

# Features

## Point1 Luminance accuracy

Delivers luminance accuracy within  $\pm 2\%$  (for Standard source A, measurement angle 20, luminance 5cd/m<sup>2</sup> or above, Auto Range)

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## Point2 Delivers two methods for simplifying instrument correction

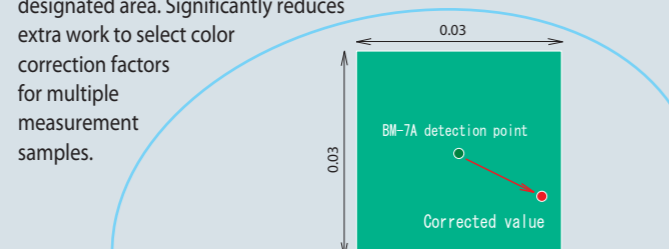
### Direct Correction

Color correction factors can now be directly entered into the BM-7A Luminance Colorimeter without relying on a PC, through direction connection to an SR-3A Spectroradiometer, SC-777 Spectral Colorimeter or another BM-7A unit. RS-232C cable is required for correction. Corrections are automatically calculated and entered based on reference luminance meter data, and data from the BM-7A unit being corrected.

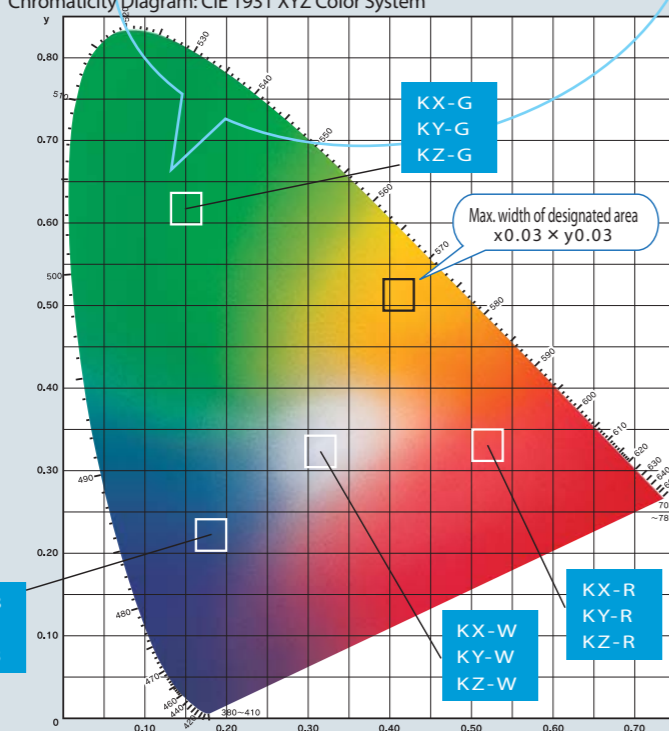


### Area Correction (Using Optional CM-700 Software)

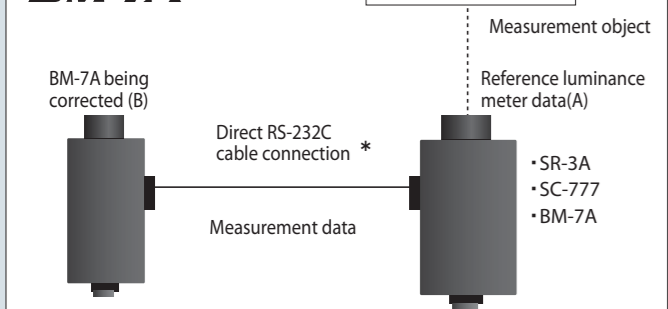
Automatically applies specified color correction factors (KX, KY, KZ) when the BM-7A Luminance Colorimeter detects light within the designated area. Significantly reduces extra work to select color correction factors for multiple measurement samples.



Chromaticity Diagram: CIE 1931 XYZ Color System



### BM-7A



\*Type of RS-232C cable depends on luminance meter used as reference.

For correction between measurement instruments using the direct correction feature: The following procedure is used to automatically calculate correction factors and save them. First, use the reference instrument (A) to measure the object, and write the data to the BM-7A unit (B) that is being corrected. Next, use it to measure the same point.

