MINOLTA

CHROMA METER
CL-200

ISO 9001 CERTIFIED ISO 14001

Enables measurement of tristimulus v
correlated color temperature and illu

MEASUREMENT FUNCTIONS

Tristimulus values	:	XYZ
Illuminance · Chromaticity	:	Ev xy, Ev u'v'
Illuminance difference · Color difference	:	Δ(XYZ), Δ(Ev xy), Δ(Ev u'v'), ΔEv Δu'v'
Illuminance · Correlated color temperature	:	Ev, Tcp, Δuv (Correlated color temperature is indicated Tcp[K(Kelvin)]±Δuv.)

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.



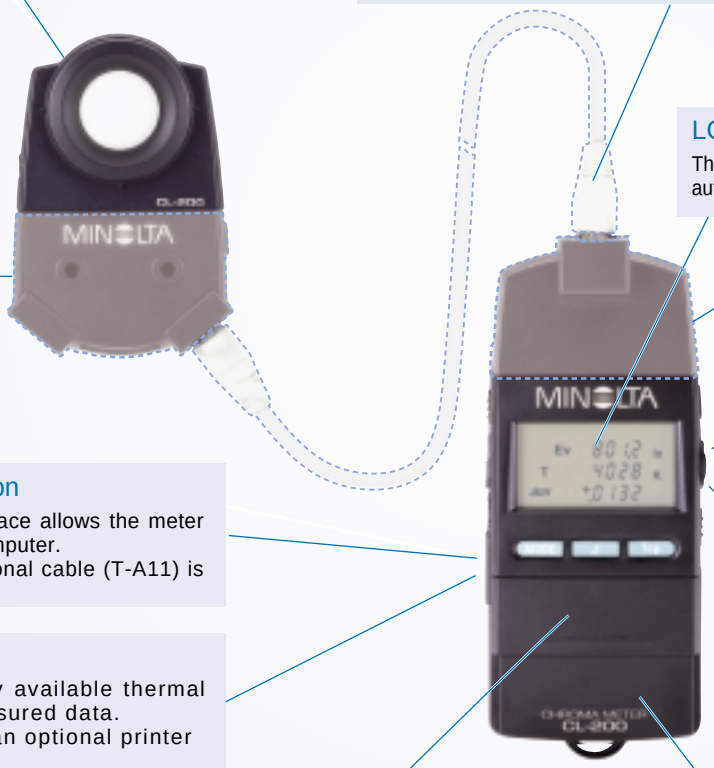
MAIN FEATURES

Quick automatic zero adjustment

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

Remote Measurement

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.



Adapter Unit
for Receptor Head
T-A21

LCD back-light

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

Adapter Unit
for Main Body
T-A20

Data hold function

Pushing in the HOLD button keeps the current measured data displayed.

RS-232C data communication

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.)

Allows continuous measurement (twice per second).

Printout

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.)

Key cover for Protection

Keys that are not used frequently can be placed under a sliding cover, prevent pressing a key in error and give the operating panel a neat appearance.

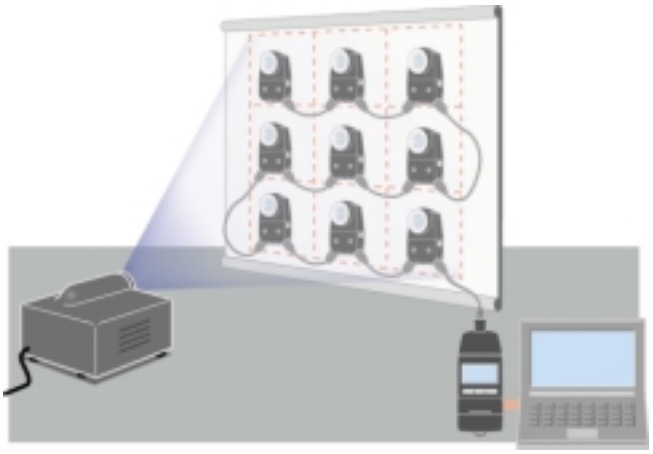
Powered by AA-size batteries or optional AC adapter.

alues, chromaticity, color difference, inance of light sources.

ILLUMINANCE MEASUREMENT SYSTEM TO MEET VARIOUS NEEDS

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.

