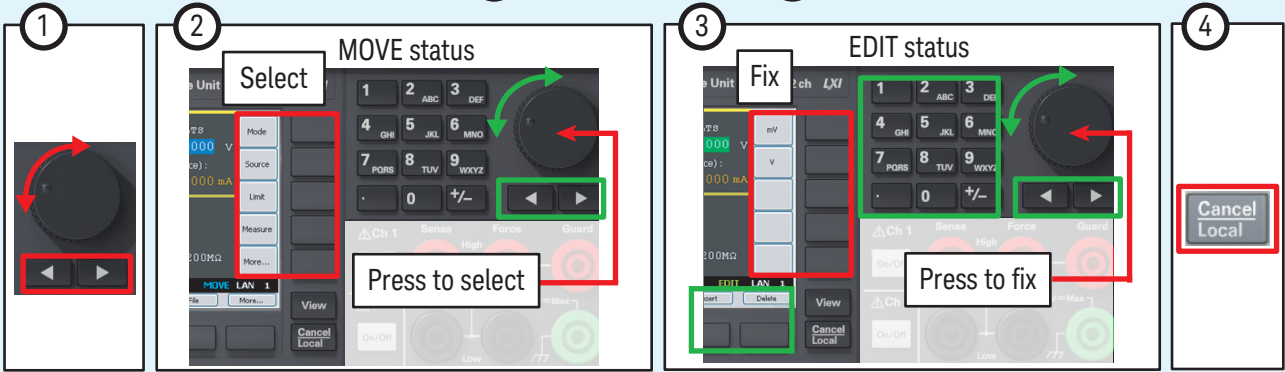
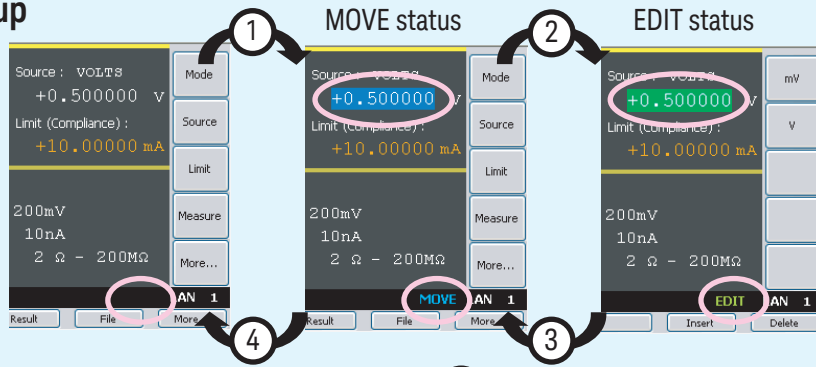
Latest Information

To get the latest firmware, software, manuals, and support information, go to www.keysight.com. You can then search them by product number.



