



# SURFACE ROUGHNESS GAGE

*w/Data Output via Bluetooth*

Model No. SRG-2200

*INSTRUCTION MANUAL*



*Manual should be read prior to operation!*

**TECHNICAL SUPPORT: (201) 962-8352**

## GENERAL

The Phase II model no. **SRG-2200** Mini Surface Roughness Tester is a next generation of product developed by the Phase II Metrology Group that features high accuracy, a wide range of application, simple operation and stable performance. It is widely applicable in testing surfaces of all kinds of metals and non-metals. Integrating the sensor with its mainframe, it's a hand-held set especially suited for use on any production site.

**Large memory with data output via Bluetooth.**

## WORKING PRINCIPLE AND STRUCTURE FEATURES

### WORKING PRINCIPLE

When the motorized sensor is making a linear uniform motion along the test surface, the contact stylus being perpendicular to the work surface, moves up and down with the work surface. Its motion is converted into electric signals, which are amplified, filtered and transformed into digital signals through a/d. The signals are then processed by the CPU into **Ra, Rz, Rq and Rt** values before being displayed on the screen.

### STRUCTURAL FEATURES

Base Instrument	1 UNIT
AA Battery	1 UNIT
Reference Standard	1 UNIT
USB Flash Drive(Manual/Software)	1 UNIT
USB SoftDog(dongle)	1 UNIT

### Optional Accessory

**Small Round Parts Vise**  
Now check surface finish on these difficult  
to test parts with your SRG-2200!  
**Part No. SRG2000-VISE**



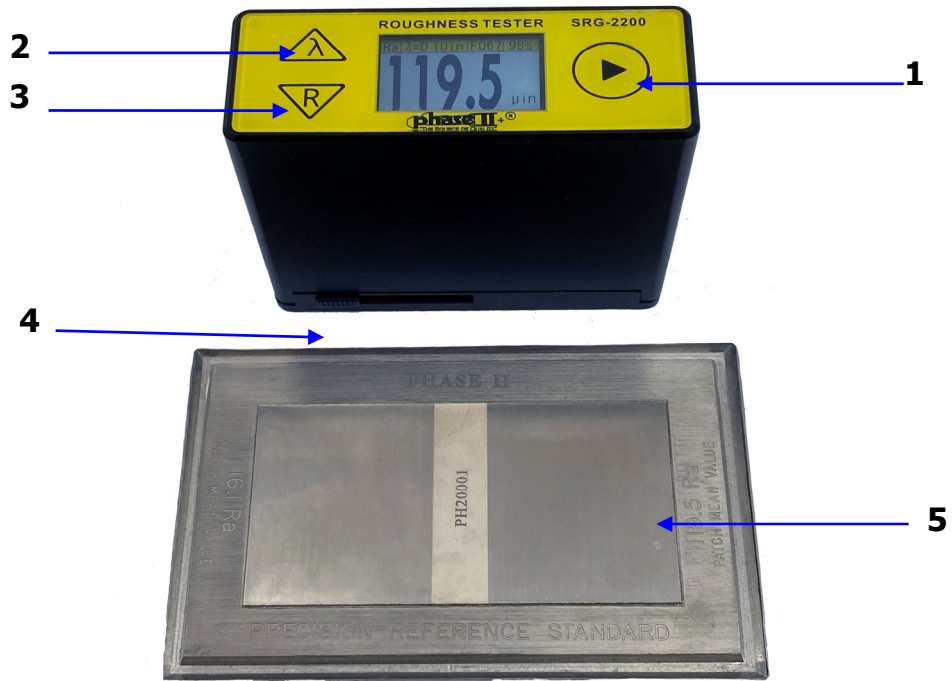
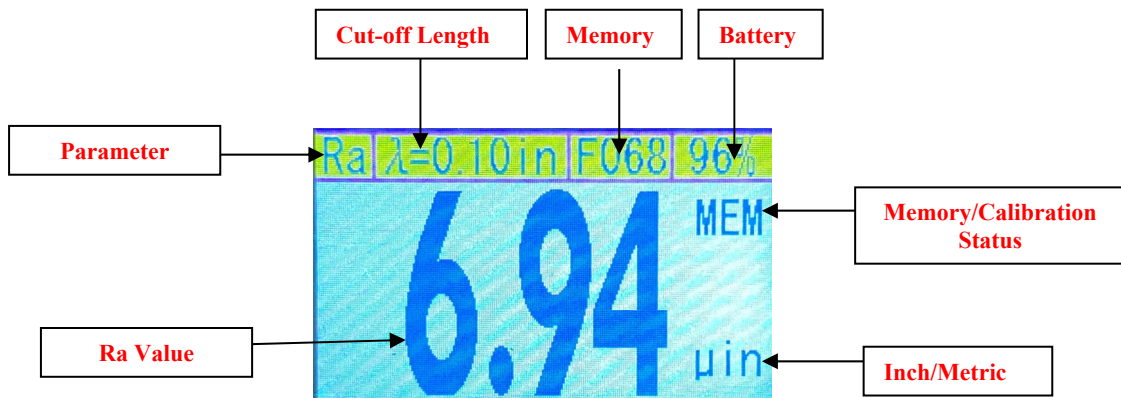


