KONICA MINOLTA

LIGHT METERS

ILLUMINANCE METER | LUMINANCE METER | UV RADIOMETER | CHROMA METER

T-10/T-10M/T-10Ws/T-10WL
LS-100/LS-110
UM-10
CL-200
CS-100A
DP-10
DP-101

The essentials of imaging

CHROMA METER CL-200

Enables measurement of tristimulus values, chromaticity, color difference, correlated color temperature and illuminance of light sources.

MAIN FEATURES

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

- Input of R/G/B/W values for Multi User Calibration requires Data Processing Software CL-S1w,(sold separately)

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 low.
- Powered by AA-size batteries or optional AC adapter.
- 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.

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 physchology.

SPECIFICATIONS

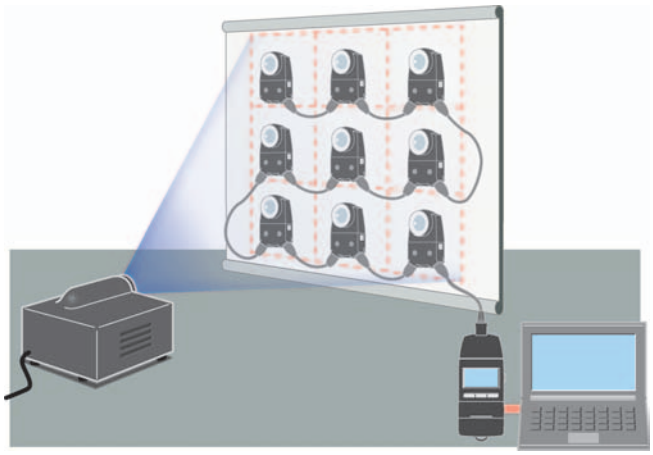
Relative Spectral Response*	Closely matches CIE Standard Observer curves $\bar{x}(\lambda)$, $\bar{y}(\lambda)$, and $\bar{z}(\lambda)$ Within 8% (f1') of the CIE spectral luminous efficiency $V(\lambda)$
Receptor	Silicon photocell
Measuring function	Tristimulus values : XYZ Chromaticity : Ev xy, Ev u'v' Correlated color temperature : Ev, Tcp, Δuv Color difference : Δ(XYZ), Δ(Ev xy), Δ(Ev u'v'), ΔEv Δu'v'
Other function	User calibration function, Data hold function, Multi-point measurement (2 to 30 points)
Measuring range	0.1~99,990 lx, 0.01~9,999 fcd (Chromaticity : 5 lx, 0.5 fcd or above) in four automatically selected ranges (lx or fcd is switchable)
Accuracy	Ev : ±2% ±1digit of displayed value (based on Minolta Standard) xy : ±0.002 (800 lx, standard illuminant A measured) Tcp : ±20K (800 lx, standard illuminant A measured)
Repeatability	xy : ±0.0005 (standard illuminant A measured)
Temperature drift	Ev : ±3% ±1digit of displayed value, xy : ±0.003
Humidity drift	Ev : ±3% ±1digit of displayed value, xy : ±0.003
Response time	0.5 sec. (continuous measurement)
Digital output	RS-232C
Display	4 Significant-digit LCD with back-light illumination
Operating temperature /humidity range	-10 to 40℃, relative humidity 85% or less (at 35℃) with no condensation
Storage temperature /humidity range	-20 to 55℃, relative humidity 85% or less (at 35℃) with no condensation
Power source	2 AA-size batteries / AC adapter (optional)
Battery life	72 hours or longer (When alkaline batteries are used) in continuous measurement
Dimensions	69×174×35mm (2-6/16×6-14/16×1-7/13 in.)
Weight	215g (7.6 oz.) not including batteries

Specifications are subject to change without notice.

* Equivalent to 2% specified for **T-1** series.
  8% CIE(f1'),new JIS(1993)
  2% old JIS

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

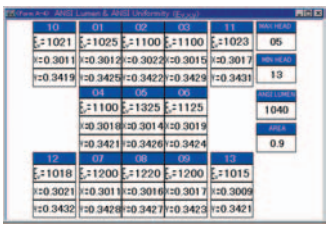
Up to 30 receptors can be connected to one main body. (For multi-point measurement, optional adapters T-A20 (for main body) and T-A21 (for receptor) are required.)

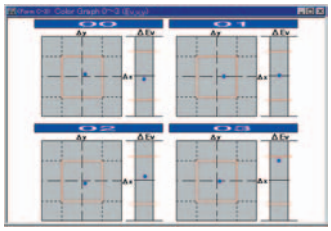


Dedicated PC software

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

- 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.