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KX-B  
KY-B  
KZ-B

KX-W  
KY-W  
KZ-W

KX-R  
KY-R  
KZ-R

## Point3 Delivers high-speed measurement

Measurement speed of just 0.5 seconds. Ideal for inline measurement in mass production settings.

## Point4 Internal interfaces

Dual interface options: USB 1.1 and RS-232C.



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## Point5 Analog output (optional)

Optional three-channel analog output to X2, Y and Z channels for recording and waveform observation using a recorder or oscilloscope.

○Analog output (Unit:ms)

FAST	Range1	Range2	Range3	Range4	Range5
	30	30	30	0.3	0.3

Above response speed indicates time required for BM-7A analog output to reach 90% of peak value, when measuring an LED using a square wave produced by a function generator.

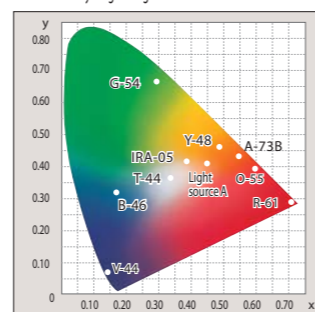
- Output impedance is approximately 100Ω.
- Recording instrument must have input impedance of 10 kΩ or above.
- Output voltage: 0-3.0V
- [Note] Customer must specify analog output at time of purchase.

## Specifications, Performance

Optics	Objective lens: Focal distance f = 80mm, F2.5 Eyepiece lens: 50 view field, $\pm 5$ diopter adjustment range					
Spectral response characteristic	Similar to CIE1931 color matching functions					
Photo cell	3-element silicon photodiode (X, Y, Z)					
Measurement angle	Selectable aperture of 20, 10, 0.20 and 0.10					
Measurement distance	350 mm to " (from front of objective lens)					
Measurement diameter (mm)	Measurement angle	Measurement distance (mm)				
		350	500	1000	5000	10000
	2°	10	15.4	32.8	169	341
	1°	5	7.7	16.4	85	170
	0.2°	1	1.5	3.3	17	34
0.1°	0.5	0.8	1.6	8	17	
Measurement functions	x, y, L, L <sub>v</sub> , chromaticity coordinates, L (luminance) $\pm \epsilon$ , u', v', L <sub>v</sub> (L <sub>v</sub> : chromaticity coordinates, L (luminance) $\pm \epsilon$ ) X, Y, Z, L, Z <sub>v</sub> (stimulus values) $\pm \epsilon$ , T <sub>c</sub> , d <sub>uv</sub> (CIE combined color temperature deviation) $\pm \epsilon$ , CIE 1931 L <sub>v</sub> V <sub>v</sub> <sup>0</sup> $\pm \epsilon$ , $\Delta E_{ab}^*$ $\pm \Delta a$ , CIE 1931 L <sub>v</sub> V <sub>v</sub> <sup>0</sup> $\pm \epsilon$ CIE 1976 L <sup>*</sup> a <sup>*</sup> b <sup>*</sup> /E <sup>*</sup> , Eab <sup>*</sup> $\pm \epsilon$ , CIE 1976 L <sup>*</sup> u <sup>*</sup> v <sup>*</sup> /E <sup>*</sup> , Euv <sup>*</sup> $\pm \epsilon$					
Measurement range	Auto, Manual (5-step selectable)					
Measurement range (not a guaranteed accuracy range)	0.01 ~ 12,000,000 cd/m <sup>2</sup>					
		Measurement angle				
		20	10	0.20	0.10	
	Range 1	0.01 ~ 30	0.04 ~ 120	1 ~ 3,000	4 ~ 12,000	
	Range 2	0.03 ~ 90	0.12 ~ 360	3 ~ 9,000	12 ~ 36,000	
Range 3	0.1 ~ 300	0.4 ~ 1,200	10 ~ 30,000	40 ~ 120,000		
Range 4	1 ~ 3,000	4 ~ 12,000	100 ~ 300,000	400 ~ 1,200,000		
Range 5	10 ~ 30,000	40 ~ 120,000	1,000 ~ 3,000,000	4,000 ~ 12,000,000		
Accuracy (for standard source A)	○Luminance 1: 1-5 cd/m <sup>2</sup> within $\pm 4\%$ (measurement angle 20 Auto Range)					
	○Luminance 2: 5 cd/m <sup>2</sup> or above within $\pm 2\%$ (measurement angle 20 Auto Range)					
	○Chromaticity 1: dx, dy within $\pm 0.002$ (10 cd/m <sup>2</sup> or above)					
	○Chromaticity 2: dx, dy within $\pm 0.01$ (0-55, Y-48, A-73B, IRA-05, T-44) : dx, dy within $\pm 0.03$ (R-61, B-46, V-44, G-54) ※For combined standard source A (100 cd/m <sup>2</sup> ) and color glass filter					
Repeatability (for standard source A)	○Luminance 1: 1-5 cd/m <sup>2</sup> : 1% or less (measurement angle 20, 2 $\sigma$ , SLOW mode, Auto Range)					
	○Luminance 2: 5 cd/m <sup>2</sup> or above: 0.5% or less (measurement angle 20, 2 $\sigma$ , SLOW mode, Auto Range)					
	○Chromaticity 1: 1-5 cd/m <sup>2</sup> chromaticity x, y: within 0.005 (measurement angle 20 SLOW mode, Auto Range)					
	○Chromaticity 2: 5 cd/m <sup>2</sup> or above, chromaticity x, y: within 0.002 (measurement angle 20 SLOW mode, Auto Range)					
Measurement time	Approx. 0.5 sec (FAST or SLOW)					
Display	Dot matrix LCD: 20 digits x 4 lines with illumination function					
Minimum luminance display	0.01 cd/m <sup>2</sup>					
Interface	Selectable USB 1.1 or RS-232C					
Power supply	Dedicated AC adapter (AC 100V to 240V, 50/60 Hz)					
Power consumption	Approx. 2.5W					
Operating requirements	Temperature: 0-40°C Humidity: Below 85% RH (must be condensation free)					
Storage requirements	Temperature: -20 to 60°C Humidity: Below 85% RH (must be condensation free)					
External dimensions	Approx. 325 x 120 x 162 mm (L x W x H)					
Weight	Approx. 3 kg (main unit only)					