FIGURE 2: STRUCTURE OF MAINFRAME



- 1) Power/Start Test Button
- 2) Cut-Off length Selection/Up
- 3) Parameter Selection/Down
- 4) Stylus Protector Shield
- 5) Reference Standard
- 6) Stylus
- 7) Battery Compartment(1-AA)




## MAJOR TECHNICAL PARAMETERS


<i>ROUGHNESS PARAMETERS</i>	Ra, Rz, Rq, Rt
<i>MEASURING RANGE</i>	RA: <b>0.05-10.0µm</b> RZ: <b>0.1 - 50µm</b> Rq : <b>0.05 ~ 10.0µm</b> Rt: <b>0.1 ~ 50µm</b>
<i>CUT-OFF LENGTHS</i>	0.25, 0.80, 2.50
<i>FILTER</i>	Gauss Digital
<i>TRACING LENGTH</i>	0.23IN (6MM)
<i>EVALUATION LENGTH</i>	1.25mm, 4.0mm, 5.0mm
<i>TRACING SPEED</i>	0.04IN/SECOND (1.0MM/SECOND)
<i>ACCURACY</i>	+/-12% of known value
<i>PICK UP STYLUS</i>	PIEZO-ELECTRIC
<i>TRACER TIP</i>	DIAMOND, RADIUS 10µM +/- 1µM
<i>MEMORY/Transmission</i>	500 Values/Bluetooth
<i>OPERATING TEMPERATURE</i>	32-104 DEGREES F (0-40 DEGREES C)
<i>POWER</i>	One 1.5v AA Battery
<i>CONTACT FORCE ON PROBE</i>	<0.5N
<i>STATIC MEASURING FORCE OF SENSOR STYLUS</i>	< 0.016N
<i>DIMENSIONS</i>	73 X 28 X 62mm
<i>WEIGHT</i>	0.5LBS (220G)

## USE AND OPERATION


### OPERATION:


#### POWER ON THE DEVICE.

Press and hold the button  on the top panel. The display will show the model and serial number and then the device is ready to work. The 1.14" IPS TFT display will show the measuring parameters and sampling length of the previous test.


POWER OFF: Press and hold the  button for a few seconds until the display turns off.

Before taking a test, choose the desired parameter **Ra, Rz, Rq, or Rt** and proper sampling length **2.5(0.10), 0.8(0.03) or 0.25(.01)** (for sampling length option, consult the appendix).

After switching on the device, press the  to change parameters.

To choose the proper sampling length, press the keypad button  (**0.25, 0.8 OR 2.5**).

After the parameters and sampling lengths are taken, you may begin testing.

Position the unit over the test area and press the start button  on top of the unit. The stylus moves automatically. When the value on the display blinks twice, the measurement has been completed and the results shown upon the display.

## **POINTS FOR ATTENTION:**


While the stylus is in motion, you must keep the device even and steady so as not to affect the accuracy of the reading.

Before the sensor returns to the original position, the device will not respond to any keypad operation until the measurement is completed.




## **CALIBRATION**

When abnormal errors are found, the supplied reference standard should be used for calibration. The **Ra** value of the supplied standard is 119.5 $\mu$ in (3.03 $\mu$ m).

**METHOD:** Place the unit on the reference standard so the stylus can run across the 119.5 patch. Take a test. If the value of the test is outside the allowable tolerance then follow these steps:

Press and hold the  button for about 4 seconds and the display will be as shown below:




Press the  button to toggle to the column that need to be changed. Use the Up and Down buttons   to adjust the numbers. See example below.



Once the correct value is entered, press and hold the  for approx.. 4 seconds to save the calibration.

