labMetric

Ohm*STAR* / Ohm*STAR*+

Precision Programmable Resistors

The Decade Box on an Ego Trip

OPERATION MANUAL



INTRODUCTION

The ohm*STAR* and ohm*STAR*+ line of precision programmable resistors have many advanced features. Resistance values are entered via a calculator-style keypad or Incrementally using a rotary encoder, programmable quick value keys or USB port. Values are prominently displayed in ohms on a large LCD and resistances is presented ot the test leads.

Quick Value Keys:

Store/recall up to four frequently used user programmable resistance values with one touch.

Memory Value Keys:

10 additional resistance memory locations (0-9)

Current Limiter:

Limits the amount of current passing through the device to prevent possible damage.

Increment Value Setting:

For use with rotary encoder, user definable or selected standard IEC standard resistance values 1%, 5%, 10% or definable ratio-metric.

Open Key:

Mechanically isolates the device from the application with the touch of a key.

Easy to Read Display:

The output resistance value in ohms is easily read from the large graphical LCD display.

100% Mechanical Relay Isolation:

Device circuit is completely mechanically isolated from the output resistor.

Auto-Off Power:

The device automatically shuts off after 4 minutes. Resistance value remains and battery life is more than 1 year.

Dual Value Display Option

Create, Download and store up to 3 different lookup tables for displaying a simulated sensor value (ie. temperature, pressure) with the resistance value. This feature is useful in simulating transducers such as thermistors, PRTD, strain, potentiometric position or conductivity sensors.

Field Calibratable:

Easily calibrate the device with a calibrated reference ohmmeter.

FEATURES AND KEY FUNCTIONS

KEY	DESCRIPTION	FUNCTION
“MENU”	Displays the following submenu: 1: STANDARD VALUES 1: 1% STD VALUES 2: 5% STD VALUES 3: 10% STD VALUES 4: RATIOMETRIC 2: CONFIGURE 1: LCD CONTRAST 2: AUTO-OFF ENABLE 3: AUTO-OFF DISABLE 3: CALIBRATE 4: ABOUT, FACTORY RST.	1: “STD VALUES” Sets the encoder increment to IEC resistor values or user selected ratiometric increments. 2: “CONFIGURE” Sets LCD contrast and allows the user to enable or disable auto-off. 3: “CONFIGURE” Refer to calibration section on users guide. 4: “VERSION” Displays firmware version and release date.
Quick Value Keys “A”,“B”,”C”,”D” “0”-“9” “sto” “rcl”	Recalls a user selected resistance value.	To set quick values keys, set a resistance value and press “**sto**” then the one of the quick value keys, “A”,“B”,”C”,”D” or “0”-“9”. Press “A”,“B”,”C”,”D”, 1 touch recall. Press “**rcl**” then “0”-“9” for 2 touch recall.
“I set”	Limits the current through the device based on the application voltage.	Press “I set” then enter your application voltage using the number keys that will be present at the ohm*STAR* inputs. Press “enter”.
“step”	Sets the resistance in ohms that amount each click of the encoder wheel changes the value.	Press “**step**” then using the number keys set the desired increment value. Press “enter”.
“table”	(Option) Load up to 4 stored data tables for the translation of know ohmic related sensor parameters. Thermistors, strain gauges etc.	See our web site for more information. www.labmetric.com
“open”	Isolate the ohm*STAR* by establishing an open circuit across the ohm*STAR* terminals.	Press “**open**” to open the circuit. Press “**open**” again to close the circuit.
⬅	Deletes from the display the last character entered.	Press “ ⬅ “
ON/OFF - enter	Turns the device on and off and used to enter resistance values.	Press once to turn on. Press and hold to turn off.

QUICK START OPERATING INSTRUCTIONS

1. Turn on the device by pressing and releasing “enter”

2. **IMPORTANT, set current protection -** Press “I set” and enter the application voltage using the number keys, than press “enter”. This will limit the current by limiting low R values.

3. Select a desired resistance value in one of the following ways.
   a. Rotary encoder
   b. Enter a value using the number keys, then press enter.
   c. Press a programmed quick value key (A -D) or stored values (0-9) using “rcl”.

4. Using the provided test leads connect the ohmSTAR to your application. To isolate the ohm*STAR* from your application, press “open”. To turn off ohm*STAR* press and hold “enter” for 3 seconds.

CALIBRATION

Annual or more frequent calibrations are recommended. Calibrations are easily performed using a calibrated ohm meter as a secondary standard.