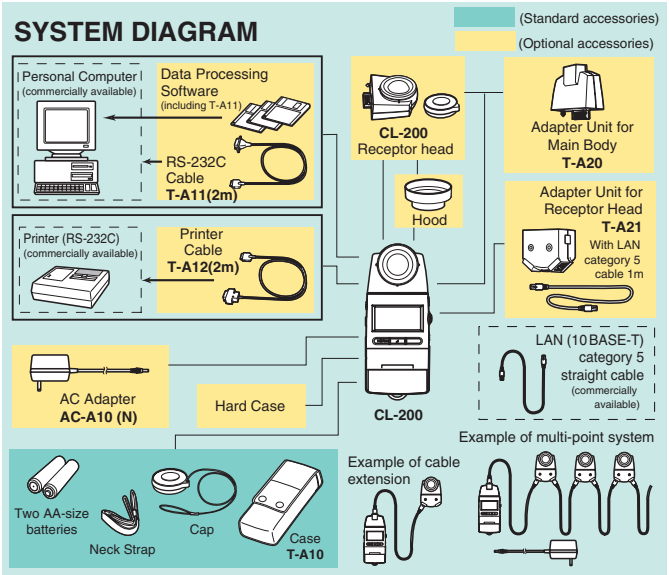




OS	Windows® 95/98/NT (ver4)
CPU	Pentium 300 MHz or higher
Memory	32MB or more
Display resolution	800 x 600 or higher

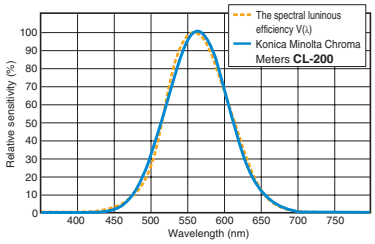
* "Windows® is a trademark of Microsoft Corporation in the USA and other countries.

SYSTEM DIAGRAM



<Illuminance Measurement Performance>

— Relative Spectral Response —

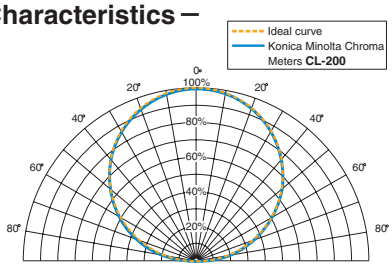


Ideally, the relative spectral responsivity of the illuminance meter should match V(λ) of the human eye for photopic vision.
As shown in the graph above, the relative spectral responsivity of Konica Minolta Chroma Meters **CL-200** is within 8% (f1') of the CIE spectral luminous efficiency V(λ).

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 —

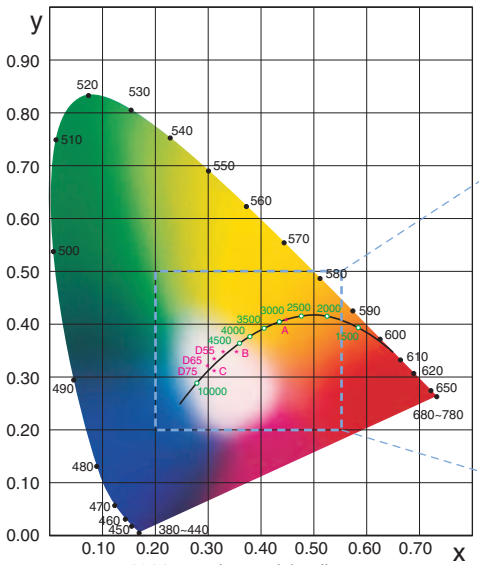
Since the light at the measurement plane is proportional to the cosine of the angle at which the light is incident, the response of the receptor must also be proportional to the cosine of the incidence angle.
The graph above shows the cosine correction characteristics of Konica Minolta Chroma Meters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



<Chromaticity and Color Temperature>

— Chromaticity (xy) —

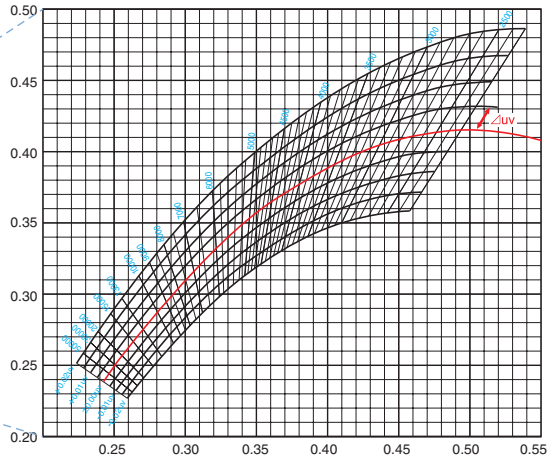
XYZ tristimulus values and the associated Yxy color space form the foundation of the present system for numerical color notation. The concept for the XYZ tristimulus values is based on the premise that all colors are seen as mixtures of these three primary colors. By defining the color matching functions of a Standard Observer, the Commission Internationale de L'Eclairage (CIE), an international organization concerned with light and color, provided the basis for colorimetry in 1931.
The tristimulus values XYZ are useful for specifying a color, but the results are not easily visualized.
The two-dimensional color (x,y) diagram is taken from the Yxy color space, in which Y is the lightness (and is identical to the tristimulus value Y) and x and y are the chromaticity coordinates calculated from the tristimulus values XYZ.
The CIE x, y chromaticity diagram for this color space is shown. In this diagram, achromatic colors are toward the center of the diagram, and the chroma or saturation increases toward the edges.



1931 x, y chromaticity diagram

— 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 given below is sometimes used to indicate the color of a light source. Correlated color temperature is used to apply the general idea of color temperature to those colors that are close to, but not exactly on the blackbody locus. For instance, a light source which has a color difference of 0.01 in the green direction (Δuv) from a black body which has a color temperature of 7,000K is indicated as having a correlated color temperature of 7,000K + 0.01 (uv unit).



xy chromaticity chart indicating the black body locus, the isotemperature lines and equal Δuv lines.