ILLUMINANCE METER T-10 Series

Accurate and Easy Measurement of Illuminance
Adapts To Various System Configurations
Modular Systems That Expand With Your Needs

Illuminance Meter T-10 <standard receptor head>
Used for measurement of a wide range of illuminance
(0.01 to 299,900 lx) (0.001 to 29,990 fcd)

Illuminance Meter T-10M <mini receptor head>
Used for measurement of illuminance that cannot be performed with the standard receptor head due to small spaces.
The measuring range is the same as T-10 (0.01 to 299,900 lx)
(Ø14 mm receptor surface, 1 m cord) (0.001 to 29,990 fcd)

Illuminance Meter T-10WS (5m cord) / T-10WL (10m cord)
Since the mini receptor head and cord are waterproofed to allow measurement of illuminance under water, this product can be used for control of illuminance in the marine products industry (e.g. fish farming) and outdoor measurement of illuminance on rainy days.

WIDE RANGE OF APPLICATIONS

- Lighting engineers and specifiers
- R&D at light products manufacturers
- inspection of light sources at construction sites, government and educational facilities
- maintenance of lights in factories, offices, and hospitals
- electrical product manufacturers
- quality control of light sources at home
- agricultural and forestry industries.

Under water measuring example
Main Features

Provides multi functions and user-friendly features

For basic operation

- Normal measurement of illuminance
- Measurement of illuminance difference
- Measurement of integrated illuminance

Improves measurement accuracy of illuminance under certain light sources (e.g. inside an orange-lit tunnel).

For advanced operation

- Setting of the reference value
- Color Correction Factor (CCF)
  Improves measurement accuracy of illuminance under certain light sources (e.g. inside an orange-lit tunnel).

Allows connection with a personal computer and continuous recording of illuminance by a recorder

- Digital output: Use of the RS232C interface (standard accessory) allows the meter to be connected to a personal computer.
- Analog output: Allows the meter to be connected to a recorder for continuous recording of illuminance.

Quick automatic zero adjustment

Turning on the meter will perform zero adjustment (no cap required), allowing immediate measurement of illuminance.

Auto ranging

Range can also be set manually.

LCD back-light

The LCD back-light turns on automatically when illuminance is low.

Uses AA-size batteries.

Measures flickering light sources

Illuminance Measurement System to Meet Various Needs

Allows simple and low-cost multi-point measurement of illuminance (2 to 30 points).
Main Features

Provides multi functions and user-friendly features
For basic operation

- Normal measurement of illuminance
- Measurement of illuminance difference
- Display of illuminance
- Display of illuminance difference

- Measurement of integrated illuminance
- Display of integrated illuminance
- Display of integration time
- Display of average illuminance

For advanced operation

- Setting of the reference value
- Color Correction Factor (CCF)
  Improves measurement accuracy of illuminance under certain light sources (e.g. inside an orange-H tunnel).

Allows connection with a personal computer and continuous recording of illuminance by a recorder

Digital output: Use of the RS232C interface (standard accessory) allows the meter to be connected to a personal computer.
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Illuminance Measurement System to Meet Various Needs

Allows simple and low-cost multi-point measurement of illuminance (2 to 30 points).

- Multi-point illuminance measurement system (9 points)
  For projector etc
- Multi-point illuminance measurement system (5 points)
  For lighting at construction sites

Relative Spectral Response

Ideally, the relative spectral responsivity of the illuminance meter should match V(λ) of the human eye for photopic vision.
As shown in the graph at left, the relative spectral responsivity of Konica Minolta Illuminance Meters T-10 is within 8% (f1) of the CIE spectral luminous efficiency V(λ).

CIE: Commission Internationale de l’Eclairage
f1 (CIE’s symbol) : The degree to which the relative spectral responsivity matches V (λ) is characterized by means of the error f1.

Cosine Correction Characteristics

Since the brightness at the measurement plane is proportional to the cosine of the angle at which the light is incident, the response of the receptor must also be proportional to the cosine of the incidence angle.
The graph at left shows the cosine correction characteristics of Konica Minolta Illuminance Meters T-10.
The cosine error of T-10 are shown in the table right.

Illuminance measurement

Example of multi-point illuminance measurement (9 points)

- This optional PC software offers several desirable features (e.g. easy operation, visual data display, and flexible data processing).
- This software provides multi-point graphical data.
- Examples shown: grid*, trend graph, and sensor position**.
  - Single-point measurement and Multi-point measurement (2 to 30 points) are available.
  - Automatic measurement at user-selected intervals.
  - Tolerance setting.
  - Capability of file save, print-out and data transfer to excel sheet.