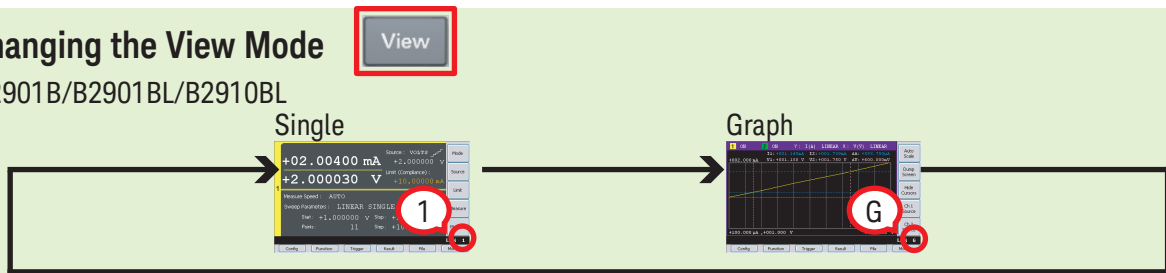
1. Line switch: Turns the instrument on or off.
2. USB-A connector: Used to connect a USB memory.
3. Auto key: Starts a repeat measurement or aborts the repeat measurement.
4. Trigger key: Starts a single measurement, aborts a repeat measurement, or initiates trigger system.
5. Assist keys: Five keys for setup assistance. Mode, Source, Limit, Measure, More, etc.
6. Numeric/alpha keys: Used to enter the value of setup parameters specified by the field pointer.
7. Rotary knob:
 - In MOVE (blue) status: Turning it moves the field pointer. Pressing it fixes the pointer position.
 - In EDIT (green) status: Turning it changes the field pointer parameter value. Pressing it fixes the value.
8. Left and right keys:
 - In MOVE (blue) status: Moves the field pointer.
 - In EDIT (green) status: Changes the field pointer parameter value. If the field pointer is on a numeric value entry field, pressing the key changes the pointer to a digit pointer.
9. Channel 1 terminals: High Force, Low Force, High Sense, Low Sense, Guard, and chassis ground
10. On/Off switch(es): Used to enable or disable the channel. Turns the channel off if it is in the output status even if it is in the remote status. Two switches on 2-channel models. The switch turns green if the channel is enabled. The switch turns red if the channel is in the high voltage state.
11. View key: Changes the display mode.
12. Cancel/Local key:
 - Cancels the setup operation if the instrument is in the local status.
 - Returns the instrument to the local status if it is in the remote status.
13. Function keys: Six keys for detail setup of several functions. Config, Function, Trigger, Result, File, Program, I/O, System, and More.
14. Channel 2 terminals: Only on 2-channel models.
15. GPIB interface connector: Connects to GPIB interface of an external computer or equipment.
16. USB-B connector: Connects to USB interface.
17. LAN interface connector: Connects to 10/100 Base-T interface. Left LED indicates activity. Right LED indicates link integrity.
18. Digital I/O connector: D-sub 25 pin female connector for general purpose I/O (GPIO). For trigger input/output, interface to a handler, interface to an interlock circuit, etc. If the interlock terminals are open, the instrument output is limited to ± 42 V.
19. AC input connector: AC power cord is connected to this receptacle.

Editing the Setup

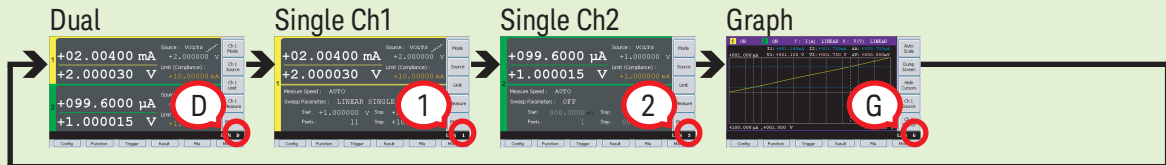


Changing the View Mode

B2901B/B2901BL/B2910BL



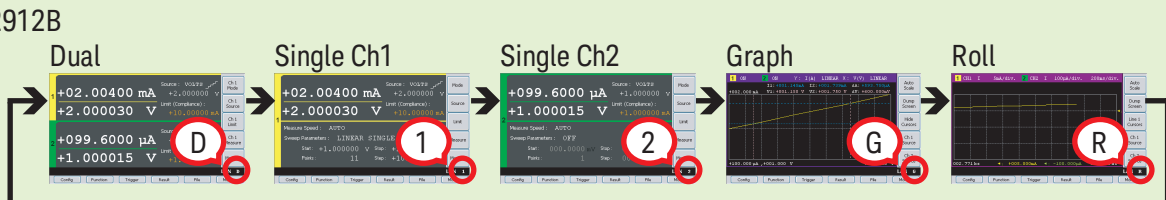
B2902B



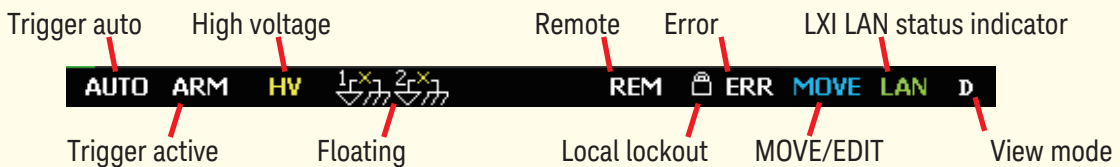
B2911B



B2912B



Status Information

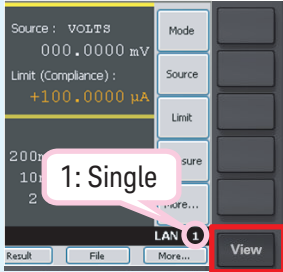


Applying DC Output

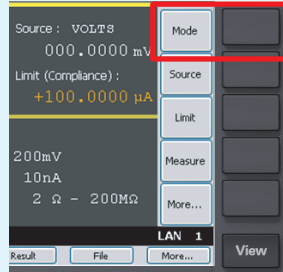
B2900 applies a constant voltage of +500 mV by the following procedure.

