KONICA MINOLTA

CHROMA METER
CR-400/410

ISO 9001 CERTIFIED ISO 14001

CR-400

CR-410

The essentials of imaging

Introducing the successor to the Konica Minolta CR-300/310, our best-selling colorimeter globally accepted as the standard in a wide range of industries.

CR-400
Measurement area ø8mm

CR-410
Measurement area ø50mm

CR-400 CR-410

Data Processor **DP-400**

The measuring head can perform measurement alone.
The measuring head is detachable from the data processor. Now, you can take measurements directly with the head alone. What's more, you can connect the measuring head directly to a PC. Simply install our optional software, and your PC can function as the data processor.

User-defined evaluation formulas freely set up.
The CR-400 Series features a User Index function that allows you to configure the evaluation formula and color-calculation formula as desired. This feature is intended to meet the needs of color-control applications in which industry-specific or customized evaluation formulas are used instead of the versatile color system and standard evaluation formula such as L*a*b*.
(Settings can be configured via a PC with optional software installed.)

Abundant accessories applicable to various materials.
A varied selection of accessories is available to accommodate various types of targets including powder, paste and opaque liquids.

Compact data processor incorporates a high-speed printer.
The compact, lightweight data processor is battery-operated* and features a built-in high-speed printer. Its size and weight are approximately one-half those of the conventional DP-300 Series. In addition, the CR-400 Series is designed with a detachable shoulder strap for easier portability. *An AC adapter is included as a standard accessory.

Full data compatibility with the CR-300/310 series
To ensure data compatibility, the CR-400 Series utilizes the same illumination-viewing optical system as the conventional CR-300/310 Series. As a result, those upgrading from the preceding model can make full use of their existing data.

Easy-to-understand the name on the buttons, ensure smooth measurement and setting operations.

Achieves exceptional accuracy
Inter-instrument agreement : CR-400: ΔE*ab within 0.6
CR-410: ΔE*ab within 0.8
Repeatability : within ΔE*ab 0.07

User calibration function ensures higher accuracy.
(Settings can be configured with the data processor or via a PC with optional software installed.)

Color difference tolerance can be set to perform PASS/WARN/FAIL
(Settings can be configured with the data processor or via a PC with optional software installed.)

Offers a wider range of color systems than the CR-300/310 Series.

The measuring head alone can store up to 1,000 measurements. When the data processor is connected, up to 2,000 measurements can be stored.(The measuring head can store up to 100 color-difference target colors with or without the data processor connected.)

Capable of displaying color-difference graphs that provide a visual representation of the color difference.
(When connected to data processor)

A simple, cellular-phone-type text entry system is provided for entering the names of color-difference target colors and calibration channels.
(When connected to data processor)

Features a large, easy-to-see LCD with a built-in backlight.

The LCD offers six user-selectable languages for the display mode, including English and Japanese.
(When connected to data processor)

Can be powered with rechargeable batteries for reduced operating costs.

Denotes a new feature not available with the previous CR-300/310 Series.

The CR-400/410 Series really shows its abilities in these applications.

When measuring powders or pastes

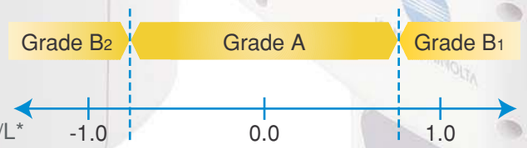
With the varied accessories, you can measure targets with diverse profiles.

Granular-Materials Attachment **CR-A50**

Glass Light-Projection Tube
CR-A33f (For CR-400)
CR-A33e (For CR-410)

When color control is performed with a customized evaluation formula, instead of the versatile color system

User-defined evaluation formulas can be entered as desired. Now, you can control color with customized evaluation formulas.



User index function
-Example-
Evaluation of tomato ripeness=a*/b*+0.3a*/L*

Note: The evaluation formula and grade indicated above are hypothetical examples used only to demonstrate the user index function.