**sensor position

**grid

Specifications are subject to change without notice.
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Illuminance meter T-10 &lt;standard receptor head&gt;</th>
<th>Illuminance meter T-10M &lt;mini receptor head&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Multi-function digital illuminance meter with detachable receptor head</td>
<td></td>
</tr>
<tr>
<td>Receptor</td>
<td>Silicon photocell</td>
<td></td>
</tr>
<tr>
<td>Relative Spectral Response*</td>
<td>Within 8% (f1') of the CIE spectral luminous efficiency V(λ)</td>
<td></td>
</tr>
<tr>
<td>Cosine Correction Characteristics</td>
<td>Within ±1% at 10° ; Within ±2% at 30° ; Within ±6% at 50° ; Within ±7% at 60° ; Within ±25% at 80°</td>
<td></td>
</tr>
<tr>
<td>Illuminance units</td>
<td>Lux (lx) or foot candles (fcd) (switchable)</td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>Auto range (manual 5 range at the time of analog output)</td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>Illuminance........................................ 0.01 to 299,900 lx 0.001 to 29,990 fcd</td>
<td></td>
</tr>
<tr>
<td>Integrated illuminance........0.01 to 999,900 x 10^3 lx•h 0.001 to 99,990 x 10^3 fcd•h / 0.001 to 9999 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User calibration function</td>
<td>CCF(Color Correction Factor) setting function</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±2% ±1digit of displayed value (based on Konica Minolta standard)</td>
<td></td>
</tr>
<tr>
<td>Temperature/humidity drift</td>
<td>Within ±3% ±1 digit (of value displayed at 20°C/68°F) within operating temperature/humidity range</td>
<td></td>
</tr>
<tr>
<td>Digital output</td>
<td>RS-232C</td>
<td></td>
</tr>
<tr>
<td>Analog output</td>
<td>1mV/digit,3V at maximum reading; Output impedance: 10kΩ; 90% response time: FAST setting: 1ms, SLOW setting: 1s</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>3 or 4 Significant-digit LCD with back-light illumination</td>
<td></td>
</tr>
<tr>
<td>Operating temperature /humidity range</td>
<td>−10 to 40°C, relative humidity 85% or less (at 35°C) with no condensation</td>
<td></td>
</tr>
<tr>
<td>Storage temperature /humidity range</td>
<td>−20 to 55°C, relative humidity 85% or less (at 35°C) with no condensation</td>
<td></td>
</tr>
<tr>
<td>Power source</td>
<td>2 AA-size batteries / AC adapter (optional)</td>
<td></td>
</tr>
<tr>
<td>Battery life</td>
<td>72 hours or longer (when alkaline batteries are used) in continuous measurement</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>69 x 174 x 35 mm (2-6/16x6-14/16x1-7/16 in.)</td>
<td>Main body : 69 x 161.5 x 30 mm (2-6/16x6-16x1-3/16 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receptor : ø16.5 x 12.5 (ø11/16 x 1/2 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cord length : 1m (3.3 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>200g (7.0 oz.) without battery</td>
<td>205g (7.2 oz.) without battery</td>
</tr>
<tr>
<td>Standard accessories</td>
<td>ø3.5mm(ø1/8 in.) subminiature plug for analog output ; Receptor cap ; Neck strap ; Case ; Battery</td>
<td>ø3.5mm(ø1/8 in.) subminiature plug for analog output ; Neck strap ; Case ; Battery</td>
</tr>
<tr>
<td>Optional accessories</td>
<td>Receptor head ; Adapter for Multi-point ; AC Adapter ; Data processing software</td>
<td></td>
</tr>
</tbody>
</table>

* Equivalent to 2% specified for T-1 series.

8% CIE(f1'),new JIS(1993)
2% old JIS

Specifications are subject to change without notice.
Compact, lightweight, easy-to-use SLR luminance meters with a wide measuring range

**Luminance Meter LS-100**

| 1° acceptance angle, |
| Measuring range: 0.001 to 299,900 cd/m² |
| (0.001 to 87,530 fL) |

**Luminance Meter LS-110**

| 1/3° acceptance angle, |
| Measuring range: 0.01 to 999,900 cd/m² |
| (0.01 to 291,800 fL) |

**MAIN FEATURES**

**Flareless SLR optical system for accurate measurements**

The SLR (single-lens-reflex) optical system allows precise aiming and ensures that the viewfinder shows the exact area to be measured. The optical system is also virtually flareless, eliminating the influence of light from outside the measurement area.