The value displayed at the end of this process should fall within the allowable tolerance of your test sample. Normal measurements can resume at this time.

## **CONVERTING IN/MM**

Press and hold the  keypad for about 2 seconds. The system will convert from Metric to English or English to Metric

## **BATTERY INDICATOR**

When the battery % symbol is near 10% then its time to change the battery in the SRG-2200. Remove the 2-screws from the backside cover. remove the battery and dispose of properly. Replace with fresh AA battery. Close the battery compartment. Power the unit on to make sure the battery % is 100%.

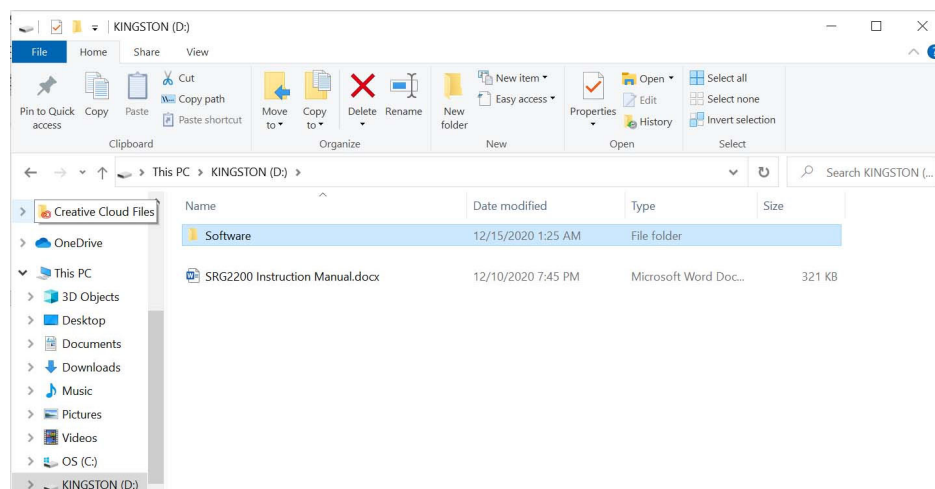
## **DATA OUTPUT**

Plug the supplied flash drive into the USB port on your PC.  
Plug in the supplied Softdog(dongle) into another USB port to allow access to the software program.

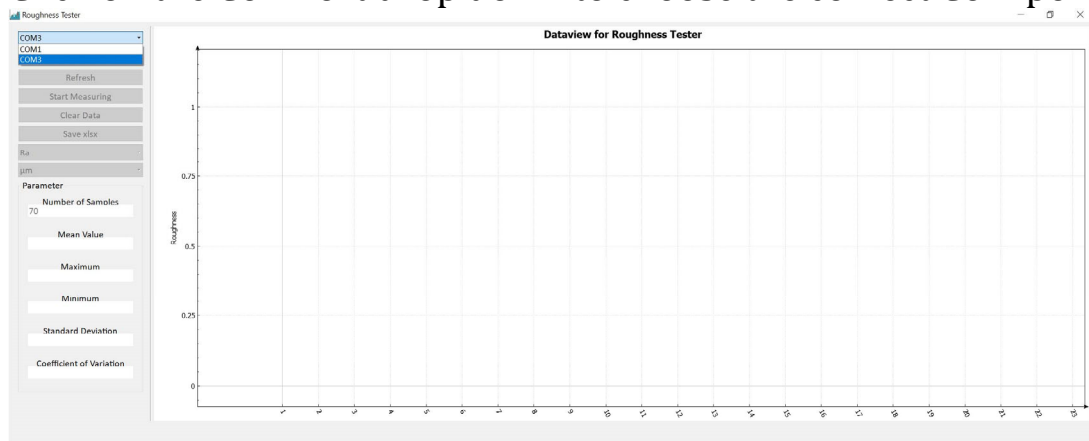


Double click the Software folder to begin loading the software.