1. Set the source mode and the Source value.

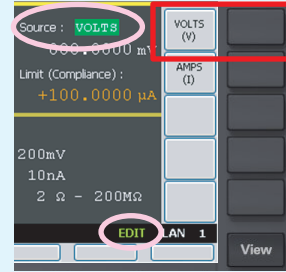
a. Press the View key to display the Single view.



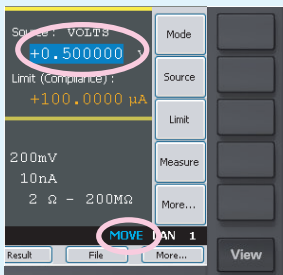
b. Press the Mode assist key.



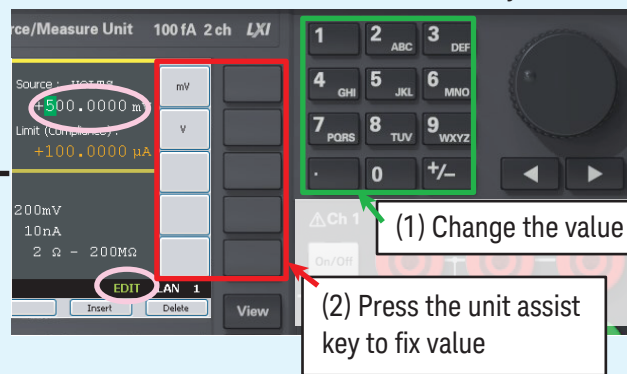
c. Press the VOLTS (V) assist key.



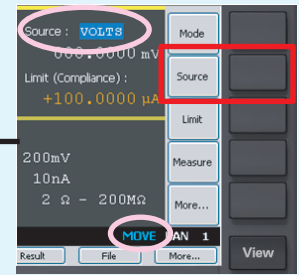
Source is set to +500 mV.



e. Edit the value as follows or in the same way as for 2-b.

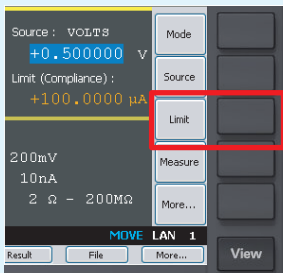


d. Press the Source assist key.

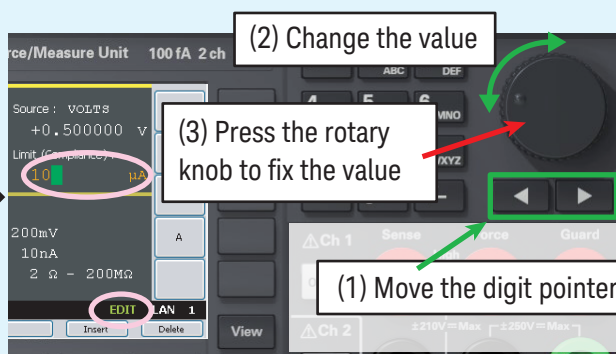


2 Set the Limit value.

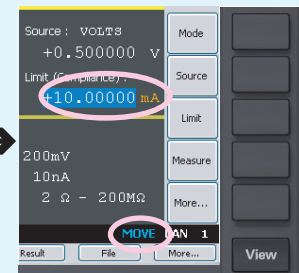
a. Press the Limit assist key.



b. Edit the value as follows or in the same way as for 1-e.



Limit value is set to +10 mA.



3. Press the Ch1 switch to enable channel 1. This turns the switch green. Channel 1 starts applying the voltage specified by the Source value. Changing the setup changes channel output immediately.

