

ohmSTAR / ohmSTAR+

Precision Programmable Resistors

The Decade Box on an Ego Trip

OPERATION MANUAL

For firmware 6.1 · Designed, manufactured and supported by Labmetric, Scottsdale, Arizona

[QR: online software guide link]

Using a computer?

See the *ohmSTAR Software Guide*: the Companion app, command line, HTTP API, Python and AI control.

1. What it is

A programmable resistance box. Every value is made by latching mechanical relays and precision fixed resistors, so the circuit inside is fully isolated from the output.

[Product photo]

Feature	What it does
Quick value keys	Four values, A–D, recalled with one touch.
Memories	Ten more values, 0–9.
Current protection	`I set` stops the output going low enough to dissipate more than 1 W.
Knob stepping	Your own step, 1 %, 5 % or 10 % standard values, or ratiometric.
Open key	Mechanically disconnects the output.
Sensor tables	Nine tables. The display shows a temperature or other reading with the resistance.
USB port	Computer control. See the Software Guide.
Field calibration	Recalibrate with a reference ohmmeter.
Battery life	More than a year. The output keeps its value when the box turns off.

2. Quick start

1. **On:** press and release `enter`.
2. **Set your voltage (important):** `I set`, type the voltage your circuit puts across the box, `enter`.
3. **Choose a resistance:** type it and press `enter`, turn the knob, press `A`–`D`, or `rcl` then `0`–`9`.
4. **Connect** the test leads. `open` disconnects the output; press again to reconnect.
5. **Off:** hold `enter` for a little over a second. It stays on while connected to a computer.

3. Keys and controls

Key	Description	How
`0`–`9` `.`	Type a value.	Type it, then `enter`.
`000/(–)`	Typing: × 1000. Before typing: minus sign, for table values such as –40 °C.	`4` `7` `000` `enter` = 47 kΩ.
`←`	Deletes the last character.	
`enter`	On, and accepts a typed value.	Press to turn on. Hold to turn off.
Knob	Steps the value up or down.	See section 4.
`A`–`D`	Quick values.	One touch recall.
`sto`	Stores the current value.	`sto`, then `A`–`D` or `0`–`9`.
`rcl`	Recalls a memory.	`rcl`, then `0`–`9`.
`I set`	Your circuit's voltage. Limits the lowest resistance. Display: VOLTS.	`I set`, voltage, `enter`.
`step`	Ohms per knob click. Display: INCREMENT.	`step`, ohms, `enter`.
`table`	Chooses a sensor table.	`table`, then `1`–`9`, or `0` for none.
`open`	Disconnects the output.	Press again to reconnect.
`menu`	Opens the menus.	See section 7.

4. Setting a resistance

Type the value in full ohms; there are no K or M keys. Use `000` to save typing.

The knob

- **Own step:** `step`, ohms per click, `enter`.
- **Standard values:** `menu` `1`, then 1 %, 5 %, 10 %, or ratiometric (0.8 % of the value per click).
- Above about 268 kΩ use a step with at most 2 decimals, and above about 2.68 MΩ at most 1. Otherwise the value can jump to an unrelated number.

Store and recall

Set the value, press `sto`, then the key. There is no confirmation.

> **Don't store while the output is open.** The key is left blank, and recalling a blank key opens the output with no message.

Limits

Highest: 25 MΩ on the ohmSTAR, 5 MΩ on the ohmSTAR+. **Lowest:** the residual (all relays shorted), or the `I set` limit if higher. Out of range, the box beeps and uses the nearest allowed value. In range, it lands at or just below the value asked for.

5. Protecting your circuit

The box is rated 1 W. `I set` keeps it below that: the lowest resistance allowed, in ohms, is the voltage squared.

I set	Lowest resistance
0.5 V (as shipped, and after a reset)	0.25 Ω: no real limit
5 V	25 Ω
12 V	144 Ω
24 V	576 Ω

> **Set I set before connecting.** Until you do, the output can go close to a short. Over-current damage isn't covered by the warranty.
>
> **A new I set voltage reconnects an open output.** Disconnect the box from your circuit first if that matters.

A value change switches relays one at a time, taking up to about ⅓ s. Meanwhile the output can dip toward the residual. If your circuit is sensitive to that, press `open` first.

6. Sensor tables

A table links resistance to what a sensor measures. With one active, you set the value in the sensor's units, such as °C, and the display shows that and the resistance. Nine tables, up to 426 points each. Tables are loaded from a computer: see the Software Guide.

1. Press `table`, then `1`–`9`. The screen shows the table and its name for a few seconds.
2. Type a value in the table's units and press `enter`, or turn the knob.
3. `table` `0` returns to plain ohms.