**Narrow acceptance angle for measurements of small specimens**

Acceptance angles of only 1° for LS-100 and 1/3° for LS-110 allow accurate measurements of small specimen areas. In addition, optional close-up lenses can be used to measure areas as small as ø1.3mm when using LS-100 and ø0.4mm when using LS-110.

**User calibration and color-correction functions**

To increase the versatility of the LS-100 and LS-110, both models are equipped with user calibration and color correction functions. The user calibration function allows the meter to be calibrated to a user-selected standard instead of the preset Konica Minolta standard; this function can also be used to standardize the response of several meters. The color correction function allows the response of the meter to be adjusted when measuring colored specimens.

**Luminance ratio and peak luminance measurements**

In addition to measurements of the present luminance, the LS-100 and LS-110 can also determine the percent ratio of the measured luminance to a luminance value stored in memory as well as the peak luminance or luminance ratio measured.

**RS-232C data communication**

Use of the built-in RS-232C interface allows the meter to be connected to a personal computer.

**Lightweight, compact design powered by a single 9V battery for portability**

(Power can also be supplied by optional Data Printer DP-10.)

**RELATIVE SPECTRAL RESPONSE**

Ideally, the relative spectral responsivity of the luminance meter should match V(λ) of the human eye for photopic vision. As shown in the graph above, the relative spectral responsivity of Konica Minolta Luminance Meters LS-100/LS-110 is within 8% (11°) of the CIE spectral luminous efficiency V(λ).

CIE : Commission Internationale de l’Eclairage

11° (CIE-s symbol) ; The degree to which the relative spectral responsivity matches V(λ) is characterized by means of the error 11°.

**REDUCTION OF FLARE**

The degree to which the influence of light from outside the defined measuring area is eliminated is an important factor in the performance of luminance meters. In Konica Minolta Luminance Meters, the flare factor is kept to below 1.5%, even if an object with extremely high luminance is just outside the meter’s measuring area. The graph at right shows the effect when a bright point is moved from A inside the measuring area to B just outside the measuring area. If the measured value at A is defined at 100%, the measured value at B would be less than 0.1%.
SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Luminance Meter LS-100</th>
<th>Luminance Meter LS-110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>SLR spot luminance meter for measuring light-source and surface brightness</td>
<td></td>
</tr>
<tr>
<td>Measuring angle</td>
<td>1°/3°</td>
<td>1°/3°</td>
</tr>
<tr>
<td>Optical system</td>
<td>85mm f/2.8 lens; SLR viewing system; flare factor less than 1.5%</td>
<td></td>
</tr>
<tr>
<td>Angle of view</td>
<td>9°</td>
<td>9°</td>
</tr>
<tr>
<td>Focusing distance</td>
<td>1014mm (40 in.) to infinity</td>
<td>1014mm (40 in.) to infinity</td>
</tr>
<tr>
<td>Minimum measuring area</td>
<td>Ø14.4mm</td>
<td>Ø4.8mm</td>
</tr>
<tr>
<td>Receptor</td>
<td>Sicon photoceull</td>
<td></td>
</tr>
<tr>
<td>Relative Spectral Response</td>
<td>Within 8% (f1) of the CIE spectral luminous efficacy V(λ)</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>FAST: Sampling time: 0.1s; time to display: 0.8 to 1.0s; SLOW: Sampling time: 0.4s, time to display: 1.4 to 1.6s</td>
<td></td>
</tr>
<tr>
<td>Luminance units</td>
<td>cd/m² or fL (switchable)</td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>FAST: 0.001 to 299,900cd/m² (0.001 to 87,530fL)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SLOW: 0.001 to 499,990cd/m² (0.001 to 14,999fL)</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.001 to 9.999cd/m² (or fL) ±2% ±2 digits of displayed value 1.000cd/m² (or fL) or greater ±2% ±1 digit of displayed value 1.000cd/m² (or fL) or greater ±2% ±1 digit of displayed value</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.001 to 9.999cd/m² (or fL): ±0.2% ±2 digits of displayed value 1.000cd/m² (or fL) or greater ±0.2% ±1 digit of displayed value 1.000cd/m² (or fL) or greater ±0.2% ±1 digit of displayed value</td>
<td></td>
</tr>
<tr>
<td>Temperature/humidity drift</td>
<td>Within ±3% ±1 digit (of value displayed at 20°C/68°F) within operating temperature/humidity range</td>
<td></td>
</tr>
<tr>
<td>Calibration mode</td>
<td>Minolta standard/user-selected standard (switchable)</td>
<td></td>
</tr>
<tr>
<td>Color correction factor</td>
<td>Set by numerical input; range: 0.001 to 9.999</td>
<td></td>
</tr>
<tr>
<td>Reference luminance</td>
<td>1; set by measurement or numerical input</td>
<td></td>
</tr>
<tr>
<td>Measurement modes</td>
<td>Luminance; luminance ratio; peak luminance or luminance ratio</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>External: 4-digit LCD with additional indications</td>
<td></td>
</tr>
<tr>
<td>Data communication</td>
<td>RS-232C; baud rate: 4800bps</td>
<td></td>
</tr>
<tr>
<td>External control</td>
<td>Measurement process can be started by external device connected to data output terminal</td>
<td></td>
</tr>
<tr>
<td>Power source</td>
<td>One 9V battery; power can also be supplied by optional Data Printer DP-10</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>While measuring button is pressed and viewfinder display is lit: 16mA average</td>
<td></td>
</tr>
<tr>
<td>Operating temperature/humidity range</td>
<td>0 to 40°C, relative humidity 85% or less (at 35°C) with no condensation</td>
<td></td>
</tr>
<tr>
<td>Storage temperature/humidity range</td>
<td>-20 to 55°C, relative humidity 85% or less (at 35°C) with no condensation</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>79x208x150mm (3-1/8x8-3/16x5-7/8 in.)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>850g (30 oz.) without battery</td>
<td></td>
</tr>
<tr>
<td>Standard accessories</td>
<td>Lens cap; Eyepiece cap; ND eyepiece filter; 9V battery; Case</td>
<td></td>
</tr>
</tbody>
</table>

