

Quick Start Guide

Measure Ready[®]

155 Precision Current Voltage Source



Safety Precautions

Observe these general safety precautions during all phases of instrument operation, service, and repair. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended instrument use. Lake Shore Cryotronics, Inc. assumes no liability for Customer failure to comply with these requirements.

The MeasureReady® 155 protects the operator and surrounding area from electric shock or burn, mechanical hazards, excessive temperature, and spread of fire from the instrument. Environmental conditions outside of the conditions below may pose a hazard to the operator and surrounding area.

- Indoor use
- Altitude to 2000 m
- Temperature for safe operation: 5 °C to 40 °C
- Maximum relative humidity: 80% for temperature up to 31 °C decreasing linearly to 50% at 40 °C
- Power supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage
- Overvoltage category II
- Pollution degree 2
- Mains fluctuations up to $\pm 10\%$

Ground the Instrument

To minimize shock hazard, the instrument is equipped with a 3-conductor AC power cable. Plug the power cable into an approved 3-contact electrical outlet or use a 3-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet Underwriters Laboratories (UL) and International Electrotechnical Commission (IEC) safety standards.

Ventilation

The instrument has ventilation holes in its side covers. Do not block these holes when the instrument is operating.

Do Not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Keep Away from Live Circuits

Operating personnel must not remove instrument covers. Refer component replacement and internal adjustments to qualified maintenance personnel. Do not replace components with power cable connected. To avoid injuries, always disconnect power and discharge circuits before touching them. Do not position the instrument so that it is difficult to disconnect the power cord.

Do Not Substitute Parts or Modify Instrument

Do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to an authorized Lake Shore Cryotronics, Inc. representative for service and repair to ensure that safety features are maintained. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Cleaning

Do not submerge instrument. Clean only with a damp cloth and mild detergent. Exterior only.

Desktop Installation

When installing the instrument in a desktop environment, ensure it is mounted on a flat, level surface.

Improper Use

If the instrument is used in a manner that is not specified by Lake Shore, the safety protections provided by the instrument are no longer guaranteed, and may be impaired.

Child Safety

This equipment is not suitable for use in locations where children are likely to be present.

 Direct current (power line)

 Alternating current (power line)

 Alternating or direct current (power line)

 Three-phase alternating current (power line)

 Earth (ground) terminal

 Protective conductor terminal

 Frame or chassis terminal

 On (supply)

 Off (supply)

 Equipment protected throughout by double insulation or reinforces insulation (equivalent to Class II of IEC 536—see Annex H)

 CAUTION: High voltages; danger of electric shock; background color: yellow; symbol and outline: black

 CAUTION or WARNING: See instrument documentation; background color: yellow; symbol and outline: black

Key specifications

Safety interlock

2-pin phoenix connector, maximum 10 Ω external circuit impedance

Ambient temperature

10 °C to 35 °C at rated accuracy; 5 °C to 40 °C at reduced accuracy

Power requirement

100 V to 240 V (universal input), 50 Hz or 60 Hz, 30 VA

Size

217 mm wide \times 87 mm high \times 369 mm deep
(8.5 in \times 3.4 in \times 14.5 in), half rack

Weight

3.2 kg (7 lb)

Approvals

See <https://www.lakeshore.com/compliance>

NOTE: Not all specifications are listed. For full specifications, see <https://www.lakeshore.com/155/>

Introduction

This guide provides basic information for getting started with your MeasureReady® 155 precision current voltage source. For further documentation and information, see our website.

Items included with the MeasureReady® 155 source:

- MeasureReady® 155 instrument
- Accessory kit:
 - USB-A to USB-C adapter
 - 2 terminal block mating connectors (6-pin), used for digital I/O and grounding connections
 - 2-pin interlock connector
- 1 line power cord

Unpacking

1. Inspect all items for both visible and hidden damage that occurred during shipment. If there is visible damage to the contents, contact the shipping company and Lake Shore immediately.
NOTE: Procedures vary with shipping companies. Keep all damaged shipping materials and contents until instructed to either return or discard them.
2. Keep the container and shipping materials until all contents have been accounted for.
3. Check off each item on the packing list as it is unpacked.