**Power the SRG-2200 on**

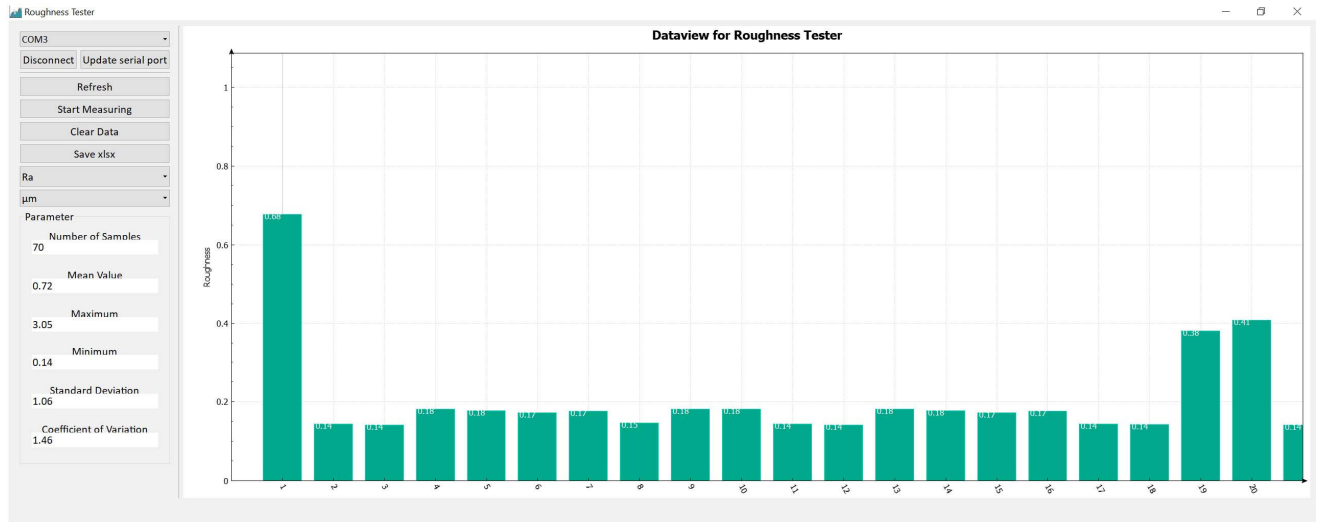


Click on the ComPort drop down to choose the correct Com port





**Click on the CONNECT box.**



**All data stored in the memory will be shown on the display. You can save as an Excel file at any time.**

## **MAINTENANCE AND REPAIR**

### **MAINTENANCE**

Avoid collision, violent shock, heavy dust, dampness, oil and a strong magnetic field. The Piezo-electric pick up stylus with diamond tip is extremely sensitive and accurate. After each use, make sure that the supplied protective cover goes on this tip after each use. Damage to this tip will result in false and erroneous readings.

### **REPAIR**

**ALL REPAIRS MUST BE DONE THROUGH THE PHASE II SERVICE DEPARTMENT.**

A return authorization number is mandatory in order for a defective tester to be accepted for repair and/or replacement. All testers must be accompanied by your warranty card or serial number. Complete description of problem and a contact person for authorization of repairs must be supplied as well.

**ANY ATTEMPT AT HOME REPAIR WILL AUTOMATICALLY VOID THE STATED WARRANTY! *NO EXCEPTIONS!***

## **Appendix: Recommended Sampling Length.**

<b>Ra (µm)</b>	<b>Rz (µm)</b>	<b>SAMPLING LENGTH</b>
>40 - 80	>160 - 320	8
>20 - 40	>80 - 160	8
>10 - 20	>40 - 80	8
>5 - 10	20 - 40	2.5
>2.5 - 5	>10 - 20	2.5
>1.25 - 2.5	>6.3 - 0	0.8
>0.63 - 1.25	>3.2 - 6.3	0.8
>0.32 - 0.63	>1.6 - 3.2	0.8
>0.25 - 0.32	>1.25 - 1.6	0.25
>0.20 - 0.25	>1.0 - 1.25	0.25
>0.16 - 0.20	>0.8 - 1.0	0.25
>0.125 - 0.16	>0.63 - 0.8	0.25
>0.1 - 0.125	>0.5 - 0.63	0.25
>0.08 - 0.1	>0.4 - 0.5	0.25
>0.063 - 0.08	>0.32 - 0.4	0.25
>0.05 - 0.063	>0.25 - 0.32	0.25
>0.04 - 0.05	>0.2 - 0.25	0.25
>0.032 - 0.04	>0.16 - 0.2	0.25
>0.025 - 0.032	>0.125 - 0.16	0.25
>0.02 - 0.025	>0.1 - 0.125	0.25
>0.016 - 0.02	>0.08 - 0.1	0.08
>0.0125 - 0.016	>0.063 - 0.08	0.08
>0.01 - 0.0125	>0.5 - 0.063	0.08
>0.008 - 0.01	>0.04 - 0.05	0.08
>0.0063 - 0.008	>0.032 - 0.04	0.08
<0.0063	<0.032	0.08