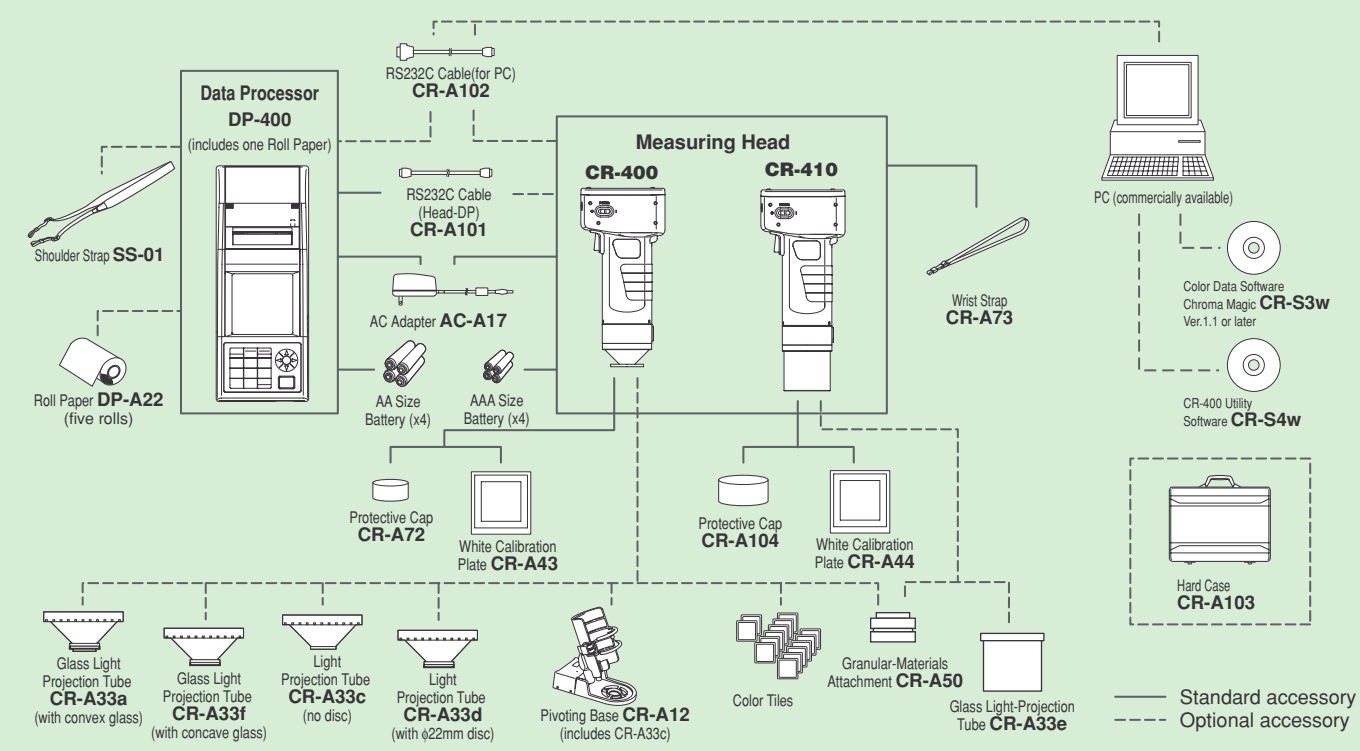
When a compact colorimeter is needed in the field

The measuring head can be used independently of the data processor. This is advantageous when portability is required or limited space is available.

When measurements need to be printed on-site for labeling of samples

The compact data processor features a built-in printer for superior mobility.

System Diagram



Optional Accessories

Granular-Materials Attachment **CR-A50**

With the Granular-Materials Attachment CR-A50, the color of powders, pastes, grains, and other granular substances can be easily and accurately measured.

Glass Light-Projection Tube **CR-A33f** (For CR-400) and **CR-A33e** (For CR-410)

Glass Light-Projection Tube CR-A33f and CR-A33e have a glass plate at the tip and can be used for measuring wet surfaces or for ensuring that materials such as textiles are flat during measurements.

Pivoting Base **CR-A12** (For CR-400)

Attaching the Pivoting Base CR-A12 to the Measuring head of the CR-400 ensures greater stability and accuracy in measurements Light-Projection Tube CR-A33c is also included.

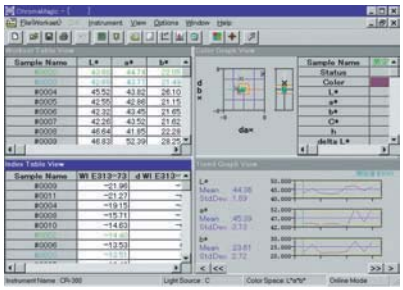
Color Data Software **CR-S3w ChromaMagic** Ver.1.1 or later

(Not Available in USA and Latin America)

- Enables comprehensive color analysis from incoming raw materials through all phases of the manufacturing and production processes.
- Supports the eight universally accepted color spaces, and provides easy-to-understand displays of color control data.
- Improves color control efficiency and reduces costs.

- Enables accurate and quick display of pass/fail results and alarm levels.
- Displays trend graph and statistical compilation of measured data.
- Easily exports data to spreadsheet applications.
- Various graphs and data display windows can be viewed at one time.
- Built-in color space and color indices offer complete solutions for a wide range of applications and industries.