Field Calibration overview:

The total number of resistance values stored during a calibration are: ohm*STAR* = 26, ohm*STAR*+ = 30

To abort calibration press “menu” at any time prior to entering the final residual resistance value. None of the previously entered values will be saved.

It is recommended to calibrate with the supplied test leads or the leads that be used in your application.

Required Tool:

A calibrated high precision reference ohmmeter having a preferred accuracy 10 times greater than the device being calibrated.

Instructions:

1. Connect the device to the reference ohmmeter .
2. Press “menu” then select option “3 :CALIBRATION”
3. Enter the measured resistance value using the number keys or if only a slight adjustment is needed then the encoder wheel can be used. Press “enter” to move the the next value,and continue until all 26 values for ohm*STAR or 30 values for ohmSTAR+ are entered plus the residual value.*
4. When the message “CALIBRATION SAVED” is displayed the calibration is complete.

SERVICE AND SUPPORT

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. Please contact us via the contact page at “www.labmetric.com”.

WARRANTY

Labmetric warrants to the original purchaser in the United States of the ohm*STAR* or ohm*STAR+* 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 of 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 WARRENTY SERVICE:

Email “service@labmetric.com” to obtain a approval. Device must be shipped at owners expense to Labmetric. See web site for current service location address.

WARRENTY DOES NOT COVER:

1. Batteries or test leads
2. Routine calibrations
3. Defects caused by :

Modification, alteration, repair or service of the device by anyone other than Labmetric.
Misuse due to negligence of accident (ie over current).

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

	OhmSTAR SPECIFICATIONS	OhmSTAR Plus SPECIFICATIONS
Range	1Ω - 25MΩ	1Ω - 5MΩ
Resolution	0.1Ω	0.01Ω
Accuracy@ 25° ± 2°	.5Ω <1000Ω ±0.1% 1KΩ – 1MΩ ±0.5% >1MΩ)	.2Ω <1000Ω ±0.05% 1KΩ – 1MΩ ±0.5% >1MΩ
Power Rating	1W	Power Rating
Envelope L x W x H	6.7” x 3.5” x 1.6” (17cm x 8.7cm x 4.1cm)	6.7” x 3.5” x 1.6” (17cm x 8.7cm x 4.1cm)
Case Dimensions L x W x H	6.7” x 3.5” x 1.1” (17cm x 8.7cm x 2.8cm)	6.7” x 3.5” x 1.1” (17cm x 8.7cm x 2.8cm)
Weight	13.8 oz (392gm)	13.8 oz (392gm)

COMPUTER INTERFACE COMMANDS

For software version OS22 6.1 and above

Serial Settings

9600 baud, 8 bit,1 stop, No Parity

Setting Resistance

A new command for setting for resistance that is totally ASCII has been added, the command is ‘r’. The data following r is the new resistance to be set, finished with a new line (‘\n’, or ‘\r’, or just pressing ENTER key in terminal software).

Unit will respond with ACK byte.

Example (setting resistance to 5.123):

r5.123<ENTER>

Setting a calibration value

The ‘T’ command can be used to write calibration or user tables, and is in ASCII and is terminated with a new line (‘\n’, or ‘\r’, or just pressing ENTER key in terminal software). The format for writing a calibration value is as follows:

T,0,x,value,DO<ENTER>

'x' is the position you want to write, an 'x' of 0 is R1, an 'x' of 1 is R2, etc. An 'x' of 31 is the residual resistance. The 'DO' is actual characters ‘D’ and ‘O’, and is used to prevent a user from accidentally writing calibration values.

Unit will respond with ACK byte.

Example (setting R5 to 20.5 ohms):

T,0,4,20.5,DO<ENTER>

Getting a calibration value

The ‘t’ command can be used to read a calibration or user table, and is in ASCII and is terminated with a new line (‘\n’, or ‘\r’, or just pressing ENTER key in terminal software). The format for writing a calibration value is as follows:

t,0,x<ENTER>

'x' is the position you want to read, an 'x' of'0 is R1, an 'x' of 1 is R2, etc. An 'x' of 31 is the residual resistance.

Unit will respond with value:

t,0,x,value<ENTER>

Example of reading R5:

t,0,4<ENTER>

+++Writing a user table

The ‘T’ command described before can write a user table. It is in ASCII and is terminated with a new line (‘\n’, or ‘\r’, or just pressing ENTER key in terminal software). The format for writing a calibration value is as follows:

T,table,position,value<ENTER>

'table' is the table index, valid values or 1 thru 9.