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### Chromaticity Diagram: Light Source A+Color Glass Filter



### BM-7A Standard Package

- BM-7A Luminance Colorimeter .....1ea.
- AC adapter .....1ea.
- Objective lens cap .....1ea.
- Eyepiece lens cap .....1ea.
- Instruction Manual .....1ea.

※Carrying case is separate.



※Some screens are simulated.  
※The specifications and external appearances of product in this catalogue may be changed without prior notice due to improvements.  
※The catalogue includes products that are sold separately.  
※The actual color of products may differ slightly from the catalogue due to lighting and printing conditions.

## TOPCON TECHNOHOUSE CORPORATION

75-1 Hasunuma-cho, Itabashi-ku, Tokyo 174-8580  
Phone: 03-3558-2666 Fax: 03-3558-4661  
E-mail: [techno-info@topcon.co.jp](mailto:techno-info@topcon.co.jp)

**Note** Make sure to carefully read the "User's Manual" to ensure that you use the product properly and safely.

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## Optional Accessories



### AL-6/AL-11 Attachment Lens

Attaches to the objective lens on the BM-7A unit. Shortens the focal distance and shrinks the minimum measurement area for measurement of small objects.

(Specifications for Measuring Small Objects)

Measurement diameter (mm)	Measurement angle	AL-6 (measurement distance: 52~67mm)	AL-11 (measurement distance: 20.4~24.8mm)
		20	1.98 ~ 2.75
10	0.99 ~ 1.37	0.61 ~ 0.74	
0.20	0.20 ~ 0.27	0.12 ~ 0.15	
0.10	0.10 ~ 0.13	0.06 ~ 0.07	

※Measurement distance may differ slightly depending on aperture mirror machining accuracy.

※Measurement distance is from metal tip of attachment lens.



### WS-3 Reference White Board

Used for measurement of object color or light source with directionality.

- Luminance factor: 90% or above (for measurement parameters of 0° incidence and 45° observation)
- Material: Barium sulfate (BaSO<sub>4</sub>)
- Dimensions: 78 mm  $\phi$ , t: 12.5 mm ●Effective white surface: 40 mm  $\phi$  (at center)



### FP-3 Fiber Probe

Light guide used for remote detection of light from measurement object.