Performing Measurement

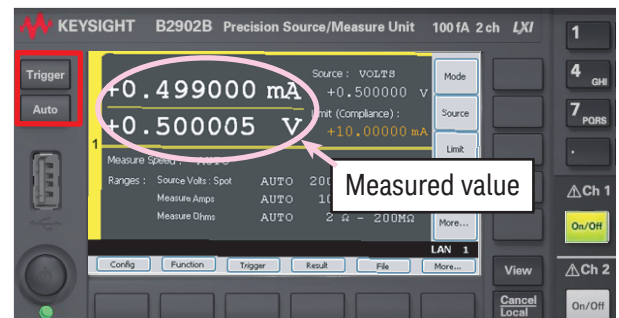
Press to start a single measurement.

Press to start a repeat measurement.

* You can change the measurement parameter by using the Measure assist key.

Disabling the Channel

Press the Ch1 switch to disable channel 1. This turns off the switch light.



This is the measurement example for a 1 kΩ resistor.

Performing Sweep Measurements

B2900 applies a staircase sweep voltage and measures the current at each step voltage by the following procedure.

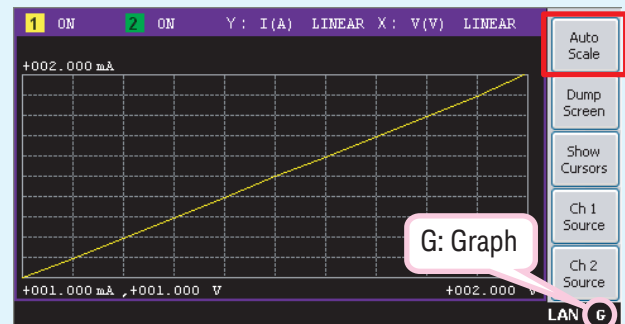
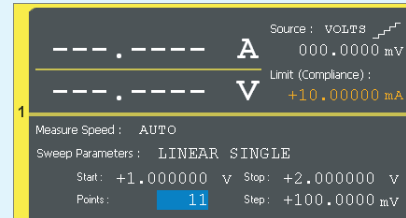
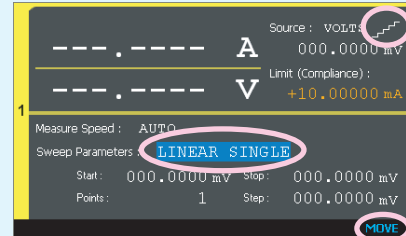
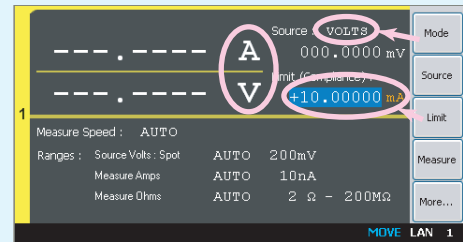
- Press the **View** key to display the Single view.
- Set the Source mode, Limit value, and measurement mode as shown in "Applying DC Output".
- Set the sweep parameters.
 - Press the **More...** More assist key to change the assist keys.
 - Press the **Show Sweep** Show Sweep assist key to display the Sweep setup parameters.
 - Press the rotary knob to change the pointer status to EDIT (green).
 - Press the **LINEAR SINGLE** LINEAR SINGLE assist key to set the linear single sweep mode.

The source shape indicator shows the staircase icon, and the status changes to MOVE (blue).
 - Use the rotary knob, arrow keys, or numeric/alpha keys to set the Start (sweep start), Stop (sweep stop), and Step (sweep step) or Points (number of sweep steps) values.
- Press the **View** key to display the Graph view.
- Press the Ch1 **On/Off** switch to enable channel 1. This turns the switch green.

Channel 1 starts applying the voltage specified by the Source value.
- Press the **Trigger** key to start a single sweep measurement.

The measurement results will be displayed on the graph.
- Press the **Auto Scale** Auto Scale assist key to fit the trace in the graph scale.
- Press the Ch1 **On/Off** switch to disable channel 1.

This turns off the switch light.



This is the measurement example for a 1 kW resistor.

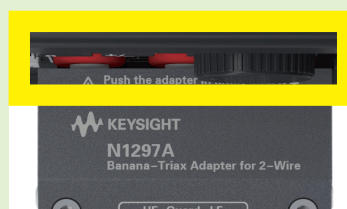
Performing Low Current Measurements

For performing low current measurements accurately, use the triaxial cable. It can reduce the affect of leakage current, external noise, and such caused by the extended measurement path. For using the triaxial cables, the Keysight N1297A/N1297B banana to triaxial adapter is required. This adapter can convert the B2900 source/measure terminals to the triaxial connectors.