* Specifications are subject to change without notice.

OPTIONAL ACCESSORIES

Data Printer DP-10

A compact, lightweight data printer with built-in D/A converter

Compact, lightweight, and battery-powered for complete portability

Timer-controlled measurements

Measurements can be taken automatically at intervals of 10s, 30s, 2m, or 10m.

Optional AC Adapter can be used. Power can also be supplied to the Luminance Meter from the DP-10.

Built-in D/A converter

Analog output is provided for connection to an analog recorder or similar device when taking continuous measurements.

Six analog output ranges: 10, 10², 10³, 10⁴, 10⁵, or 10⁶ (cd/m² or fL)

SPECIFICATIONS (DP-10)

<table>
<thead>
<tr>
<th>Type</th>
<th>24-character thermal-dot (7x5 dot matrix)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing speed</td>
<td>0.8s/line (1.5s/line including return to start of next line)</td>
</tr>
<tr>
<td>Printed data</td>
<td>Measurement number: 1 to 9,999</td>
</tr>
<tr>
<td></td>
<td>Measured values: Maximum 6 digits</td>
</tr>
<tr>
<td>Interval time</td>
<td>Elapsed time since first measurement: 00:00 to 99:59 (h:m)</td>
</tr>
<tr>
<td>Output range</td>
<td>10, 10², 10³, 10⁴, 10⁵, or 10⁶ (cd/m² or fL) manually selected</td>
</tr>
<tr>
<td>Output voltage</td>
<td>1V (full scale)</td>
</tr>
<tr>
<td>Output resolution</td>
<td>0.1mV/digit (1mV/digit when range of 10 is selected when using LS-110)</td>
</tr>
<tr>
<td>Response time</td>
<td>300ms</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>0.002mV/C</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.4% of value displayed by Luminance Meter ±0.2mV</td>
</tr>
<tr>
<td>Power source</td>
<td>6 AA-size batteries or optional AC Adapter (output: 9V, 1A)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>186K53x102mm (7-5/16x2-1/16x4 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>440g (15.5 oz.) without batteries or thermal paper</td>
</tr>
</tbody>
</table>

Specifications are subject to change without notice.
UV RADIOMETER UM-10

An easy-to-use instrument for measuring ultraviolet radiation. Choose from three different high-sensitivity receptor heads according to your application.