- Effective measurement angle: 20° ●Measurement diameter: 3-10 mm  $\phi$
- Measurement distance: 31.0-84.9 mm ●Fiber length: Approx. 1m



### IA-1A ITV Adapter

Adapter for connecting BM-7A to CCD camera.



### MF-10/MF-100 Mesh Filter

Mesh type filter for measuring objects with brightness exceeding measurement range of BM-7A.



### Tripod V

Simplifies collimation of measurement object.

- Max. height: 1830 mm ●Min. height: 585 mm
- Folded length: 810 mm ●Leg sections: 3
- Weight: 4.7 kg (with pan head)



### Fine Adjustment Stand S-4

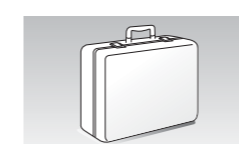
Simplifies vertical and lateral collimation when attaching BM-7A. (Unit must be removed from pan head of type S tripod.)

- Elevation angle: 40° ●Depression angle: 80°
- Rotation: 360° ●Weight: Approx. 1.7 kg



### CM-700 Application Software

Software for management of measured data with graphing and file management features.



### Carrying Case

Convenient carrying case for transport or storage when not in use.



## Luminance Colorimeter

# BM-7A



High speed

High Accuracy

Cost reduction

Printed using soy ink.



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Printed in Japan 2006 10-11 TD 6-1

Delivers improved luminance accuracy and faster measurement speed.  
Connects directly to standard instruments for direct color correction.

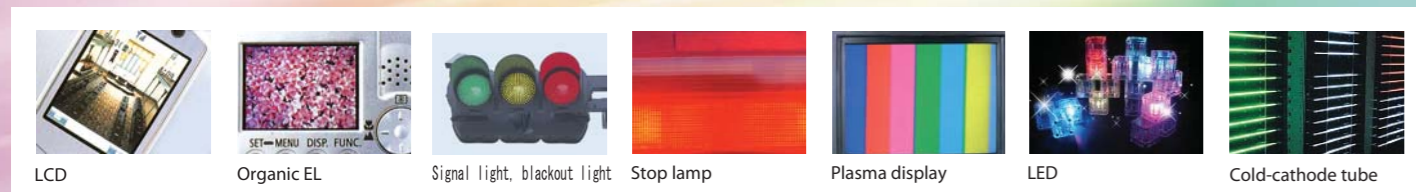
The new BM-7A Luminance Colorimeter builds upon its predecessor, the BM-7 Luminance Colorimeter, with photoelectric tristimulus colorimetry for broad application in luminance and chromaticity measurement. The BM-7A improves performance with even better accuracy and faster measurement speed, supporting varied applications for light source color measurement.

The BM-7A Luminance Colorimeter also connects directly to standard instruments for direct correction, including our SR-3A Spectroradiometer, SC-777 Spectral Colorimeter or another BM-7A unit. It reduces the extra work of entering instrument correction values, significantly reducing your quality control costs.



### Main Applications for BM-7A

Optical property evaluation for flat panel displays, luminance/chromaticity/color temperature measurement for lamps and other light sources



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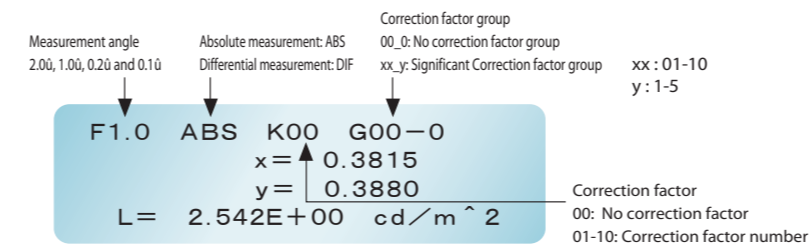


## Luminance Colorimeter BM-7A

Extensive calculation and display capabilities, yet easy to operate

### Display

Measurement results are displayed in the screen readout at right.



### Display Mode

Sets the display mode for measurement data. Four display modes can be selected, as shown below.

