

RGB/HSB value, no lighting material color analysis

COLOR ANALYZER

Model : RGB-1002

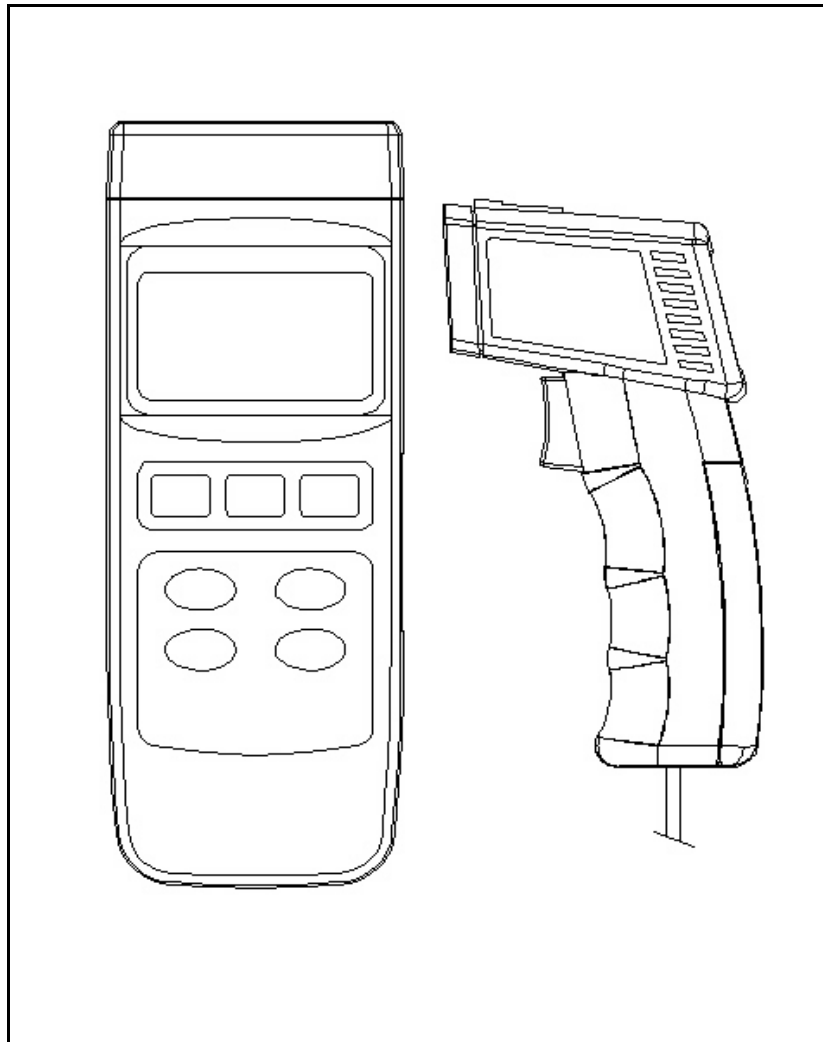


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1. FEATURES

- * The RGB-1002 is a portable color analyzer equipped with an external sensor probe having a 45° /0° color measuring geometry. The modern, accurate microprocessor technology uses the spectral analysis method to determine the color of the sample. Excellent repeatability due to spectroscopic analysis technique used.
- * Friendly operation, just press the operation button will get the color value (R, G, B or H, S, L).
- * Relative function, can easy to compare the color value of the different two measurement material.
- * The RGB-1002 is designed mainly for measuring the color of no lighting sample such as textiles, paper, leathers, painting materials..... It is the useful tool for the quality control and the wide industrial application.
- * The color analyzer also can measure the reference lighting sample color value such as CRT, LCD monitor, LED lamp, lighting lamp.....
- * For no lighting sample color measurement, a defined light source illuminates the sample and the reflected surface light is spectrometrically analyzed.
- * For lighting sample color measurement, the light source of sample is spectrometrically analyzed directly.
- * RS232 computer interface, can store the measuring color value in the computer for recording and the further color analysis.
- * Build in CAL (Calibration) button, for no lighting sample measurement, use the included white color calibration card to make the self calibration easily.
- * Hand held housing case, easy to carryout.
- * Power supply by 006P DC 9V battery or DC 9V adapter.