Features

The MeasureReady 155 precision current voltage source includes features such as:

- Low RMS noise: from 200 nV (10 mV)/7 pA (1 μ A)
- Bipolar, 4-quadrant power source
- DC and AC modes supported up to 100 kHz (MeasureReady® 155-AC)
- Full scale ranges:
Voltage: 10 mV to 100 V , Current: 1 μ A to 100 mA
- 0.001% programming resolution (from 100 nV/10 pA)
- Manual and autorange function
- Front and rear input connectors
- Touchscreen user interface
- Remote connectivity via USB and GPIB adapter
- 3-year standard warranty

Front panel



The front panel consists of:

1. Power button
 2. TiltView™ touchscreen
- Four safety banana connectors:
3. Guard
 4. Output High
 5. Output Low
 6. Chassis ground

Rear panel

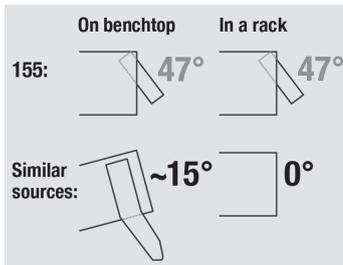
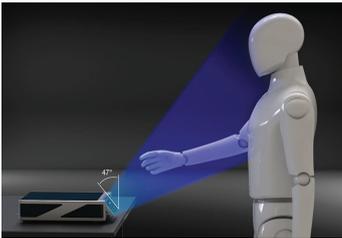


The rear panel consists of:

1. Triax output connector
2. BNC output connector
3. Safety interlock terminal block connector: must be connected with pins shorted for 155 source for output voltages greater than 10 V.
4. In-phase reference output connector
5. TTL digital IO port
6. RJ-45 Ethernet interface
7. USB communications interface
8. USB Type-C™ interface
9. Line input assembly

Placement

The MeasureReady 155 is an out-of-the-box benchtop instrument with an adjustable TiltView™ screen for an improved viewing angle. The screen adjusts from a 0° to a 47° viewing angle, whether mounted in a rack or on a bench top.



Rack mounting

The teslameter can be installed into a half rack or dual half rack mount using the optional Lake Shore rack mount kits. The kits contain the necessary parts to mount one instrument with the provided blank, or two instruments side by side in a rack mount space, 483 mm (19 in) wide by 88.9 mm (3.5 in) high. See <http://www.lakeshore.com/rack-kit/> for full details.

NOTE: Ensure that there is 1 in (25 mm) clearance on both sides of the instrument after rack mounting.

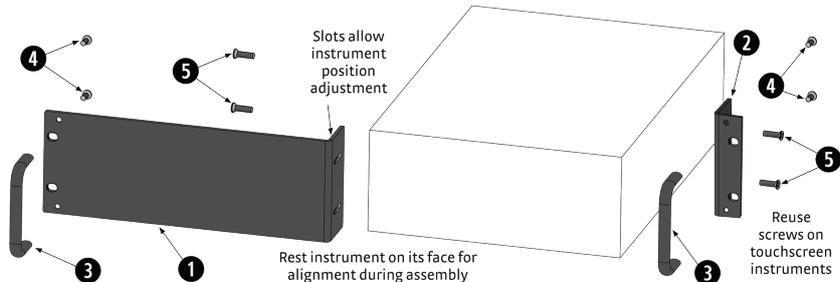
Item	Description	Qty
❶	Rack mount panel	1
❷	Rack mount ear	1
❸	Rack handles	2
❹	Screw, 8-32 × 0.38 in FHM Phillips	4
❺	Screw, M4 × 16 mm FHM Phillips (original touchscreen instrument screws) -- OR --	4
	Screw, 6-32 × 0.5 in FHM Phillips	4

1. Remove instrument feet.
2. Attach the rack handles to the rack mount panel ❶ and rack mount ear ❷ using the supplied 8-32 screws ❹.
3. For dark blue touchscreen instruments:

Remove the front screws from the side panels and use M4 screws to attach the rack mount ear.

For beige keypad instruments:

- a. Remove the front screws from the sides of the instrument and retain for future use, if the rack kit is ever removed.
- b. Use the 6-32 screws ❺ to attach the rack mount ear.



Connections and Installation

The MeasureReady® 155 includes a 3-conductor power cord that mates with the IEC 320-C14 line cord receptacle. Line voltage is present on the two outside conductors and the center conductor is a safety ground. The safety ground attaches to the instrument chassis and protects the user in case of a component failure.

WARNING: Always plug the power cord into an easily accessible, properly grounded receptacle to ensure safe instrument operation.

WARNING: Position the 155 source in such a way to enable easy access to the disconnecting device. Failure to comply could result in death or injury to personnel.