**Main Features**

- Easy operation
- Wide total measuring range (0.1 to 199,900 µW/cm²) with automatic range selection
- Choice of three different receptor heads to match specific applications
- Compact, handheld design
- Digital (RS-232C) and analog output terminals

**Main Applications**

**Fields Utilizing Photochemical Reactions**
- Checking exposure of photoresists in semiconductor manufacturing
- Checking exposure of emulsions for printing or platemaking
- Testing fading due to UV exposure
- Evaluating characteristics of solar cells
- Testing deterioration of products due to UV exposure

**Fields Utilizing Biological Applications of UV Exposure**
- Diagnosis of erythema and other skin pigmentation problems
- Treatment of white skin spots or oversensitivity to light
- Optimization and control of breeding conditions for fish and domestic animals
- Suppressing growth of useless shoots on plants
- Monitoring conditions for photosynthesis

**Fields Utilizing the Photoelectric Effect**
- Electrophotography
- Electrographic etching

**Fields Requiring Use of Sterilization Lamps**
- Food processing
- Beauty treatment
- Scientific research

**Other fields which require adjustment, monitoring, or research of ultraviolet light and light sources**

**Examples of Subject Light Sources**

- Fluorescent health lamps
- High-pressure mercury lamps
- Ultra-high-pressure mercury lamps
- Photopolymerization lamps
- Blacklight lamps
- Copier lamps
- Xenon lamps
- Fluorescent lamps
- Sterilization lamps
Expansion Keyboard UM-A25
With Expansion Keyboard UM-A25 attached, the following functions are added.

**Integrated irradiance**
The total irradiance received over a period of time can be measured.
Maximum integrated irradiance
Approx. 1,000,000,000 mJ/cm
Maximum integration time: 999.900 sec

**Color correction factor**
By setting the appropriate color correction factor, the UM-10 can be adjusted to more accurately measure the irradiance of different lamp types.

**Irradiance difference**
The difference between a measured irradiance and a target irradiance stored in memory can be determined.

**Percent irradiance**
The measured irradiance as a percentage of a target irradiance stored in memory can be determined.

*The target irradiance can be measured or input as numerical values.

### SYSTEM DIAGRAM
(Optional Accessories)

![System Diagram](image)

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Irradiance meter with interchangeable receptor heads for measuring UV radiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptor heads</td>
<td>Silicon photodiode</td>
</tr>
<tr>
<td>Model</td>
<td>UM-250</td>
</tr>
<tr>
<td>Spectral response</td>
<td>220 to 300nm</td>
</tr>
<tr>
<td>Peak wavelength</td>
<td>250±10nm</td>
</tr>
<tr>
<td>Cosine error</td>
<td>30°: Within ±3%</td>
</tr>
<tr>
<td></td>
<td>60°: Within ±15%</td>
</tr>
<tr>
<td>Measurement modes</td>
<td>Irradiance, integrated irradiance, and integration time, irradiance difference, percent irradiance</td>
</tr>
<tr>
<td>Irradiance measuring range</td>
<td>0.1 to 199,900μW/cm² in four automatically selected ranges</td>
</tr>
<tr>
<td>Integrated irradiance range</td>
<td>Maximum approx. 1,000,000 μJ/cm² measurable (in 9999 display cycles)</td>
</tr>
<tr>
<td>Integration time</td>
<td>999,900sec, (288h)</td>
</tr>
<tr>
<td>Linearity</td>
<td>Within ±5% of reading = 1 digit</td>
</tr>
<tr>
<td>Temperature/humidity drift</td>
<td>Within ±3% ±1 digit (of value displayed at 23°C/73.4°F within operating temperature/humidity range</td>
</tr>
<tr>
<td>Analog output</td>
<td>0 to 3V, 1mV/digit</td>
</tr>
<tr>
<td>Digital output</td>
<td>RS-232C 2400BPS</td>
</tr>
<tr>
<td>Display</td>
<td>4-digit LCD</td>
</tr>
<tr>
<td>Operating temperature/humidity range</td>
<td>0 to 40°C, relative humidity 85% or less (at 35°C) with no condensation</td>
</tr>
<tr>
<td>Storage temperature/humidity range</td>
<td>−20 to 55°C, relative humidity 85% or less (at 35°C) with no condensation</td>
</tr>
<tr>
<td>Power source</td>
<td>One 9V battery or optional AC adapter</td>
</tr>
<tr>
<td>Dimensions</td>
<td>73.5X186X33mm(2-7.8X7-5/16X1-5/16 in)</td>
</tr>
<tr>
<td>Weight</td>
<td>270g(9.5 oz.) including battery</td>
</tr>
<tr>
<td>Standard accessories</td>
<td>Case, Cap, Strap, Analog output plug</td>
</tr>
</tbody>
</table>

*Available only when optional Expansion Keyboard UM-A25 is attached.
Specifications are subject to change without notice.
Enables measurement of tristimulus values, chromaticity, color difference, correlated color temperature and illuminance of light sources.