Between points the box draws a straight line. Outside the table it stops at the first or last point and beeps. Type negative values; the knob doesn't handle them properly.

> **Don't choose an empty table.** The output goes to its lowest resistance and the display can still say OPEN. Press `table` `0` to leave it.

7. Menus and settings

Press `menu`, then the item number.

Menu	Item	Function
1: Standard Values	1: 1 % · 2: 5 % · 3: 10 % · 4: Ratiometric	What each knob click does
2: Configure	1: LCD Contrast	Turn the knob, then any key to accept
	4: Auto Off	On or off, until next power-up
3: Calibrate		Starts calibration at once (section 8)
4: Settings	1: About	Model and firmware version
	3: Default Settings	Both ask to confirm. See below.
	4: Factory Reset	

	Default Settings	Factory Reset
Settings, I set, step, contrast, memories, quick values	Reset	Reset
All nine sensor tables	**Emptied**	**Emptied**
Calibration	Kept	**Replaced with generic values**

> **Factory Reset replaces your box's calibration.** It then reads up to about 2.5 % off. Recalibrate afterwards. To clear a settings problem, use Default Settings.

Auto-off: on battery, off after about 5 minutes with no key, knob or computer activity. Not while connected to a computer.

8. Calibrating at the box

Calibrate yearly, or more often. You enter 31 measured resistor values and the residual, on either model. A calibration lab can also do it.

You need: a calibrated reference ohmmeter, ideally 10 times more accurate than the box, and the leads you will use. Lead resistance becomes part of the calibration.

1. Connect the box to the meter.
2. Press `menu` `3`. The display says `ENTER R1 VALUE`.
3. Type the meter reading and press `enter`. The knob can make small adjustments.
4. Repeat for R2 to R31, then `ENTER RESIDUAL VALUE`.
5. `CALIBRATION SAVED` means done.

> **To abort,** press `menu` any time before the residual is entered. Nothing is saved; the display says `CALIBRATION ABORTED`. If a result looks wrong, run it again.

9. Troubleshooting

Symptom	Cause and fix
A quick value or memory opens the output	The key is blank, usually stored while open. Set a value and store it again.
Beeps and shows a different number	Out of range. Check `I set`, the model's range, the table's ends.
Says OPEN and `open` doesn't clear it	An empty table may be active. `table` `0`.
Off by a percent or two	Factory Reset? Recalibrate. Check the leads.
Turned itself off	Auto-off, about 5 minutes on battery. The output keeps its value.
Won't turn off	It stays on while connected to a computer over USB.
`ERROR, STUCK KEY!`	A key held about 3 s, or jammed. Release it; check nothing presses the keypad.
Knob jumps to an odd number	Use a step with fewer decimals (section 4).

10. Specifications

	ohmSTAR	ohmSTAR+
Range	1 Ω to 25 MΩ	1 Ω to 5 MΩ
Resolution	0.1 Ω	0.01 Ω
Accuracy at 25 °C ± 2 °C, below 1 kΩ	0.5 Ω	0.2 Ω
1 kΩ to 1 MΩ	±0.1 %	±0.05 %
Above 1 MΩ	±0.5 %	±0.5 %
Power rating	1 W	1 W
Envelope, L × W × H	6.7 × 3.5 × 1.6 in (17 × 8.7 × 4.1 cm)	
Case, L × W × H	6.7 × 3.5 × 1.1 in (17 × 8.7 × 2.8 cm)	
Weight	13.8 oz (392 g)	

11. Service and warranty

Labmetric offers full repair service. Annual calibration is recommended, using a certified calibration lab. Do not attempt to repair or modify the device, as this will void the warranty. Any service other than battery replacement should be referred to Labmetric.

Labmetric, 10632 N Scottsdale Rd B417, Scottsdale, AZ 85254
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Warranty. Labmetric warrants to the original purchaser in the United States of the ohmSTAR or ohmSTAR+ that we will repair or replace, at our option, any malfunctioning or defective part without charge for 1 year from the original date of purchase. Replaced or repaired parts are warranted for the remainder of the original warranty period. Labmetric will provide labor and return shipping to the original purchaser for the warranty repair without charge.

To obtain warranty service, email support@labmetric.com for approval. The device must be shipped at the owner's expense to Labmetric. See the website for the current service address.

The warranty does not cover:

1. Batteries or test leads.
2. Routine calibrations.
3. Defects caused by modification, alteration, repair or service by anyone other than Labmetric, or by misuse due to negligence or accident (i.e. over-current).

Under no circumstances shall Labmetric be liable to the original purchaser or to any other person for any special or consequential damages, whether arising out of breach of warranty, breach of contract, or otherwise. Some states do not allow the exclusion or limitation of special or consequential damages, so the above exclusion or limitation may not apply to you.