NOTE: If the power supply cord is damaged or lost, it must be replaced. Contact Lake Shore for a replacement to ensure proper voltage, current and type of cord. The power supply cord must not exceed 3 m (10 ft) in length.

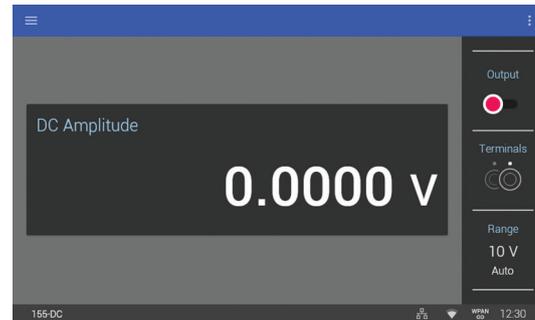
Startup

Follow these steps to excite your load under test.

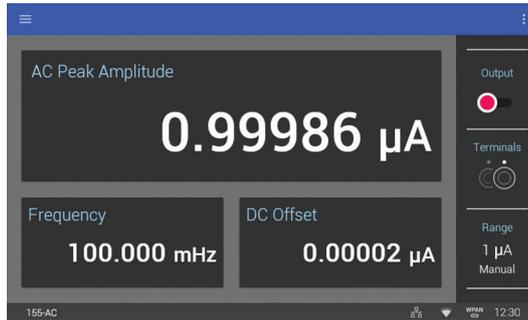
Connection

Make the following connections to the MeasureReady 155:

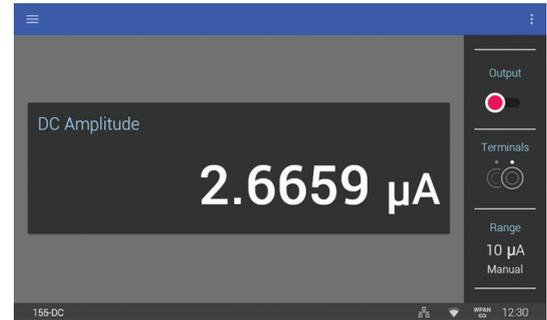
1. Attach the load under test to the banana cables on the front panel, or to the BNC or triax connectors on the rear panel.
2. Plug in the 155 using the supplied power cord. The 155 will begin its power-up sequence. After the sequence is complete (this may take approximately 45 seconds during initial operation), the default screen is displayed.



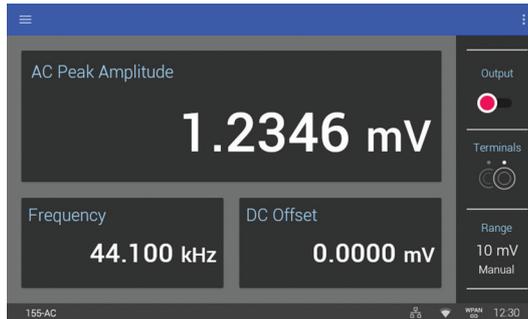
Displays



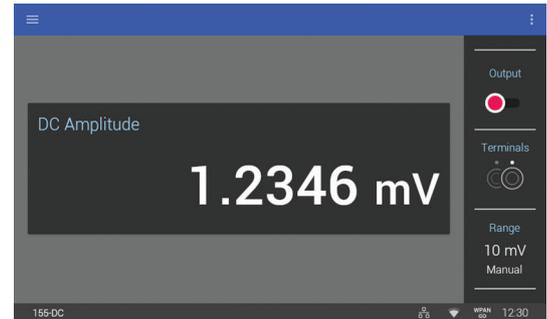
Current AC display



Current DC display



Voltage AC display



Voltage DC display

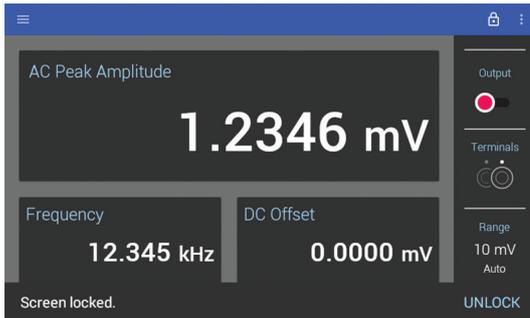
Basic operation

Default screen

Output enable/disable, Terminals and Range are always displayed on the right side of the screen. Tap any of these options to configure the settings.