'position' is the part of the table you want to write.

A position of 0 writes the table name. A position of 1 writes the table unit string. A position of 2, if the value is -1, erases all the points in the table. A position of 3 or higher adds an entry to the bottom of the table list (the number set to position here is not important, it is always added to the bottom of the list).

'value' is what to write to this position.

If position is 3 or higher, two comma separated values need to be sent (the first value is the user translated value, the second value is the actual resistance tied to the user translated value).

Unit will respond with ACK byte.

Example of setting table 1 to “DARREN”, with units “ZARGS”, with 2 user translation points:

T,1,0,DARREN<ENTER>
T,1,1,ZARGS<ENTER> T,1,2,-
1<ENTER> T,1,3,0,0<ENTER>
T,1,3,100,200<ENTdfdfsdfsR>

Reading part of user table sdfs

Any previously written position can be read with the ‘t’ command. It is in ASCII and is terminated with a new line (‘\n’, or ‘\r’, or just pressing ENTER key in terminal software). The format for reading a table value is as follows:

t,table,position<ENTER>

'table' and 'position' have the same meaning as the previously described. ‘T' command.
The response is as follows:

t,table,position,value<ENTER>

An example of reading the number of points saved to the table 1:

t,1,2<ENTER>

Reading entire table

The ‘t’ command can also be used to dump the entire calibration or user table at once. It is in ASCII and is terminated with a new line (‘\n’, or ‘\r’, or just pressing ENTER key in terminal software). The format for reading a table value is as follows:

t,table<ENTER>

The unit will respond by displaying all the values in the table, as if the ‘t’ command was used to read them individually. table of 0 is the calibration table, table of 1 thru 9 are user translation tables.

DUAL DISPLAY TRANSLATION TABLE

The translation table file is a simple text file consisting of printable ASCII characters. It can be generated by a text editor, WORD, EXCEL, or similar programs. EXCEL is usually preferred because of its math capabilities and easy columnizing. When saving to disk, make sure the output format is TEXT. The file must contain at least 4 lines (2 overhead lines and 2 conversion lines, explained next). The file normally contains at most 258 lines. Any lines after that are ignored. Comments are allowed on any line except the first. Comments must be placed to the right of all required numbers, and separated from them by at least 1 space, tab, or comma. Comment-only lines are not allowed.

The first line of the table file contains the description line. Leading and trailing blanks and tabs are ignored. The text is automatically centered on the LCD screen (by this program). The text may contain any of the standard ASCII printable characters. The LCD screen width is 20 characters.

The second line of the file contains one value, 0 thru 5. This indicates how many decimal places to display of the User Units value. Zero indicates no decimal is shown. A value of 1 means numbers are shown to tenths, and so on.

The rest of the lines are for the conversion values. The lines contain 2 values, establishing the equivalence between the user units and ohms. The values may consist of the characters 0 thru 9 and decimal. The two numbers are separated by spaces, tabs, or commas, or any combination thereof. The first column of values is in User Units, the second column is the equivalent values in ohms. The column of User Units may be increasing or decreasing in value, but not both. The column of ohms may also increase or decrease in value, independent of the User Units, and also must be monotonic. When the Ohm Source (Plus) is translating, it establishes the first pair of values and the last pair of values as the upper and lower limits of translation. It will not extrapolate beyond these points. It should be noted that the resistance limitations (24M at the high end, 1W dissipation at the low end) are always in effect, so a translation table may not be completely traversable if it specifies resistances beyond this range.
Ohms values must be spelled out in full ohms, in the table. The suffixes K and M are not allowed.