CIE L*a*b*	Tint(CIE)
CIE L*C*h	Tint(CIE) Delta
CMC	WI(ASTM E313-1973)
CIE L*u*v*	WI(ASTM E313-1973) Delta
HUNTER Lab	WI(ASTM E313-1996)
CIE94	WI(ASTM E313-1996) Delta
XYZ/Yxy	WI(Berger)
FMC2	WI(Berger) Delta
Dominant WL	WI(CIE)
Excitation Purity	WI(CIE) Delta
NBS 100	WI(Hunter)
NBS 200	WI(Hunter) Delta
Rx	WI(Stensby)
Rx Delta	WI(Stensby) Delta
Ry	WI(Taube)
Ry Delta	WI(Taube) Delta
Rz	YI(ASTM D1925)
Rz Delta	YI(ASTM D1925) Delta
Strength:Tristimulus(%)	YI(ASTM E313-1973)
Strength:Tristimulus X(%)	YI(ASTM E313-1973) Delta
Strength:Tristimulus Y(%)	YI(ASTM E313-1996)
Strength:Tristimulus Z(%)	YI(ASTM E313-1996) Delta
Tint(ASTM E313-1996)	YI(DIN 6167)
Tint(ASTM E313-1996) Delta	YI(DIN 6167) Delta



System requirements

OS	Windows® 95/98/2000/XP, WindowsNT®4.0
CPU	Pentium 166MHz or higher
Memory	32MB or more
Hard disk	100MB or more free space
Display resolution	SVGA (800×600) or higher

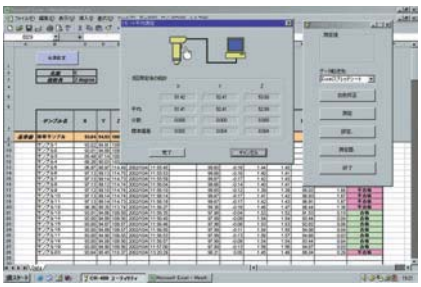
Parallel port or USB port to connect protecting key

Notes for users of Windows®95 and Windows NT® 4.0

(1) The protect key for the USB port connection cannot be used.
(2) When using Windows®95, you must use Internet Explorer Version4.0 or higher.
(3) When using Windows NT® 4.0, you must use SP4 or higher, or Internet Explorer Version 4.0 or higher.

CR-400 Utility Software **CR-S4w**

- To take measurements or change the measurement parameters of the CR-400/410 Series, you can control the unit with a PC.
- Measurement data can be transferred directly to a Microsoft Excel® file by means of the OLE function. (Excel® 97/2000/2002 is required to use the Excel® transfer function.)
- Calibration data and color-difference reference color data can be uploaded or modified.



System requirements

OS	Windows® 98/2000/XP
CPU	Pentium 166MHz or higher
Memory	32MB or higher
Hard disk	100MB or more free space
Display resolution	VGA (640× 480) or higher

Specifications

Name	Chroma Meter Measuring Head	
Model	**CR-400 Head**	**CR-410Head**
Illuminating/viewing system	d/0 (Diffuse illumination/0° viewing angle) (Specular component included)	Wide-area illumination/0° viewing angle (Specular component included)
Detector	Silicone photo cells (6)	
Display range	Y: 0.01 to 160.00% (reflectance)	
Light source	Pulsed xenon lamp	
Measurement time	1 seconds.	
Minimum measurement interval	3 seconds.	
Battery performance	Approx. 800 measurements (when using batteries under company testing Minolta's conditions)	
Measurement/illumination area	φ8/φ11	φ50/φ53
Repeatability	Within ΔE*ab0.07 standard deviation (when the white calibration plate is measured 30 times at intervals of 10 seconds)	
Inter instrument agreement	ΔE*ab: within 0.6	ΔE*ab: within 0.8
	Average of 12 BCRA series II colors	
Observer	2 degrees Closely matches CIE 1931 Standard Observers: ($\bar{x}_2\lambda$, $\bar{y}\lambda$, $\bar{z}\lambda$)	
Illuminant *1	C, D_{65}	
Display *1	Chroma values, color difference values, PASS/WARN/FAIL display	
Tolerance judgment *1	Color difference tolerance (box tolerance and elliptical tolerance)	
Color space/ colorimetric data	XYZ, Y x y, L*a*b*, Hunter Lab, L*C*h, Munsell (only illuminant C), CMC(l:c), CIE1994, Lab99, LCh99, CIE2000, CIE WI•Tw (only illuminant D_{65}), WI ASTM E313 (only illuminant C), YI ASTM D1925 (only illuminant C), YI ASTM E313 (only illuminant C), User index (up to six can be registered from computer)	
Languages	Operating keys : English LCD : English (default) (LCD : German, French, Italian, Spanish, Japanese) *1	
Storable data sets	1000 (measuring head and data processor save different data)	
Color difference target colors	100	
Calibration channels *1	20 channels (ch00 : white calibration, ch01 to ch19 : user calibration)	
Display	Dot-matrix LCD with back light (15 chars x 9 lines + 1 line for icon display)	
Interface	RS-232C compliant (for data processor/PC) * Baud rate : 4800, 9600, 19200 (bps), set at 9600 bps when shipped from factory	
Power source	4 AAA size alkaline or Ni-MH batteries, AC adapter (AC-A17) AC120V ∼ 50-60Hz 0.4A (for N.America and Japan) AC230V ∼ 50-60Hz 0.4A (for worldwide except N.America)	
Size	102(W) x 217(H) x 63(D)mm	102(W) x 244(H) x 63(D)mm
Weight	Approx. 550g	Approx. 570g
	(including 4 AAA size batteries and not including RS-232C cable)	
Operating temperature/ humidity range	0 to 40°C, relative humidity 85% or less (at 35°C) with no condensation	
Storage temperature/humidity range	-20 to 40°C, relative humidity 85% or less (at 35°C) with no condensation	
Other	LCD back light ON/OFF function (when ON, back light stays ON for 30 seconds after last key or measurement operation)	