Note for attaching the adapter on the B2900 terminals: Push the adapter in firmly until it locks in-place (< 1 mm spacing). If there is some space as shown in "Bad connection", the contact is not enough.



N1297A

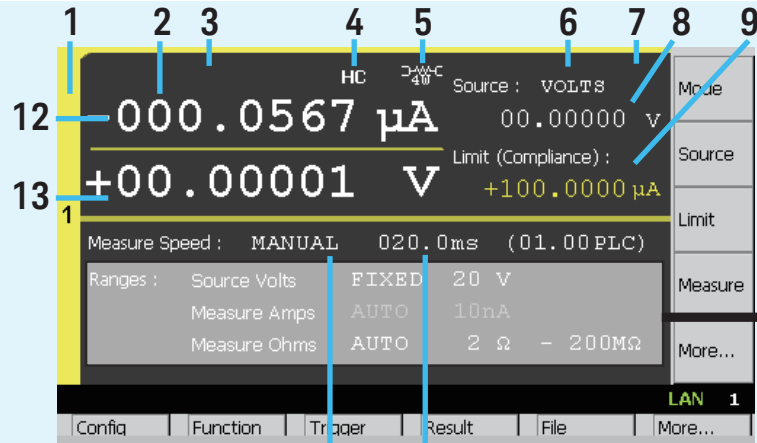


Good connection (no space)



Bad connection

Single View



1. Channel number. 1 or 2.
2. Latest measurement data
3. Over voltage/current status indicator (OV or OC)
4. High capacitance mode indicator (HC)
5. Remote sensing (4-wire connection) status indicator
6. Source function. VOLTS or AMPS.
7. Source shape indicator. DC, pulse, sweep, or pulsed sweep. DC does not show the indicator.
8. Source output value, 5½ digit resolution on B2901B/B2902B/B2901BL/B2910BL, and 6½ digit resolution on B2911B/B2912B
9. Limit (Compliance) value
10. Measurement speed. AUTO, SHORT, MEDIUM, NORMAL, LONG, or MANUAL.
11. Aperture time in seconds or PLC (power line cycle, number of power line cycles per measurement).
Only for the MANUAL speed.
12. Primary measurement data
13. Secondary measurement data or limit test result Pass or Fail

Range Setup

Ranges :	Source Volts : Spot	AUTO	200mV
	Measure Amps	AUTO	10nA
	Measure Ohms	AUTO	2 Ω - 200MΩ

Source Volts: Spot	Constant voltage output range
Measure Amps	Current measurement range
Source Amps: Spot	Constant current output range
Measure Volts	Voltage measurement range
Measure Ohms	Resistance measurement range

Sweep Setup (More > Show Sweep)

Sweep Parameters :	LINEAR SINGLE		
Start :	000.0000 mV	Stop :	+1.500000 V
Points :	101	Step :	+015.0000 mV

Sweep Parameters	Sweep mode. LINEAR SINGLE, LINEAR DOUBLE, LOG SINGLE, or LOG DOUBLE
Start	Sweep start value
Stop	Sweep stop value
Points	Number of sweep steps
Step	Sweep step value

Pulse Setup (More > Show Pulse)

Pulse :	ON	Peak :	+05.00000 V
		Delay :	001.2000 ms
		Width :	025.0000 ms

Pulse	Pulse output ON or OFF
Peak	Pulse peak value
Delay	Pulse delay time
Width	Pulse width
	Pulse base value is the same as the Source output value.

(Available for B2901B/B2902B/B2911B/B2912B)

