Luminance Colorimeter

BM-5AC

BM-5A series for next-generation!
Connecting to Oscilloscope through analog output, The BM-5AC can measure build up time and fall down time of flicker light. Example) Rise and fall response characteristics, frequency, etc. of a flashing light source.

For measurement of luminance, chromaticity and color temperature, for example; optical characteristic test, Interior panel for automobile, Speed meter for automobile, Fluorescent substance.

 RESPONSE SPEED OF ANALOG OUTPUT

<table>
<thead>
<tr>
<th>Range</th>
<th>NORMAL</th>
<th>FAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 1</td>
<td>30ms</td>
<td>5ms</td>
</tr>
<tr>
<td>Range 2</td>
<td>30ms</td>
<td>0.5ms</td>
</tr>
<tr>
<td>Range 3</td>
<td>30ms</td>
<td>0.05ms</td>
</tr>
<tr>
<td>Range 4</td>
<td>30ms</td>
<td>0.5ms</td>
</tr>
<tr>
<td>Range 5</td>
<td>30ms</td>
<td>0.05ms</td>
</tr>
</tbody>
</table>

*The response speed in the table above is the time that it takes analog output from the instrument to reach 90% of the peak value, when measuring an LED driven by a square wave from a function generator.

**Usage**

For measurement of luminance, chromaticity and color temperature, for example; optical characteristic test, Interior panel for automobile, Speed meter for automobile, Fluorescent substance.

**Feature**

**POINT.1** High speed measuring for ultra low luminance.  
It can measure the luminance as ultra low as 0.005 cd/m² at about 2 second.  
Note: For measurement angle of 3 degree.

**POINT.2** Wide measurement area  
Selectable 5 measurement angle 0.1° / 0.2° / 1° / 2° / 3° enable you to measure the luminance from small to wide area without attachment lens.

**POINT.3** Analog output  
The BM-5AC can connect to the recorder and the oscilloscope through analog output X,Y, Z (selectable).

**POINT.4** USB Interface  
The BM-5AC is equipped with USB and RS-232C interface.

**Block diagram**
Standard accessories software supports control of instrument and data collection

BM-5AC colorimetry software CS-900A (standard accessory)

Application software CS-900A for Windows supports BM-5AC. You can control BM-5AC using the CS-900A, and collect, save, plot on a graph and calculate of the measured data and, use them for many purpose.

On the Colorimetry mode, it can shorten the communication time between the instrument and PC due to omitting spectral data transmission.

xy chromaticity graph

Colorimetry data
Measurement conditions / note

xy chromaticity graph
u*v* chromaticity graph
u'v' chromaticity graph
a*b* chromaticity graph

Color space mode:
L, xy, XYZ, u\', v\', L*a*b*, Correlated color temperature, Deviation, Dominant wavelength, Chromaticity Statistics

Mode selection:
AUTO EACH : The measuring device determines optimum measuring range for each fiber automatically
AUTO ALL: The measuring device determines measuring range automatically based on highest value among X, Y, Z.
MANUAL EACH: Use this mode to set common measurement range for among X, Y, Z manually.
MANUAL ALL : Use this mode to set individual measurement range to each X, Y, Z filter manually.

Select the measurement mode:
Color Range Setting

Select the measurement mode:
Color Range Setting

Color Range Setting:
Single / Interval / Continue

The software determines whether or not the measured color data fall within the specified range in the color diagram.

System required (recommended)

- OS : Windows® 7 Ultimate / Professional (32bit / 64bit)
- Windows® 8.1 Pro or more (32bit/64bit)
- Windows® 10 Pro or more (32bit/64bit)
- CPU : Intel® Core™ i3 2.4GHz or more
- Memory : 1GB or more
- Ports : USB2.0 (One port) / RS-232C serial port (One port)

*The RS-232C cable (straight cable for DOS/V PC) must be purchased separately.

- Name of the parts

Measurement angle selectable switch
(3° / 2° / 1° / 0.2° / 0.1°)
Objective lens
(20x, 12x, 10x, 5x)
Panel switch
- NORMAL / FINE switch...Setting measurement range
- SINGLE / AVE switch...Setting average measurement
- CHANGE switch: Change display mode, memory change item
- CALIBRATION switch...Start calibration
- SHIFT switch: Shift the figure in display
- LAMP switch...ON / OFF of Back light of display
- MODE switch...Change color diagram mode
- FUNCTION switch: Enter function mode / return

* The switches in parentheses are enabled while in function mode.
**Specification**

**Optical system**
- Objective lens: f=80mm, F1.5
- Eyepiece lens: Vane field 5°, Dipter adjustment range ±5 dipter

**Spectral sensitivity**
- Similar to CIE1931 color matching function

**Photo-detector**
- Photomultiplier tube

**Measurement angle**
- Selectable: 3°, 2°, 1°, 0.2°, 0.1°

**Measurement distance**
- 350mm to ∞

<table>
<thead>
<tr>
<th>Measurement angle</th>
<th>Measurement distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3°</td>
<td>350</td>
</tr>
<tr>
<td>2°</td>
<td>300</td>
</tr>
<tr>
<td>1°</td>
<td>250</td>
</tr>
<tr>
<td>0.2°</td>
<td>200</td>
</tr>
<tr>
<td>0.1°</td>
<td>150</td>
</tr>
</tbody>
</table>

**Repeatability**
- Luminance: ±4% (for standard source A)
- Chromaticity1: dx,dy within ±0.005 (Auto range, for standard source A)
- Chromaticity2: dx,dy within ±0.008 (D-55, Y=48, ALRA 65.7, 44R, E=1.8, 44L, 44G, 54)