2. APPLICATION

- * To check the color value of textiles, paper, leathers, painting materials.
- * The objective quality control of color during production.
- * The color measurement and recording of products supplied by supplier to check for conformity specification.
- * The comparison of color samples against color standard.
- * The interpretation and statistic evaluation of color sample measurement.
- * To check the reference color value of CRT monitor, LCD monitor, light lamp.

3. SPECIFICATIONS

Display	LCD size : 59 mm x 34 mm.
Measuring geometry	45° /0° - circular illumination at 45° , measurement at 0° .
Spectral range	400 nm to 700 nm.
Light source	Two white LED lamp.
Measuring principle	For no lighting sample color measurement such as textiles, paper, leathers, painting materials....., a defined light source illuminates the sample and the reflected surface light is spectrometrically analyzed. <i>* For lighting sample color measurement, the light source of sample is spectrometrically analyzed directly.</i>
Color sensors	3 color photo transistors : <i>Red photo transistor</i> <i>Green photo transistor</i> <i>Blue photo transistor</i>
Measurement	RGB value R (Red) value : 0 to 1023. G (Green) value : 0 to 1023. B (Blue) value : 0 to 1023.
	HSL value Hue value : 0 to 1.000. Saturation value : 0 to 1.000. Luminance value : 0 to 1.000.

Repeatability	R (Red) value	< 3
	G (Green) value	< 3
	B (Blue) value	< 3
	Hue value	< 0.01
	Saturation value	< 0.01
	Luminance value	< 0.01
	<p><i>* Repeatability is specified under the same sample tested 10 times within two minutes.</i></p> <p><i>* Accuracy is specified under after the instrument is calibrated.</i></p>	
Measurement sample material type	<p>Type 1 : No lighting sample material : Such as textiles, paper, leathers...</p> <p>Type 2 : Lighting sample material : Such as CRT, LCD monitor, LED lamp, lighting lamp.....</p> <p><i>* The RGB-1002 is designed mainly for measuring the color value of type 1 (no lighting sample). For the type 2 (lighting sample) color measurement just for the reference only.</i></p>	
Buttons	OP button (Operation button)	
	CAL button (Calibration button)	
	REL button (Relative button)	
	RGB/HSL button (Select RGB or HSL value)	
	<p>Light ON/OFF button</p> <p><i>* No lighting sample measurement, select the sensor light to on.</i></p> <p><i>* Lighting sample measurement, select the sensor light to off.</i></p>	

Power off	Auto shut off saves battery life or manual off by push button. <i>* Power will off automatically after 3 min., if no buttons be pressed.</i>
Low battery	Low battery indicator.
Calibration	Self calibration. <i>* The calibration white calibration card is included.</i>
Computer interface	RS 232 PC serial interface.
Operating Temperature	0 °C to 50 °C (32 °F to 122 °F).
Operating Humidity	Less than 80% RH.
Power Supply	DC 9V battery, Alkaline type 006P, MN1604(PP3) or equivalent.
	DC 9V adapter input. <i>@ AC/DC power adapter is optional.</i>
Power Current	Standby : Approx. DC 6.3 mA. Measurement : Approx. DC 32 mA. (2 SEC.)
Weight	478 g/ 1.05 LB. <i>* Main instrument and the sensor probe</i>
Dimension	<i>Main instrument : 203 x 76 x 38 mm</i> <i>Sensor probe : 160x92x45 mm</i>
Accessories Included	Instruction manual..... 1 PC. Sensor probe (RGB-1002P)..... 1 PC. White color calibration card..... 1 PC. Carrying case, CA-06..... 1 PC.
Optional Accessories	<i>* AC to DC 9V adapter.</i> <i>* RS232 cable, UPCB-02.</i> <i>* Data Acquisition software, SW-U801-WIN.</i>