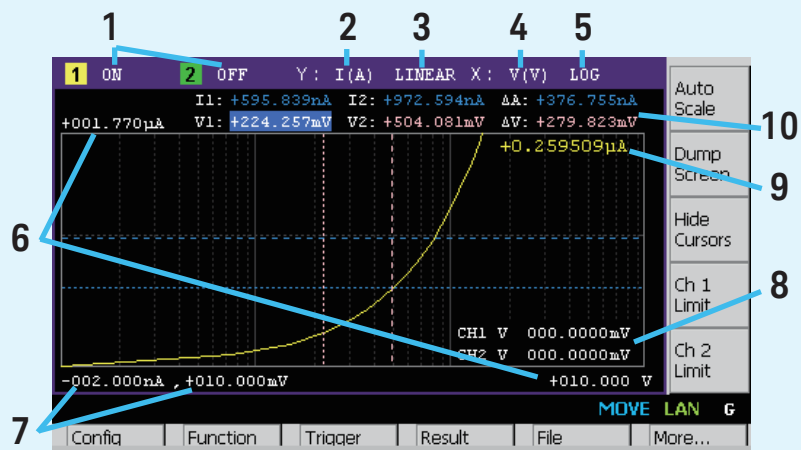
Trigger Setup (More > Show Trigger)

Trigger :	MANUAL	Source	Measure
	Count :	1	1
	Delay :	0.000 μs	0.000 μs
	Period :	0.000 μs	0.000 μs
	Trigger :	AUTO	AUTO

Trigger	Trigger type. AUTO, SYNC, TIMER, or MANUAL
Count	Trigger count (number of triggers)
Delay	Trigger delay time
Period	Trigger period
Trigger	Trigger source. AUTO, BUS, TIMER, INTn (n=1 or 2), LAN, or EXTm (m=1 to 14)

Graph View

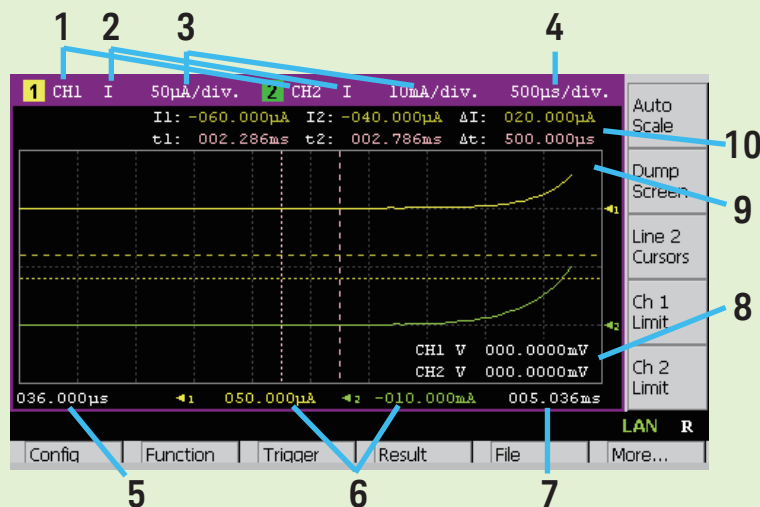
Displays the graph for plotting the channel 1 and/or 2 measurement or math result.



1. Graph display status ON or OFF. Only on 2-channel models. [n] is for channel n.
2. Y-axis data type I (A), V (V), R (Ω), P (W), or MATH
3. Y-axis scale LINEAR or LOG
4. X-axis data type I (A), V (V), R (Ω), P (W), MATH, t (s), V1, or V2
5. X-axis scale LINEAR or LOG
6. Graph maximum value
7. Graph minimum value
8. Channel 1 and/or 2 source output value, limit value, or none (controlled by the Ch n Source, Ch n Limit, or Hide Ch n assist key)
9. Channel 1 and/or 2 Y-axis data at the active X-cursor position. ----.---- is displayed for the no-data position.
10. Cursor data (controlled by the Show Cursors or Hide Cursors assist key)
 - First line Positions and distance (e.g. I1, I2, ΔA) of Y-cursors 1 and 2
 - Second line Positions and distance (e.g. t1, t2, Δt) of X-cursors 1 and 2

Roll View

Displays the time domain graph for plotting the channel 1 and/or 2 measurement data.
(Only on B2911B/B2912B)