**Accuracy**
- Luminance: ±4% (for standard source A)
- Chromaticity: ±0.005 (for standard source A)

**Measurement range**
- Auto / Manual 5 steps selectable

**Function**
- Luminance, CIE1931 chromaticity coordinates, CIE1976 chromaticity coordinates, Tristimulus value XYZ, Correlated color temperature and Deviation, CIE1976 L*a*b*, Eab*±Δ, CIE1976 L*u*v*, Euv*±Δ
- For a combination of the standard source A and the next colored glass, when COLOR ADJUSTMENT is applied

**Measurement distance**
- 4 to 1,200,000 cd/m²

**Luminance range**
- For guaranteed accuracy
- 0.05cd/m² or more: 2% or less 0.05cd/m² or above: 0.8% or less

**Accuracy**
- Luminance: ±4% (for standard source A)
- Chromaticity: ±0.005 (for standard source A)

**Measurement diameter**
- 3°: 0.2cd/m² or more 2°: 0.05cd/m² or more 1°: 0.025cd/m² or more 0.2°: 0.01cd/m² or more 0.1°: 0.005cd/m² or more

**Accuracy**
- Luminance: ±4% (for standard source A)
- Chromaticity: ±0.005 (for standard source A)

**Measuring field**
- 1°: 0.2cd/m² or more 2°: 0.05cd/m² or more 3°: 0.025cd/m² or more 4°: 0.01cd/m² or more

**Accuracy**
- Luminance: ±4% (for standard source A)
- Chromaticity: ±0.005 (for standard source A)

**Measurement distance**
- About 2 seconds (Single measurement mode)

**Display**
- Dot matrix 20 characters x 4 lines with back light

**Interface**
- USB / RS-232C

**Power supply**
- Dedicated AC adapter

**Power consumption**
- Approximately 20VA when using an AC adapter

**Operating condition**
- Temperature: 0 to 40°C, Humidity: 85% R.H. or less (no condensation)

**Storage condition**
- Temperature: -20 to 60°C, Humidity: 85% R.H. or less (no condensation)

**External dimension**
- Approx 355mm x 154mm x 212mm (LxWxD)

**Weight**
- Approx 3.6kg (main unit only)

**SAFETY PRECAUTIONS**

- Make sure to carefully read the "Manual" to ensure that you use the product properly and safely.
- Always connect the instrument to the specified power supply voltage. Improper connection may cause a fire or electric shock.

**-Extra-cost option**

**Attachment lens AL-6 / AL-11 / AL-12**

- Placing the attachment lens on the instrument’s objective lens, the focal distance shorten and reduce the minimum measurement area.

<table>
<thead>
<tr>
<th>Measurement angle</th>
<th>AL-6</th>
<th>AL-11</th>
<th>AL-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>3°</td>
<td>2.91 to 4.14</td>
<td>1.76 to 2.18</td>
<td>4.83 to 5.91</td>
</tr>
<tr>
<td>2°</td>
<td>1.94 to 2.76</td>
<td>1.18 to 1.45</td>
<td>3.23 to 3.97</td>
</tr>
<tr>
<td>1°</td>
<td>0.97 to 1.38</td>
<td>0.59 to 0.72</td>
<td>1.61 to 1.97</td>
</tr>
<tr>
<td>0.2°</td>
<td>0.20 to 0.27</td>
<td>0.12 to 0.14</td>
<td>0.32 to 0.46</td>
</tr>
<tr>
<td>0.1°</td>
<td>0.10 to 0.13</td>
<td>0.06 to 0.07</td>
<td>0.16 to 0.20</td>
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</table>

**White standard board WS-3**

- Uses when measuring object color and direction high directivity light.
  - Luminance factor: 90% or less (Incidence 0°, Observation 45°)
  - Material: Barium sulfate (BISO)
  - Dimension: ø87mm, t=12.5mm
  - Effective white surface: ø40mm (Central portion)

**Fiber probe FP-3**

- Light guide
  - Effective measuring angle 2°
  - Measurement diameter: ø1 to 10mm
  - Measurement distance: 31.6 to 84.9mm
  - Fiber length: about 1m

**TV adapter IA-2**

- Adapter for connecting CCD camera (C. mount, 1/2 inch) to the instrument.

**Mesh Filter MF-10 / MF-100**

- Uses when measuring the light which is over measurement range of the instrument.

**Tripod SN**

- The tripod SN make collimation easy.
  - Max height: 183mm
  - Min height: 156mm
  - Length when stored: 810mm
  - Leg stages: 3steps
  - Weight: 4.7kg with tripod head

**Fine adjustment tripod head S-4**

- The S-4 makes up / down / left / right collimation easy.
  - Rotation: 360°
  - Elevation angle: 40°
  - Weight: 2.1kg

**Standard package of BM-5AC**

- BM-5AC main body: 1ea.
- AC adapter: 1ea.
- Analog output plug: 1ea.
- Quick manual: 1ea.
- Carring case: 1ea.
- USB cable: 1ea.
- Lens cap for objective lens: 1ea.

**-Extra-cost option**

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<tr>
<th>Lens cap for objective lens: 1ea.</th>
<th>USB cable: 1ea.</th>
<th>Carring case: 1ea.</th>
<th>Quick manual: 1ea.</th>
<th>CD-ROM: 1ea.</th>
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<th>AC adapter: 1ea.</th>
<th>BM-5AC main body: 1ea.&quot;</th>
<th>10.0</th>
<th>5.0</th>
<th>1.0</th>
<th>0.5</th>
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<th>0.1</th>
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