### Four types of calibration functions for correcting measurement values:
- **Normal Calibration**: Corrects measurement values for Standard Illuminant A as the calibration light source.
- **Normal User Calibration**: Corrects measurement values for input calibration light source values.
- **Multi Calibration**: Corrects measurement values for the R/G/B/W values of ultra-high-pressure mercury lamps.
- **Multi User Calibration**: Corrects measurement values for input calibration light source values for R/G/B/W.

#### Enables multi-point measurement
Allows simple and low-cost multi-point measurement. Up to 30 receptors can be connected to one main body.

#### Simple operation
- Turning on the meter will perform zero adjustment (no cap required), allowing immediate measurement.
- Keys that are not used frequently can be placed under a sliding cover, to prevent pressing a key in error and to give the operating panel a neat appearance.

#### Other features
- The receptor can be separated and then connected to the main body with a LAN cable. This allows the user to install the receptor up to 100m from the main body and control it remotely. (For this, optional adapters T-A20 (for main body) and T-A21 (for receptor) are required.
- Use of the built-in RS232C interface allows the meter to be connected to a personal computer. (For RS-232C interface, an optional cable (T-A11) is available.)
- Connecting to a commercially available thermal printer allows printout of measured data. (For connecting to a printer, an optional printer cable (T-A12) is available.)
- The LCD back-light turns on automatically when illuminance is fcd is switchable.
- Evaluating color in an experimental environment for psychology.
- Color adjustment of CRTs, flat panel and other display devices.

#### MAIN FEATURES

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Silicon photocell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring function</td>
<td>Tristimulus values : X, Y, Z</td>
</tr>
<tr>
<td>Correlated color temperature : Ev, Tpc, ∆u, ∆v</td>
<td></td>
</tr>
<tr>
<td>Color difference : ∆E(X,Y), ∆E(xy), ∆E(μ,μ'), ∆E(μ,μ')</td>
<td></td>
</tr>
<tr>
<td>Other function</td>
<td>User calibration function: Data hold function, Multi-point measurement (2 to 30 points)</td>
</tr>
<tr>
<td>Measuring range</td>
<td>0.1<del>99,999 lx, 0.01</del>99.99 lx (Chromaticity : 5 lx, 0.5 fcd or above)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Ev : ±0.001 (x, y) (800 lx, standard illuminant A measured)</td>
</tr>
<tr>
<td>Repeatability</td>
<td>Ev : ±0.0005 (x, y)</td>
</tr>
<tr>
<td>Temperature drift</td>
<td>Ev : ±3% ±1°/° of displayed value, x : ±5°</td>
</tr>
<tr>
<td>Humidity drift</td>
<td>Ev : ±3% ±1°/° of displayed value, x : ±5°</td>
</tr>
<tr>
<td>Response time</td>
<td>0.5 sec. (continuous measurement)</td>
</tr>
<tr>
<td>Digital output</td>
<td>RS-232C</td>
</tr>
<tr>
<td>Display</td>
<td>4 Significant-digit LCD with back-light illumination</td>
</tr>
<tr>
<td>Illuminance measurement performance</td>
<td>30000 lx (standard illuminant A)</td>
</tr>
<tr>
<td>Operating temperature/humidity range</td>
<td>-10 to 40°C, relative humidity 85% or less (at 35°C) with no condensation</td>
</tr>
<tr>
<td>Storage temperature/humidity range</td>
<td>-20 to 55°C, relative humidity 85% or less</td>
</tr>
<tr>
<td>Power source</td>
<td>2 AA-size batteries / AC adapter (optional)</td>
</tr>
<tr>
<td>Battery life</td>
<td>72 hours or longer (When alkaline batteries are used)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>69 x 174 x 35mm (2-6/16 x 6-14/16 x 1-7/13 in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>215g (7.6 oz.) not including batteries</td>
</tr>
</tbody>
</table>

### MAIN APPLICATIONS

- R&D and color inspection of light sources in a variety of industries, eg, lamp manufacturers, building and interior design.
- Setting up projectors for presentation purposes.
- Color adjustment of CRTs, flat panel and other display devices.
- Color evaluation and control of light boxes and light booths.
- Evaluating color in an experimental environment for psychology.

### SPECIFICATIONS

- Relative Spectral Response*: Closely matches CIE Standard Observer curves x(λ), y(λ), and z(λ) Within 8% (ITS1) of the CIE spectral luminous efficiency V(u).