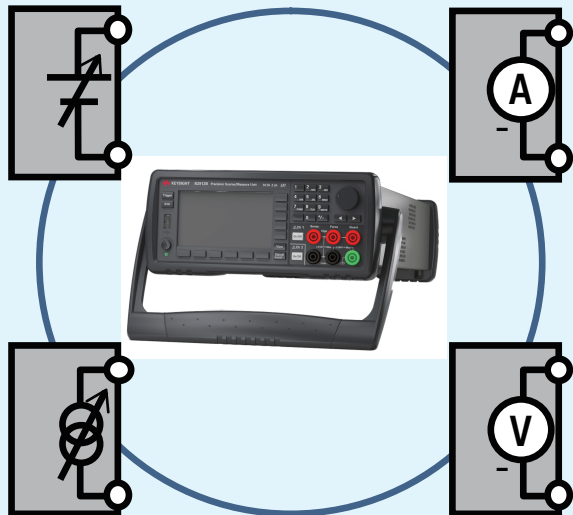


1. Displays status ON or OFF, on B2911B
Displays status Ch 1, Ch 2, or OFF, on B2912B
Two lines can be displayed on the graph. [1] indicates the graph setup for line 1. [2] indicates the graph setup for line 2.
2. Y-axis data type I, V, R, or P.
3. Y-axis scale per division A/div., V/div., Ω /div., or W/div.
4. X-axis scale per division s/div.
5. X-axis minimum value (minimum timestamp)
6. Y-axis offset values for line 1 and 2
7. X-axis maximum value (maximum timestamp)
8. See Graph View.
9. See Graph View.
10. See Graph View.

What is the B2900 SMU?

Voltage source

Current meter



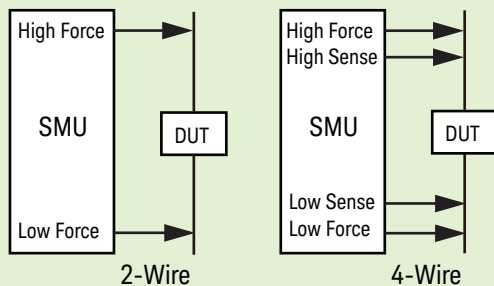
Current source

Voltage meter

An SMU combines the capabilities of a current source, a voltage source, a current meter, and a voltage meter along with the capability to switch easily between these various functions into a single instrument. This gives it the ability to evaluate the IV characteristics of devices across all four measurement quadrants without the need for any additional equipment.

In addition to its DC operation mode, B2901B/B2902B/B2911B/B2912B also have the ability to perform pulsed measurements in order to prevent device self-heating from distorting the measurement results.

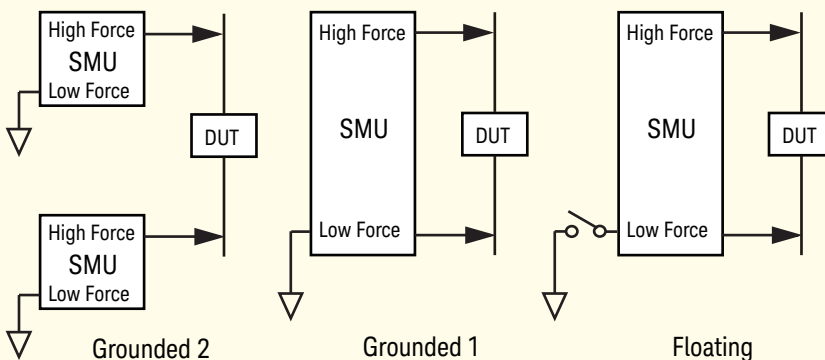
2-Wire and 4-Wire Connections



To simplify the connections, use 2-wire connection by connecting the Force terminals only and opening the Sense terminals.

For low resistance measurements and high current measurements, use 4-wire connection. Connecting the Force and Sense lines together at the terminal of the DUT minimizes the measurement error caused by the residual resistance of the test leads or cables.

Grounded and Floating Measurements



With the default setting, Low Force terminal is connected to the chassis ground. However, it can be disconnected from the ground for floating measurements. This setup is effective for differential voltage measurements which usually require two channels as shown in the Grounded 2 connection.

For the floating measurements, set the Low Terminal State to FLOATING on the Output Connection dialog box. With the default setting, it is set to GROUNDED. The dialog box is opened by pressing the Config > Source > Connection function keys. With the FLOATING setting, the Low Force and Low Sense terminals can be connected to the maximum of ± 250 V.

WARNING: Potentially hazardous voltages of up to ± 250 V may be present at the Low Force and Low Sense terminals. To prevent electrical shock, use accessories that comply with IEC 61010-031. The terminals and the extended conductors must be isolated by using insulation caps, sleeves, etc.