4. FRONT PANEL & LAYOUT DESCRIPTION

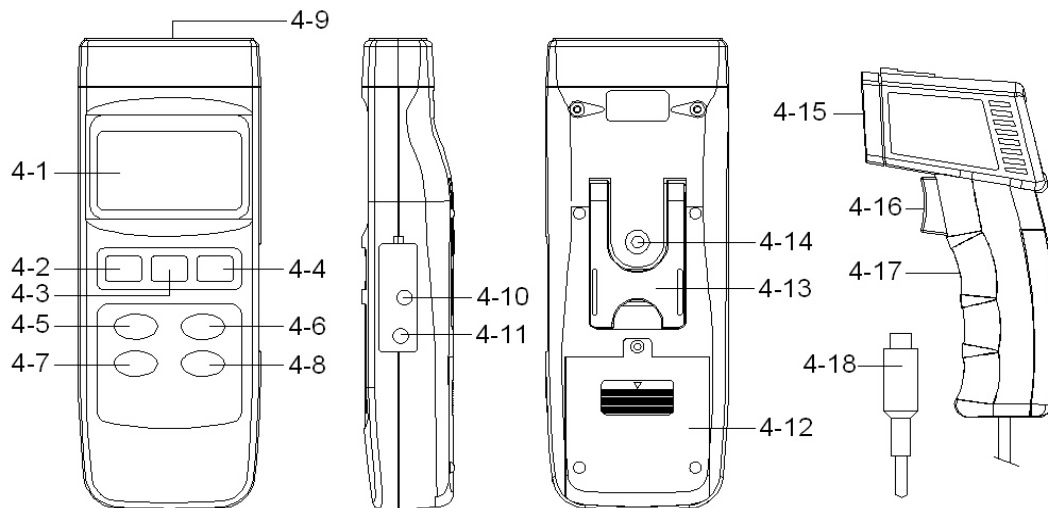


Fig. 1

- | | |
|------------------------------|---------------------------------|
| 4-1 Display | 4-10 RS232 socket |
| 4-2 Power button | 4-11 DC 9V Adapter Input Socket |
| 4-3 OP button (Meter) | 4-12 Battery cover/compartament |
| 4-4 Function button | 4-13 Stand |
| 4-5 CAL (Calibration) button | 4-14 Tripod screw |
| 4-6 REL (Relative) button. | 4-15 Color sensor head |
| 4-7 RGB/HSL button | 4-16 OP button (Probe) |
| 4-8 LIGHT ON/OFF button | 4-17 Probe handle |
| 4-9 Input socket | 4-18 Probe plug |

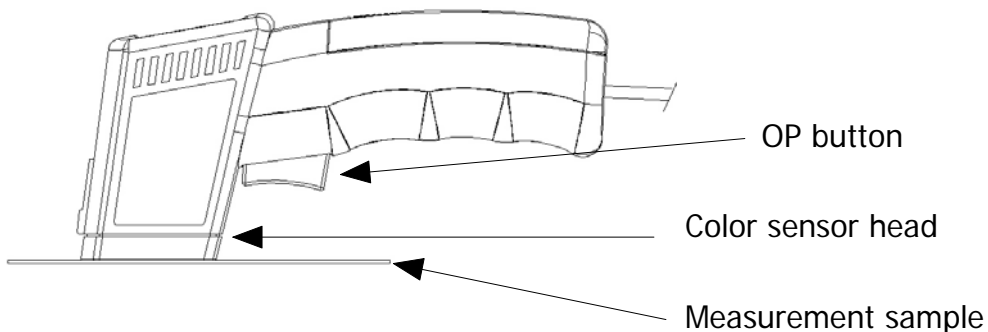
5. OPERATION PROCEDURES

5-1 No lighting sample color measurement

No lighting sample is the unit that can not lit itself, such as paper, textile, painting, plastic, painting material...

The RGB-1002 is designed mainly for measuring the color of no lighting sample

- 1) Connect the " Probe plug " (4-17, Fig. 1) to the " Input socket " (4-9, Fig. 1).
- 2) Switch ON the meter by pressing the " Power button " (4-2, Fig. 1), the display will show zero value both for RGB unit.
- 3) Use the hand to hold " Probe handle " (4-17, Fig. 1). Contact the " Color sensor head " (4-15, Fig. 1) close to the measurement sample firmly.