### Dimensions

**Units:mm**

- **Center of receptor window**: ø45.2
- **Tripod socket**: ø46.2
- **Height**: 473
- **Weight**: 215g (7.6 oz.) not including batteries
Allows simple and low-cost multi-point measurement (2 to 30 points).

Up to 30 receptors can be connected to one main body. (For multi-point measurement, optional adapters T-A20 (for main body) and T-A21 (for receptor) are required.)

**Dedicated PC software**

This optional PC software offers several desirable features (e.g., easy operation, visual data display, and flexible data processing).

- Single-point measurement and Multi-point measurement (2 to 30 points) are available.
- Automatic measurement at user-selected intervals.
- Tolerance setting.
- Capability of file save and print-out.

**SPECIFICATIONS**

- **Battery life**: 72 hours or longer (When alkaline batteries are used)
- **Operating temperature**: -10 to 40°C
- **Humidity**: 35%RH or less
- **Display**: 4 Significant-digit LCD with back-light illumination
- **Measuring range**: 0.1~99,990 lx, 0.01~9,999 fcd
- **Accuracy Ev**: ±3% R (Chromaticity : 5 lx, 0.5 fcd or above) in four automatically selected ranges (lx or fcd is switchable)
- **Response**:
  - ±2% of the CIE spectral (or) within 8% of the CIE spectral (or)
- **Wavelength (nm)**:
  - 400, 450, 500, 550, 600, 650, 700, 800
- **Units**: mm
- **Input of R/G/B/W values for**
  - Multi User Calibration requires
  - Up to 30 receptors can be connected to one main body. (For multi-
  - Printer (RS-232C)
  - Data Processing Software CL-S1w, (sold separately)
  - Battery life 72 hours or longer (When alkaline batteries are used)
  - Operating temperature -10 to 40°C
  - Display 4 Significant-digit LCD with back-light illumination
  - Humidity drift Ev: ±3%
  - Accuracy Ev: ±2%
  - Measuring range: 0.1~99,990 lx, 0.01~9,999 fcd
  - Accuracy for chromaticity: ±0.002 (800 lx, standard illuminant A measured)
  - Accuracy for color temperature: ±0.01K
  - Measuring range for color temperature: 2700~6000K
  - Accuracy for color temperature: ±0.01K
  - Accuracy for hue angle: ±1°
  - Accuracy for color purity: ±0.01

**SYSTEM DIAGRAM**

- Data Processing Software (including T-A11)
- Printer (RS-232C)
- AC-A10(N)
- AC Adapter
- Receptor head
- CL-200
- Receptor head
- T-A10
- CL-200
- Case
- Printer
- CL-200
- Shirt
- T-A20
- T-A21
- T-A10
- Neck Strap
- Example of multi-point system
- Two AA-size batteries
- Example of multi-point system

**<Illuminance Measurement Performance>**

- **Relative Spectral Response**
  - Ideally, the relative spectral responsivity of the illuminance meter should match V(λ) of the human eye for photopic vision.
  - As shown in the graph above, the relative spectral responsivity of Konica Minolta Chroma Meters CL-200 is within 8% (1%) of the CIE spectral luminous efficiency V(λ).

- **Cosine Correction Characteristics**
  - Since the light at the measurement plane is proportional to the cosine of the angle at which the light is incident, the response of the receptor must also be proportional to the cosine of the incidence angle.
  - The graph above shows the cosine correction characteristics of Konica Minolta Chroma Meters CL-200.
  - The cosine error of CL-200 is shown in the table right.

- **Color Temperature (Tcp)**
  - A black body (perfect radiant body) is an ideal object that absorbs all energy, changes its color from red through yellow to white as its temperature increases. The absolute temperature T (K) of the black body is referred to as the color temperature. The xy chromaticity diagram given on the left shows the relationship between the temperature and color by a locus (black body locus).
  - The diagram below shows how colors are characterized by means of the color temperature.
A compact, lightweight, battery-powered instrument with a 1° measurement angle for high-accuracy non-contact measurements of the luminance and chromaticity of light sources and reflective subjects

**EASY-TO-READ DISPLAY**

**Compact and lightweight**

**Measurements of subjects at a distance**

SLR (single-lens-reflex) viewing system and flare-free optical system provide accurate measurements of subjects at a distance with virtually no influence from light outside the measurement area.

**Measurements of small subjects**

1° measurement angle allows measurements of subjects as small as ø14.4mm (at a subject distance of 1014mm); by using optional Close-Up Lenses, subjects as small as ø1.3mm can be measured.