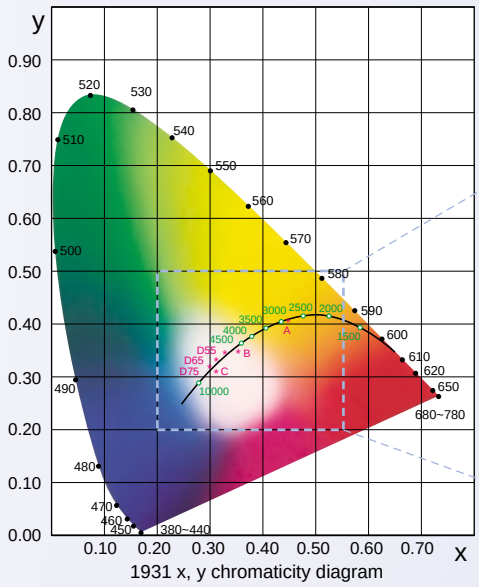
OS	Windows® 95/98/NT (ver4)
CPU	Pentium 300 MHz or higher
Memory	32MB or more
Display resolution	800 x 600 or higher

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

<Chromaticity and Color Temperature>

– Chromaticity (xy) –

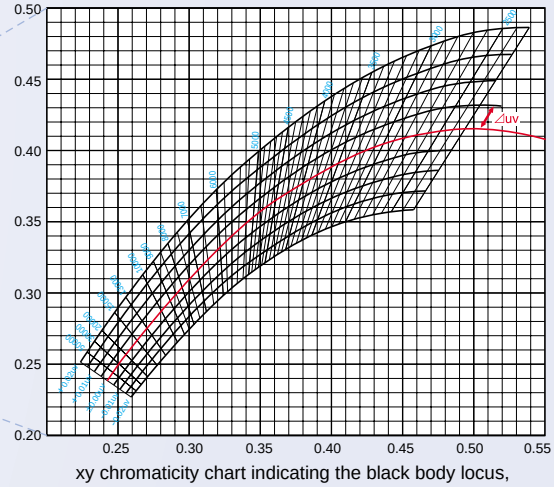
XYZ tristimulus values and the associated Yxy color space form the foundation of the present system for numerical color notation. The concept for the XYZ tristimulus values is based on the premise that all colors are seen as mixtures of these three primary colors. By defining the color matching functions 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) –

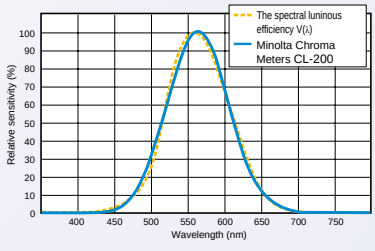
A black body (perfect radiant body) is an ideal object that absorbs all energy, changes its color from red through yellow to white as its temperature increases. The absolute temperature T (K) of the black body is referred to as the color temperature. The xy chromaticity diagram given on the left shows 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.

<Illuminance Measurement Performance>

– Relative Spectral Response –

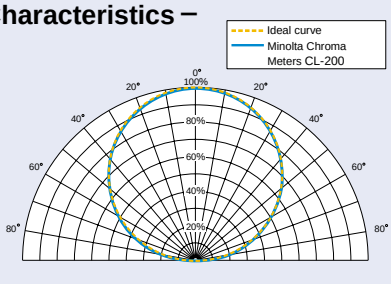


Ideally, the relative spectral responsivity of the illuminance meter should match V(λ) of the human eye for photopic vision.
As shown in the graph above, the relative spectral responsivity of Minolta Chroma Meters CL-200 is within 8% (f1') of the CIE spectral luminous efficiency V(λ).