4) **RGB value measurement**

Press the " OP button " (4-16 or 4-3, Fig. 1) once, the display will show the symbol " Mesu ", waiting few seconds the display will show R,G,B value. After the R,G,B value present on the LCD, the measuring procedures are finished, the hand can move away from the probe handle.

H,S,L value measurement

If intend to get the H,S,L (Hue, Saturation, Luminance) value, just press the " RGB/HSL button " (4-7, Fig. 1) once, the display will show H,S,L value.

Press the " RGB/HSL button " once again, display will return to R,G,B value.

RGB value	R (Red) value : 0 to 1023 G (Green) value : 0 to 1023 B (Blue) value : 0 to 1023
HSL value	Hue value : 0 to 1.000 Saturation value : 0 to 1.000 Luminance value : 0 to 1.000

Consideration :

The HSL color are more closely approximates how the human eye distinguishes color as compared to the common RGB color value. Hue is what distinguishes one color from another. You can think of hue as which color. Saturation is how much color, or the purity of the color. Luminance is how bright or intense the color is. Markers point to where the color is located in HSL color

Warning :

For no lighting sample color measurement, when press the " OP button " (4-16 or 4-3, Fig. 1) once, the " Color sensor head " (4-15, Fig. 1) should turn on the white light.

If the " Color sensor head " switch off the white light. then should take the actions :

- a. Power ON the meter, do not press the " OP button ".
- b. Press the 'LIGHT ON/OFF button " (4-8, Fig. 1) once.
Press the " OP button " again, the " Color sensor head " will turn on the white light.

- * During press the " OP button ", if the " Color sensor head " turn on the white light, it is ready for " No lighting sample color measurement ".
- * During press the " OP button ", if the " Color sensor head " switch off the white light, it is just ready for " Lighting sample color measurement ", refer chapter 5-2.

5-2 Lighting sample color measurement

Lighting sample is the unit that can lit itself, such as CRT monitor, LCD monitor, LED lamp, lighting lamp....

The RGB-1002 is designed mainly for measuring the color of no lighting sample. However it can measure the lighting sample color value for reference.

- 1) Press the " OP button " (4-16 or 4-3, Fig. 1) once to check if the " Color sensor head " already switch off the white light.
 - * During press the " OP button ", if the " Color sensor head " switch off the white light, it is ready for " Lighting sample color measurement ".
 - * During press the " OP button ", if the " Color sensor head " turn on the white light, it is ready for " No lighting sample color measurement ", refer chapter 5-1.
 - * If the " Color sensor head " turn on the white light, then should take the actions :
 - a. Power ON the meter, do not press the " OP button ".
 - b. Press the 'LIGHT ON/OFF button " (4-8, Fig. 1) once.
Press the " OP button " again, the " Color sensor head " will switch off the white light.

- 2) Power ON the meter, use the hand to hold " Probe handle " (4-17, Fig. 1). Contact the " Color sensor head " (4-15, Fig. 1) close to the measurement lighting sample firmly.
- 3) Press the " OP button " (4-16 or 4-3, Fig. 1) once, the display will show the symbol " Mesu ", waiting few seconds the display will show R,G,B value. After the R,G,B value present on the LCD, the measuring procedures are finished, the hand can move away from the probe handle.
If intend to get the H,S,L value, just press the " RGB/HSL button " (4-7, Fig. 1) once, the display will show H,S,L value. Press the " RGB/HSL button " once again, display will return to R,G,B value.

5-3 Relative measurement

- 1) During the measurement, after the display show R,G,B value (H,G,L value), if press the " REL (Relative) button " (4-6, Fig. 1) once, the display will show zero value with flashing.
- 2) If make the new measurement (same as chapter 5-1), then press the " OP button " (4-16 or 4-3, Fig. 1) once, the display will show the relative difference color value (new color value deduct the original color value) with flashing.
- 3) Press the " REL (Relative) button " (4-6, Fig. 1) once again, the display will return to normal function.