Screen lock

Tap the Action icon  to lock the screen to prevent accidental changes to parameter values.



Navigation drawer

Tap the Settings menu  to go to the navigation drawer to adjust settings.

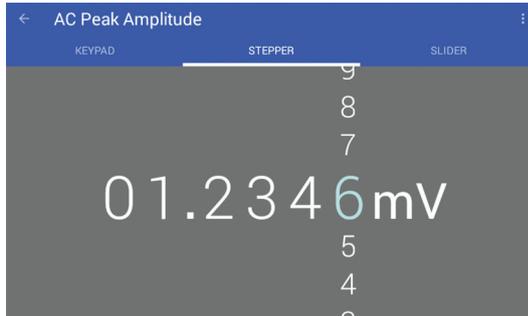
- Output settings: Includes settings for Terminals, Excitation mode, Source shape, Range, Output limit and Current limit.
- System settings: Use this screen to adjust settings for the MeasureReady 155, including Display and sound, Date and time, Privacy, and Interface settings.

On each screen, settings can be adjusted using three types of functions (functions vary by screen):

- Keypad: Use the keypad to type a number when you know the exact value you wish to use.



- Stepper: Use the stepper function to fine tune a value by swiping up or down to change it.



- Slider: Use the slider for larger adjustments. Use the quick access points below the slider to move quickly to the minimum and maximum values.

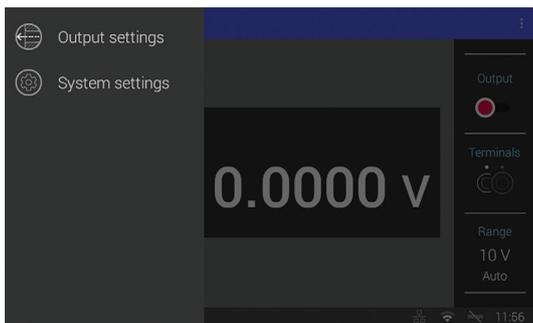


NOTE: If your adjustments are outside the available limits, a message will appear along with a link to the appropriate screen to make a change.

Basic voltage and current operation

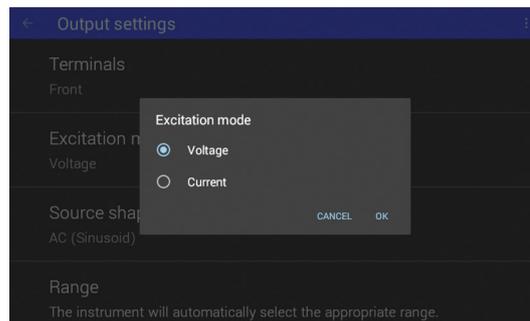
The steps below demonstrate how to set up a basic AC voltage operation.

1. Tap the Settings menu (top left corner of the screen) to go to the navigation drawer.

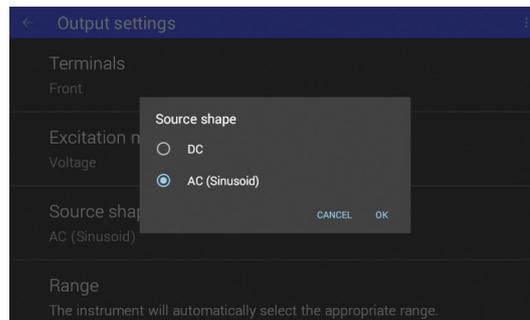


2. Tap **Output settings**.
3. On the Output settings screen, choose **Excitation mode**.

4. Tap the **Voltage** radio button, and then tap **OK**.

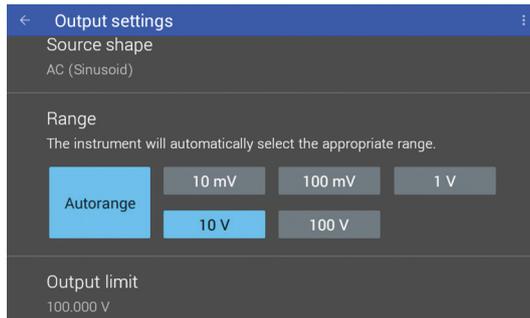


5. On the Output settings screen, choose **Source shape**.
6. Tap the **AC** radio button, and then tap **OK**.

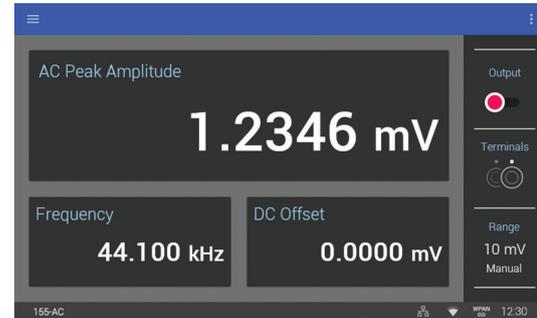


7. On the Output settings screen, select the **Range** you wish to use.

NOTE: Autorange is the default setting. Autorange will automatically select the appropriate range based on output amplitude and offset.