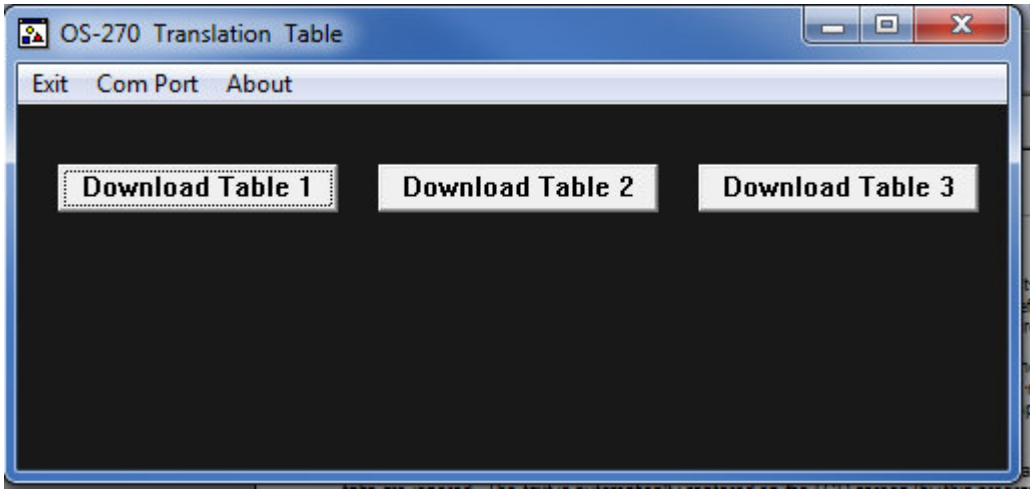
1.1 Functional Overview

The program does nothing until a Download button is clicked. It then asks for the input file name, processes the file, downloads the data, and returns to idle.
Some error checking is performed:

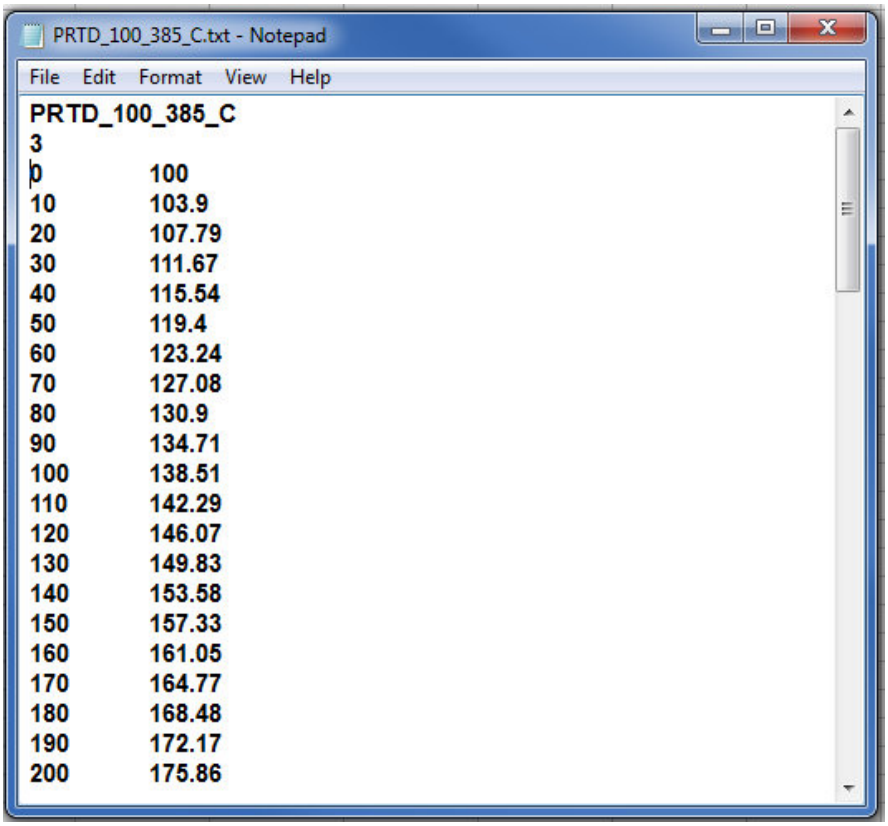
Description line:	Blank or non-displayable characters
Decimal Pt line:	Value is less than 0, greater than 5, or missing
Conversion lines:	Less than 2 lines present before EOF, Less than 2 values on line, More than 256 entries (conversion lines), First column is not monotonic, Second column is not monotonic, First column is outside the range +/- 12 million, Second column is outside the range 0.7 ohm – 12Meg

Download is performed using the Write EEPROM command to store 4 bytes at a time. After each write command, the Ohm Source (Plus) returns a pass/fail byte. If failure, downloading stops. If no response is received, the program continues to poll for the response every 20 mS, for up to 160mS. (Routine EvTimer() is called by Windows every 20 mS). If the reply never comes in, the message “Communication Failure” is displayed.

At the end of a successful download, the box is sent the Refresh from EE command, which will configure the box to be translating with the just-downloaded table.



Example text file





Designed, Manufactured and Supported by:
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Scottsdale, Arizona

www.labmetric.com

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