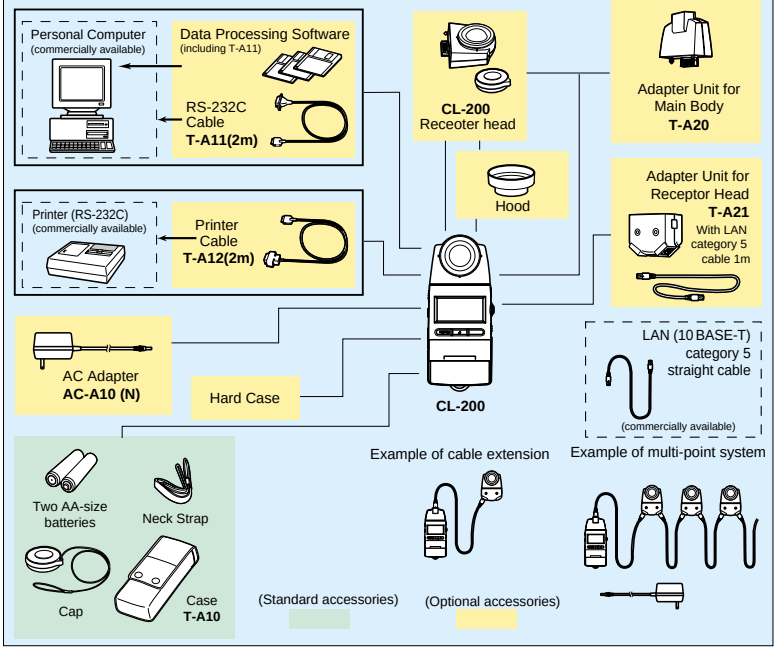
CIE ; Commission Internationale de l'Eclairage
f1'(CIE's symbol) ; The degree to which the relative spectral responsivity matches V(λ) is characterized by means of the error f1'.

– Cosine Correction Characteristics –

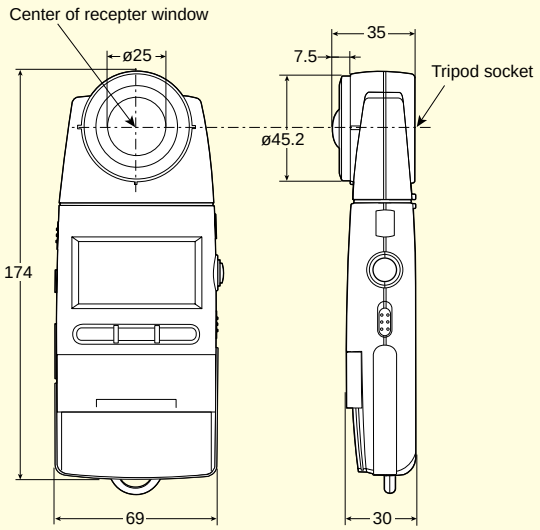
Since the light at the measurement plane is proportional to the cosine of the angle at which the light is incident, the response of the receptor must also be proportional to the cosine of the incidence angle.
The graph above shows the cosine correction characteristics of Minolta Chroma Meters CL-200.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



SYSTEM DIAGRAM



DIMENSIONS (Units : mm)



SPECIFICATIONS

Model	Chroma Meter CL-200
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 environment conditions	Temperature : -10 to 40℃ (14 to 104℉); relative humidity 85% or less (at 35℃ / 95℉) with no condensation, Maximum altitude : 2000m, Installation category : II, Pollution degree : 2
Storage temperature range	-20 to 55℃ (-4 to 131℉) ; relative humidity 85% or less (at 35℃/95℉) 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
Standard accessories	Case, Lens Cap, Neck Strap, Battery
Optional accessories	Receptor Head, Adapter Unit for Receptor T-A20, Adapter Unit for Main Body T-A21, AC Adapter AC-A10 (N), Data Processing Software, Printer Cable T-12, RS-232C Cable T-A11 (for PC), Hood, Hard Case

Specifications are subject to change with out notice.

SAFETY PRECAUTIONS

To ensure correct use of the instrument, please adhere to the following.

- Before using the instrument, be sure to read the instruction manual.
- Always use the specified power. Use of inappropriate power may result in afire or electric shock.

ISO 9001 CERTIFIED

Toyokawa Administrative Center (Aichi Pref., Japan) of Minolta Co., Ltd. was approved by the British certification organization LIoyd's Register Quality Assurance for certification under the ISO 9001:1994 international quality assurance standards on March 3, 1995. Since the Center's establishment in 1990, Radiometric Instruments Operations in Toyokawa Administrative Center has carried out the development and production of precision instruments for the measurement of color, light, and temperature. The ISO 9001:1994 certification was awarded to the Radiometric Instruments Operations quality control system, including the design, development, production, calibration, and servicing of the measuring instruments described above.

MINOLTA

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9242-4876-11 AAHAP① Printed in Japan