#### Chromaticity (xy), Luminance (L)

F1.0 ABS K00 G00-0  
x = 0.3815  
y = 0.3880  
L = 2.542E+00 cd/m<sup>2</sup>

#### Tristimulus values (X, Y, Z)

F1.0 ABS K00 G00-0  
X = 1.099E+02  
Y = 1.000E+02 cd/m<sup>2</sup>  
Z = 3.559E+02

#### Chromaticity (u'v'), Luminance (L)

F1.0 ABS K00 G00-0  
u' = 0.3815  
v' = 0.3880  
L = 2.542E+00 cd/m<sup>2</sup>

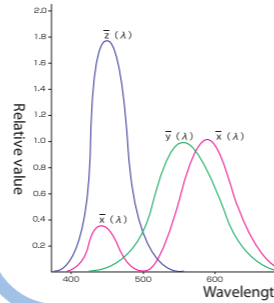
#### Correlated color temperature (Tc), Deviation (duv), Luminance (L)

F1.0 ABS K00 G00-0  
Tc = 2856K  
duv = 0.0000  
L = 8.940E+01 cd/m<sup>2</sup>

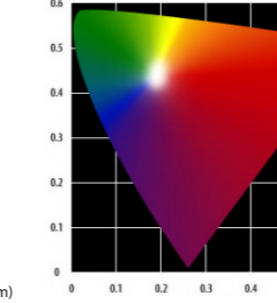
### Differential Measurement

F1.0 DIF K00 G00-0  
x = 0.0001  
y = -0.0000  
L = 1.240E-03 cd/m<sup>2</sup>

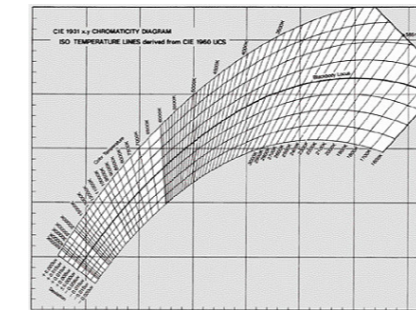
#### Color matching function



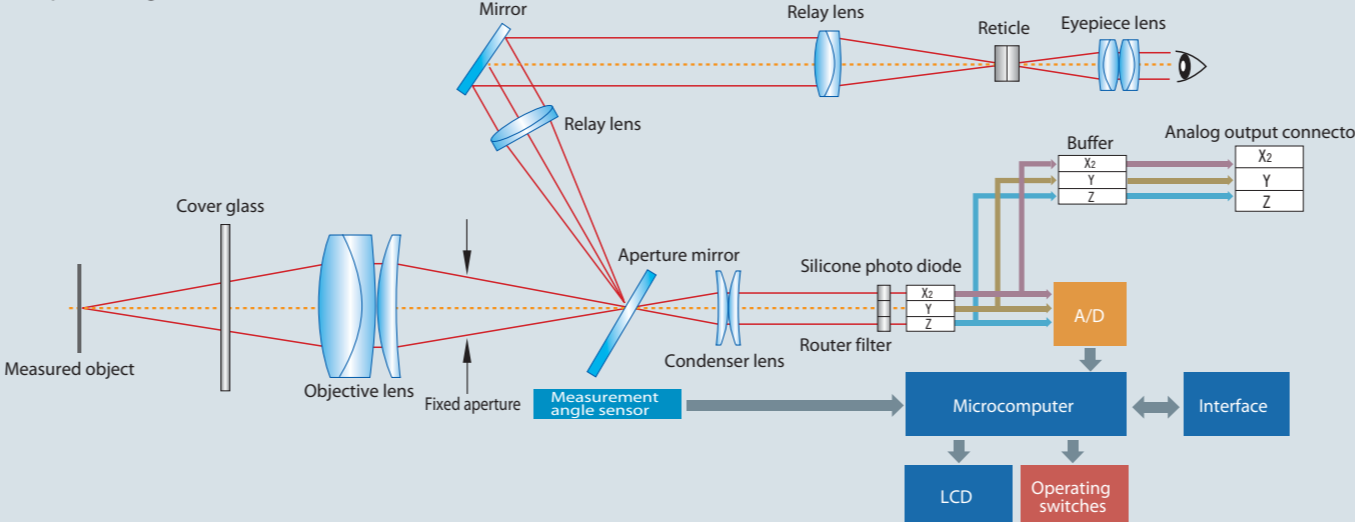
#### u'v' Chromaticity Diagram



#### Isotemperature Line and Blackbody Locus



### Optics Diagram



Software to simplify graphing and automatic measurement.

