

Simco Worksurface Tester Model ST-4

INSTRUCTIONS

Installation/Operation/Maintenance



CAUTION

It is important that these instructions be read and understood before attempting to install or operate the equipment. Failure to do so could result in serious personal injury and/or damage to the equipment. At the end of this manual, a written warranty is provided. This should be preserved carefully.

Notes to users

WARNING

This equipment is not constructed for classified (hazardous) environment. It cannot be used where it will be exposed to ignitable or corrosive materials and gases.

CAUTION

This equipment is intended for use in electrostatic processes that are free from water, oil, solvent and other conductive contaminants. Exposure to such contaminants will cause failure of the electrical insulation system in the product. Special care should be taken to ensure that there is no dew formation. This equipment should be stored or used in a place less than 60 %RH.

Please read this instructions carefully prior to attempting to operate.

This equipment should NOT be operated in an ambient with corrosive fumes of acid/alkali or corrosive gases such as chlorine.

When not used, the switch should be OFF.

This equipment should be used as written in this operation manual.

This instrument contains delicate components and it is likely to be affected if dropped. Please handle the instrument with care. In such an event, it should be carefully examined and any necessary repairs be made by an authorized technician. This equipment also has chip micro-computer inside so do not use under a radio wave noise.

Do not touch and hart the sensor of this equipment.

Do not weigh and/or push by finger on the LCD display.

This equipment was assembled and inspected at Simco Japan, Inc. Do not attempt to disassemble or modify its construction. If you are not clear about its operation and maintenance, call Simco Japan's authorized agent in your area.

This equipment has nickel-metal hydride battery. Thus if this equipment remain ON or OFF condition longer than one-year, the battery would be in non-chargeable condition due to discharge of electricity. Please turn off when not used and charge the battery frequently.

Thank you for buying Simco products. This equipment will meet your expectations and provide safe operation when it is properly installed and maintained.

Receipt of equipment

Please carefully remove the equipment from the carton and inspect. Note any damage that might have occurred during shipment. Empty the carton to ensure that small parts are not discarded.

If any damage has occurred during shipment, the local carrier should be notified at once. A report should be forwarded to SIMCO JAPAN, INC. The address and other relevant information are written on the back cover page.

Packing articles and accessories

- (1) Worksurface Tester Model ST-4 1 pc.
- (2) Probe Assembly cable 1 pc.
Cable length 850 mm, banana plug, alligator clip
- (3) Instructions / Warranty 1 pc.
- Option:
- (1) USB Cable 1 pc.
- (2) USB-AC ADAPTER 1 pc.
- (3) Carrying case 1 pc.

Please check if any part is missing or does not have satisfactory finish. Contact us or our agents immediately in the event of such occurrence.

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Explanation of Symbols:

 **WARNING**

 **ATTENTION / CAUTION**

 **ELECTRIC SHOCK HAZARD**

Section 3. Specification

ST-4 accurately measures and displays surface resistivity in the range from $10^3 \sim 10^{13} \Omega / \text{square}$.

Worksurface Tester Model ST-4 has a built-in voltage source that places a potential difference (V) of 10V or 100V DC between the parallel conductive probes. The source can deliver up to 10mA or 1mA of current, and it is measurement of this current (I) that is used to determine the surface resistivity. The resistance between the probes (R) is calculated automatically in the tester using Ohm's Law

$$R=V/I$$

The arrangement of the probes makes the resistance measurement in ohms equivalent to the surface resistivity in ohms per square. ST-4 tester displays the resistivity, after logarithmic conversion, as an exponent of LCD. a block diagram of the circuit is shown in fig.1

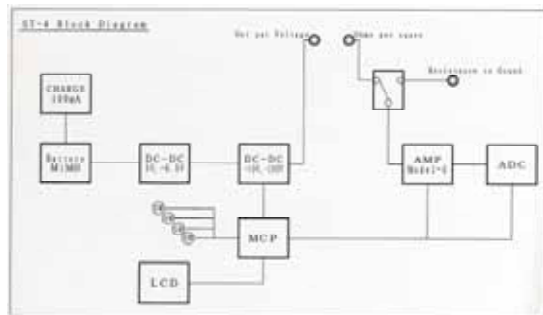


fig.1 Diagram of the circuit

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Red LED indicator: in process of charging

Weight : body 700g
cable 25g

Section 4. Setup

3.1 Battery

ST-4 can be charged from USB port at the side of the equipment. When turning ON power switch, LCD (at left bottom) shows the remaining battery charge with four steps as below fig. When the battery charge is low, connect USB cable (mini-B-USB) to AC/DC adaptor or your PC's USB port to charge. Once charging starts, [CHARGE] LED indicator is turn on RED during charging period.



Remaining battery indicator



ATTENTION

ST-4 battery remaining indicator may not match exactly same as real remaining battery charge. Thus it may show sharp drop upon the remaining and usage condition.

3.2 Measurement

ST-4 can set up the measurement time and max/min of the resistivity.

Push [SET] button under LCD (see the picture below) with tiny pin (approx 1mm diameter). [SE01] show up first, then the reserved measurement time comes up. You can set up the measurement time with UP/DOWN button with tiny pin. Once you complete set up and push again [SET] button, [SE02] comes up and the reserved maximum measurement time will be indicated. The measurement time can be changed by 0.5 with UP/DOWN button. After you complete setting up the maximum, please push [SET] button. Next you can see [SE03] and the reserved minimum measurement time. Same as setting up the maximum, you can set up with UP/DOWN button by 0.5. After you complete, push [SET] again, then the mode is back to normal measurement mode.