6. CALIBRATION PROCEDURES

- 1) Refer chapter 5-1, no lighting sample measurement procedures.
- 2) Prepare the attached " White color calibration card ",.
- 3) Use the hand to hold " Probe handle " (4-17, Fig. 1).
Contact the " Color sensor head " (4-15, Fig. 1) close to the " White color calibration card " firmly.
- 4) Press both the " Function button " (4-4, Fig. 1) and " CAL button " (4-5, Fig. 1) once a while.
The display will show the following screens in sequence as :

R	CAL
---	-----

Wait approx.
30 seconds



R	CAL
	1 0 2 3

Wait approx.
10 seconds



R	CAL
G	1 0 2 3
	1 0 2 3

Wait approx.
10 seconds



R	CAL
G	1 0 2 3
B	1 0 2 3
	1 0 2 3

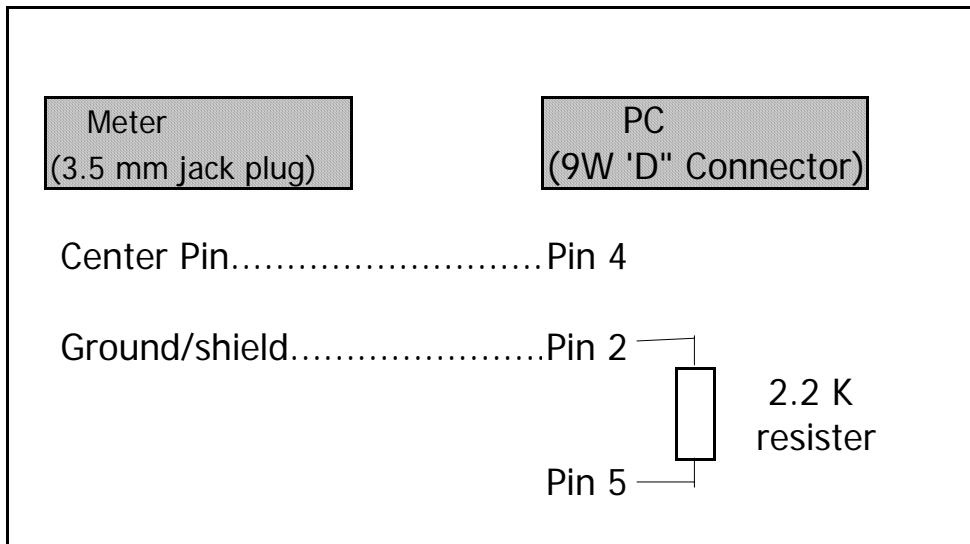
Generate
3 beep sound
and finish
the calibration
procedures

7. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (4-10, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0


Each digit indicates the following status :

D0	End Word = 0D		
D1 & D8	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1 = 1 DP, 2 = 2 DP, 3 = 3 DP		
D10	Polarity 0 = Positive 1 = Negative		
D11 & D12	Annunciator for Display		
	R = 70	G = 71	B = 72
	H = 42	S = 73	L = 99
D13	When sending the R color value = 1 When sending the G color value = 2 When sending the B color value = 3 When sending the H color value = 4 When sending the S color value = 5 When sending the L color value = 6 <i>* Send the R, G, B, H, S, L value in sequence.</i>		
D14	4		
D15	Start Word = 02		

RS232 setting

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

8. BATTERY REPLACEMENT

- 1) When the LCD show the low battery symbol "  ", it is necessary to replace the battery.
- 2) Slide the " Battery Cover " (4-12, Fig. 1) away from the instrument and remove the battery.
- 3) Replace with 9V battery (Alkaline type).
- 4) Make sure the battery cover is secured after changing the battery.

9. TROUBLE SHOOTING

- 1) During make the normal " no lighting sample " color value measurement, if the display value show not normal value (small value), please check when press the " OP button " if the " Color sensor head " (4-15, Fig. 1) turn on the white light or not , if not, please fix it (refer page 9).
- 2) If the meter's circuit system hold :
 - a. Meter can not power ON.
 - b. After power ON, can not operate the buttons,
Then please take away the battery from the meter,
then install the battery again.