### Communication

Data from BM-7A during remote operation:

- Measurement data
- Luminance
- Tristimulus values (X, Y, Z)
- Chromaticity (x, y)
- Chromaticity (u'v')
- Correlated color temperature
- Deviance in color temperature
- BM-7A status data
- Model (BM-7A)
- Unit number
- Unit version number
- Correction factor

### Requirements for Included Software

- OS: Windows 2000/XP
- Memory: As recommended for your OS
- Hard disk: 10 MB or more
- Interface: RS-232C/USB1.1

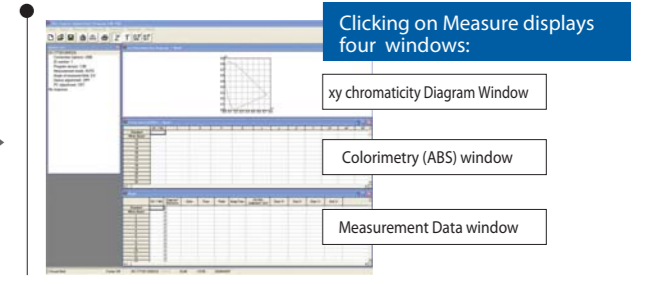
### Requirements for CM-700 Application Software (Not Included)

OS	Windows 2000 Professional, Windows XP Professional, Windows XP Home Edition
CPU	Pentium 600 MHz or better
Memory	256 MB of RAM or more
Hard disk	60 MB or more
Interface	RS-232C serial port (1), USB 1.1 port (2)
Screen resolution	1024 x 768, 256 colors
Languages	Japanese, English

\*Windows is a registered trademark of Microsoft Corp. in the US and in other countries.

### Major Features of CM-700 Software

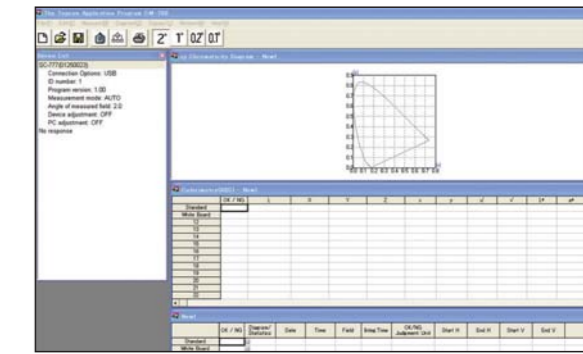
- 1 Single unit control  
Multiple unit control  
Opens existing file
  - 2 Click the button for one of the following operations.
- Single Control ▶ For measurement using a single luminance meter (single point measurement).
  - Multicontrol ▶ For simultaneous measurement using multiple luminance meters (multi-point measurement).
  - Open File ▶ Reads an existing file.



### Configurable Parameters

Response speed	Selects the response speed. ◎FAST For measuring fixed light sources such as sunlight and halogen lamps, as well as light sources for high-frequency lamps such as LCD backlights. ◎SLOW For general measurement of fixed lights, high-frequency flashing lights and flashing light sources such as fluorescent lights and CRTs.
Range	Selects AUTO or MANUAL configuration of measurement range. ◎AUTO For automatic configuration of range according to brightness of measured object. ◎MANUAL For manual configuration of X, Y and Z ranges.
Average	To take the average value as the measurement value, enter the number of measurements to be taken.
No. of measurements	Selects the mode for the measurement frequency. ◎Single Takes a single measurement. ◎Interval Takes measurements at the user-specified interval, repeated by the number of times specified by the user. ◎Continue Performs continuous measurement, repeated by the number of times specified by the user.
CIE Type	Selects the observation angle for CIE color matching function. The selected spectrum data is used in the following windows. (BM-7A: Fixed at 2°.) ◎Colorimetric value (ABS) ◎Colorimetric value (DIF) ◎Chromaticity statistics
Time series graph	Displays the measurement result (L) in time series.
Measure button	Clicking the button executes the measurement according to the configured parameters, and displays the measurement results in the windows.

### Example: Data Verification on BM-7A



### System Diagram



### Hardware Features



### Dimensions (mm)