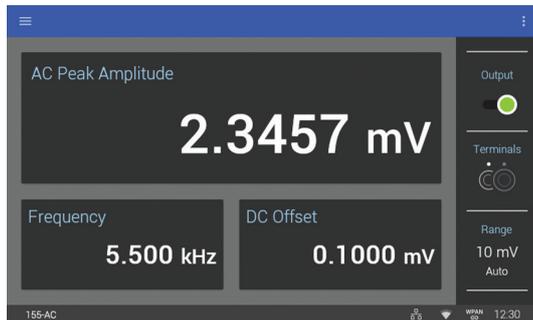
8. On the Home screen, touch a setting section of the screen (card) to change its value.



9. Settings can be adjusted using any of the three types of functions, Keypad, Stepper or Slider.



10. To turn on the output, touch the **Output** enable switch. The switch is green when it is enabled.



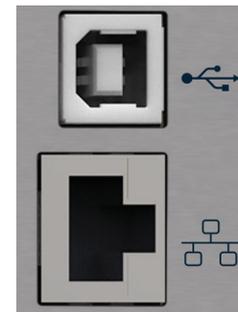
Computer interface connections

If desired, attach the MeasureReady 155 to your PC using Ethernet or USB.

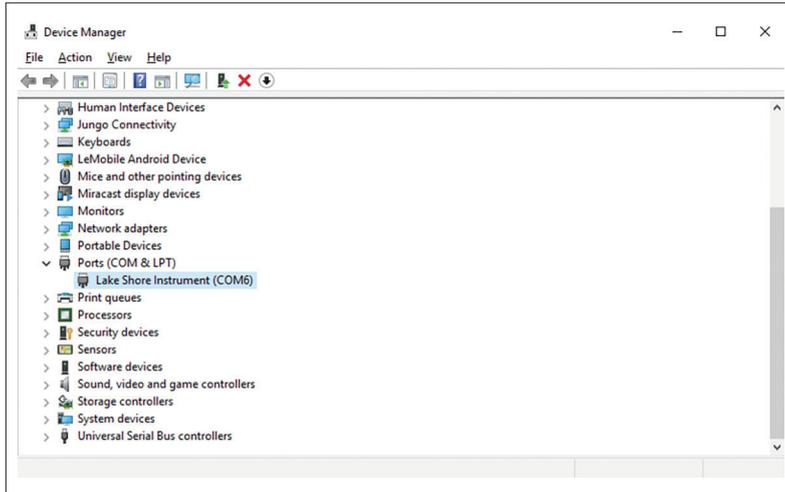
GPIB is also available for remote interface capability via an external adapter, which can be purchased from Lake Shore. Visit <https://www.lakeshore.com/products/product-detail/measureready/gpib-adapter/> for more information.

NOTE: In order to use the adapter, the instrument must have operating system version 2.6.4 (or later) installed.

Serial port settings	
Baud rate	115,200
Data bits	8N1
Parity	None
Stop bits	1
Flow control	None



Use the command list (see Chapter 5 of the MeasureReady® user's manual) and your favorite serial terminal program (such as Putty or Termit) to communicate with the MeasureReady 155 via the remote interface. The USB connection will be listed as a virtual COM port on your PC. If you are not able to connect, make sure you have the correct COM port selected. You can do this by checking Device Manager:



If you are unable to see the MeasureReady 155 in this view, you may need to install the USB driver that can be found on the Lake Shore Software web page: <https://www.lakeshore.com/software/>.

Contacting Lake Shore

The Lake Shore Technical Support Department is staffed Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m. EST, excluding holidays and company shut down days: <https://www.lakeshore.com/support/>.

The Lake Shore Forum is also a great place to look for solutions, to post issues, and to share successes: <https://forums.lakeshore.com/>.

For further documentation and information, please see <https://www.lakeshore.com/155/>.

Lake Shore Service

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