## Polished Finishes Compared to RMS and Ra Readings

Number Finish	RMS	Ra
3	30-45	25-40
4	18-30	15-25
6	14-20	12-18
7	5-9	4-8
8	1-5	0-4

### RMS: Root Mean Square

A) Profilometer measures scratch depth  
 B) Mean Average  
 C) Squares Average  
 Example: 36RMS  
 Means-Depth=36 or .006"

### Choosing The Correct Grit Size:

**Step1:** Consult chart-Average particle size  
**Step2:** Considering that only 1/2 the diameter can be exposed to penetrate the material, choose grit size of double the depth needed

### Proper grit- Chart1

1/2 average particle size only half exposed  
 80 grit = .0105"  
 1/2 = .00525"

## Grit Size Comparison

### Average Particle Size

Grit Size	Inches	Microns
4	.2577	6848
6	.2117	5630
8	.1817	4620
10	.1366	3460
12	.1003	2550
14	.0830	2100
16	.0655	1660
20	.0528	1340
24	.0408	1035
30	.0365	930
36	.0280	710
46	.0200	508
54	.0170	430
60	.0160	406
70	.0131	328
80	.0105	266
90	.0085	216
100	.0068	173
120	.0056	142
150	.0048	122
180	.0034	86
220	.0026	65
240	.00248	63
260	.00175	44
320	.00128	32
400	.00090	23
500	.00065	16
600	.00033	8
900	.00024	6

## Surface Measurements Comparison

RMS (Micro- Inch)	RMS (Micron)	Ra (Micro-Inch)	Ra (Micron)	Grit Size
80	2.03	71	1.80	80
58	1.47	52	1.32	120
47	1.20	42	1.06	160
34	.86	30	.76	180
17	.43	15	.38	240
14	.36	12	.30	320

These values are the average data of many tests, therefore, slight deviations from the norm do exist. However, because of the number of tests performed, reasonable accuracy should be assumed. Because of the many variables which create this data, deviations of +/-5% would be considered well within good measurement parameters. The relationship between abrasive grit numbers and surface roughness in terms of micro-inches is sometimes a basis for speculation. The values are approximately as follows:

Grit Size	Surface Roughness Ra-Micro-Inch
500	4 -10
320	6-15
240	8-20
180	25-40
120	45-60
60	140-180

# Global Connections



## **Main Headquarters: U.S.A**

### **Phase II Machine & Tool, Inc.**

21 Industrial Ave

Upper Saddle River, NJ. 07458 USA

Tel: (201) 962-7373

Fax: (201) 962-8353

General E-Mail: [info@phase2plus.com](mailto:info@phase2plus.com)

## **BEIJING, CHINA**

### **Phase II Measuring Instruments (Beijing) Ltd.**

Room 301, Bldg 2 Qing Yuan Xi Li, Haidian District, Beijing 100192, China

Tel: +86-10-59792409

Fax: +86-10-59814851

General E-mail: [info@phase2china.com.cn](mailto:info@phase2china.com.cn)

Revised: May 12, 2017

# Warranty /Return Policy

## Warranty Policy:

All portable and stationary material testing instruments manufactured for/by Phase II shall be free from defects in material and workmanship for a period of 1 to 5 full years (depending upon model) from date of purchase. Parts found to be defective shall be replaced or repaired at Phase II's sole discretion. Products found by Phase II to be misused, abused or neglected are not covered under this warranty. Parts not covered by this warranty are normal wear and consumable items such as (but not limited to) impact balls, impact bodies, diamond indenters, carbide ball indenters, impact springs, cables and connectors, batteries, diamond stylus, contact probes, points and test blocks.

**Consumable(wearable) items such as cables and probes have a 90 day warranty from date of purchase.**

This warranty is exclusive and in lieu of all other warranties whether written, oral or implied, including any implied warranties or merchantability or fitness for a particular purpose. In no event shall Phase II be liable for any incidental, special or consequential damages of any nature.

Any attempts to "open, modify, or tamper with" this device by anyone other than Phase II will result in a voided warranty.

## Return Policy:

All Phase II products must have authorization prior to return. If product is not acceptable for any reason including application issues and demonstrations, authorization for return must be obtained within 5 days of receipt of product. Unit must be in same new condition it was received. Failure to do so will result in an automatic 15% restocking fee. Returns after 30 days will not be accepted.