**Color difference can also be measured**

**Calibration to a user-selected reference is also possible**

**Luminance units of cd/m² or fL can be selected**

**MAIN APPLICATIONS**

**Light-Source Measurements**

- Luminance and chromaticity of small light sources such as LEDs, miniature neon lamps, etc.
- Luminance and chromaticity of general light sources such as tungsten lamps, fluorescent lamps, etc.
- Luminance and chromaticity of traffic signals, airport guidance lights, emergency exit signs, etc.

**Reflective-Subject Measurements**

- Color measurements of subjects which cannot be measured by contact methods, such as distant building walls, just-painted surfaces, subjects with complicated shapes, or subjects which should not be touched for sanitary reasons.

**Display Measurements**

- Luminance and chromaticity of color TVs and CRTs
- Luminance measurements of monochrome TVs and SRTs
- Luminance and chromaticity of projection TVs and video projectors.
Data Processor DP-101
Compact, portable, multi-function data processor to increase the versatility of Minolta Chroma Meter CS-100A

Additional Color Notations
When DP-101 is used with the CS-100A, measured values can be calculated in terms of X, Y, L*ab*, Yuv*, color temperature, and distance from blackbody locus Δx, Δy for absolute color values and in terms of Δ(x,y), ΔL*ab*, ΔYuv*, and ΔYuv for color difference.

Data Storage and Printout
DP-101 has memory space for up to 300 sets of measurement data and a built-in thermal printer for printing out data either at the time of measurement or from memory at a later time.

Interval Timer for Automatic Measurements

SPECIFICATIONS

Type Battery-powered multi-function data processor for use with Konica Minolta Chroma Meter CS-100A
Measurement modes Absolute and difference
Chromatic systems Absolute color: X, Y, L,a*,b*, color temperature, distance from blackbody locus Δx, Δy
Color difference: Δ(x,y), ΔL*a*b*, ΔYuv, ΔYuv
Target color channels 4 (for each calibration channel and 1 quick-input temporary target-color channel); set by measurement or numerical input
Data memory Space for 300 sets of measurement data divisible into 16 pages; built-in NiCd battery for backup maintains data in memory even if POWER switch is set to OFF
Display 16-character x 2-line dot-matrix LCD with adjustable viewing angle
Printer 24-character thermal-dot
Statistical calculations Maximum, minimum, mean, and standard deviation
Interval timer Timer interval user-selectable from 3s to 99m
Data communication RS-232C format; transmission rate: 9600 baud (can be set by service personnel to 600, 1200, 2400, or 4800); output voltage: CMOS ±5V; RS-232C terminal uses DIN 8-pin connector
Other Multiple-multiplier-averaging mode; remote-control socket; can supply to CS-100A
Power source 6 AA-size batteries or included AC Adapter
Dimensions 220x50x200mm (8-3/16x2x7-7/8 in.)
Weight 1300g (2.87lb.), not including batteries

Specifications are subject to change without notice.

Optional Accessories

Close-Up Lenses

Long Eye-Relief Eyepiece

When the Long Eye-Relief Eyepiece is used, the measuring area and measurement display inside the viewfinder can be seen with the eye 2cm (2 in.) away from the eyepiece.

Angle Finder Vn

Angle Finder Vn allows the measuring area and measurement display inside the viewfinder to be seen at an angle of 90° to the normal viewfinder optical axis. Angle Finder Vn can also be focused and the magnification can be set to 1x or 2x.

Data Management Software

CS-S10w Professional (Optional accessory)

Specifications are subject to change without notice.

System requirements

- **OS**
  - Windows®/XP Professional SP2, Windows®/XP Professional SP3, Windows®/XP Professional x64 Edition
  - **CPU**
    - Pentium® III 600 MHz equivalent or higher (recommended)
  - **Memory**
    - 128 MB min. (256 MB or more recommended)
  - **Hard disk**
    - 60 MB or more space required for installation
  - **Display**
    - 1024 x 768, 256 colors or more
  - **Other**
    - CD-ROM drive, USB port

- *Windows®* is a trademark of Microsoft Corporation in the USA and other countries.
- *Pentium®* is a trademark of Intel Corporation in the USA and other countries.
SAFETY PRECAUTIONS

For correct use and for your safety, be sure to read the instruction manual before using the instrument.

- Always connect the instrument to the specified power supply voltage. Improper connection may cause a fire or electric shock.
- Be sure to use the specified batteries. Using improper batteries may cause a fire or electric shock.

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