3.2.1 Set up the measurement time

The four measurement time can be set up.

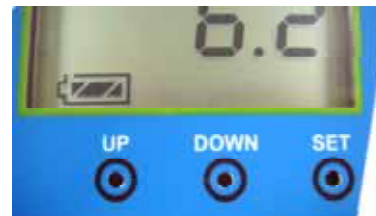
LCD : Measurement time : Bar indicator

15 : 15 sec : 1 sec/ 1 bar

30 : 30 sec : 2 sec/ 1 bar

60 : 60 sec : 4 sec/ 1 bar

(default set up is [15])



3.2.2 The maximum set

If the resistance is over the maximum, the indicator will be blinking and show [+] beside. (default set is [13.5])

3.2.3 The minimum set

If the resistance is under the minimum, the indicator will be blinking and show [-] beside. (default set is [2.5])

Section 5. Operation

4.1 Surface resistivity check

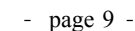
- 1) Turn on switch ON
- 2) Place ST-4 Tester on the surface to be tested gently
- 3) Push [START] button, then the measurement starts. During surface resistivity check, LED in TEST is lighted Green (Ohms per square, Surface Resistivity). Also LED in OUT is lighted Green first, then lighted Red once hitting over 6 square.
- 4) During the measurement, LCD just shows 「— — —」 (no value) and the measurement progress by bar graph at right top corner.
- 5) After the measurement time is up, LED in OUT is lighted Yellow and the resistivity value shows. the exponent measurement value shows beyond one decimal point on LCD (ex. $10^{8.4}$, the value shows as 8.4)
- 6) If the test is outside of the operating range of ST-4 ($10^{-3} \Omega/\text{sq}$ below or $10^{13} \Omega/\text{sq}$ above), the value indicator is blinking and shows [-] (below the minimum) or [+] (above the maximum) left the value. If you set your own max/min range (refer to Section 3 Set up) and outside of the range, it shows same.
- 7) If another measurement is desired, push [START] button again.
- 8) When measurements are completed, turn OFF the switch.

4.2 Resistance to Ground Check

- 1) Attach a ground lead to RESISTANCE TO GROUND jack on the side of the tester and its mode automatically change to ground check between the lead end and ST-4 probe. LED in TEST is lighted Red (Ohms, Resistance to Ground).
- 2) Connect the other end of the ground to a common point grounding block or to another known nearby ground.
- 3) Place ST-4 tester on the surface to be tested.
- 4) Push [START] button and start measurement. Also LED in OUT is lighted Green first, then lighted Red once hitting over 6 square.
- 5) During the measurement, LCD just shows 「— — —」 (no value) and the measurement progress by bar graph at right top corner.
- 6) After the measurement time is up, LED in OUT is lighted Yellow and the resistivity value shows. The exponent measurement value shows beyond one decimal point on LCD (ex. $10^{8.4}$, the value shows as 8.4)
- 7) If the test is outside of the operating range of ST-4 ($10^{-3} \Omega$ below or $10^{13} \Omega$ above), the value indicator is blinking and shows [-] (below the minimum) or [+] (above the maximum) left the value. If you set your own max/min range (refer to Section 3 Set up) and outside of the range, it shows same.
- 8) If another measurement is desired, push [START] button again.
- 9) When measurements are completed, turn switch OFF, then disconnect the ground cable from the common point grounding block or other known nearby ground. Then disconnect plug of the cable carefully.

Section 7. Dimensional drawings

Exponent	Real number
0.1	1.3
0.2	1.6
0.3	2.0
0.4	2.5
0.5	3.2
0.6	4.0
0.7	5.0
0.8	6.3
0.9	7.9



SIMCO EQUIPMENT REPAIR WARRANTY

Simco equipment has been carefully tested and inspected at the factory and is warranted to be free from any defects in materials or workmanship.

Simco Japan, Inc. will, under this warranty, repair or replace any equipment, which proves upon their examination, to have become defective within the Warranty period from the date of shipment. A one year Warranty applies to all Simco equipment. The equipment is to be returned by the purchaser to Simco Japan, Inc. or authorized agent of Simco, transportation prepaid and insured for its full purchase price. Prior to returning any goods for any reason, contact Simco Japan, Inc. or authorized agent for a Return Authorization Number. This number must accompany all returns.

The Warranty does not apply when the equipment has been tampered with, misused, improperly installed, altered, has received damage through abuse, carelessness, accident, connected to improper line voltage, or has been serviced by anyone other than an authorized factory representative. The warranty does not apply when Simco parts and equipment have been energized by other than appropriate Simco Power unit or generator, or when Simco Power unit or generator has been used to energize other than Simco parts and equipment.

Simco Japan, Inc. makes no Warranty, expressed or implied, nor accepts any obligation, liabilities or responsibility in connection with the use of this product other than the repair or replacement of parts as stated herein.

Product Name	<i>Simco Worksurface Tester S T - 4</i>		
Delivery Date	Product's serial number contains information on the shipping date.	Warranty Period	<i>A one year Warranty</i>



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