*1 indicates when connected to the Data Processor or when not set using the Data Processor or the optional software, that some of the function are not available when the measuring head is not connected.

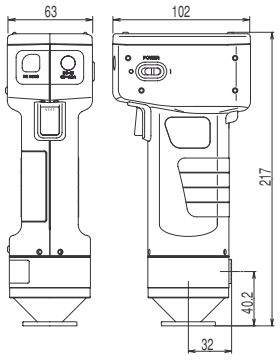
Name	Data Processor
Model	**DP-400**
Display range	Y : 0.01 to 160.00% (reflectance)
Measurement time *2	1 Seconds.
Minimum measurement interval *2	3 Seconds.
Battery performance	Approx. 800 measurements (when using batteries under company testing Minolta's conditions)
Illuminants	C, D_{65}
Display	Chroma values, color difference values, color difference graphs, PASS/WARN/FAIL display
Tolerance judgment *2	Color difference tolerance (box tolerance and elliptical tolerance) Only for the display function
Color space/ colorimetric data	XYZ, Y x y, L*a*b*, Hunter Lab, L*C*h, Munsell (only illuminant C), CMC (l:c), CIE1994, Lab99, LCh99, CIE2000, CIE WI-Tw (only illuminant D_{65}), WI ASTM E313 (only illuminant C), YI ASTM D1925 (only illuminant C), YI ASTM E313 (only illuminant C), User index (up to six registered in the Measuring Head can be used)
Languages	Operating keys : English, LCD : English (default), German, French, Italian, Spanish, Japanese
Storable data sets	Max. 2000 pieces of data (divisible into 100 pages) Deletion and Undoing selected stored data (one piece of data or all data) are possible
Color difference target colors *2	Only for the operating function (100 pieces of data when the measuring head is connected; input of measurement values or numeric) (independent of page function)
Calibration channels *2	Only for the operating function (20 channels when the measuring head is connected) (ch00: white calibration; ch01 to ch19: user calibration)
Page function	100 pages
Display	Dot-matrix LCD with back light (16 chars x 9 lines + 1 line for icon display) Contrast adjustment
Printer	384 dot line thermal printer (can also print graphs) Automatically prints out all measurement results (can be set not to print)
Statistical function	Maximum, minimum, average, and standard deviation
Automatic measurement *2	Date and time display: year, month, day, hour, minute Timer: 3seconds. to 99 minutes. (Some measurement modes require more than 3 seconds.)
Interface	RS-232C compliant Baud rate (bps) : 19200 fixed (when connected to PC) When measuring head is connected baud rate is automatically set to that of the measurement head
Power source	4 AA size alkaline or Ni-MH batteries, AC adapter (AC-A17) AC120V∼ 50-60Hz 0.4A (for N.America and Japan) AC230V∼ 50-60Hz 0.4A (for worldwide except N.America)
Size	100(W) x 73(H) x 255(D)mm
Weight	Approx. 600g (not including batteries and paper)
Operating temperature/ humidity range	0 to 40°C, relative humidity 85% or less (at 35°C) with no condensation
Storage temperature/humidity range	-20 to 40°C, relative humidity 85% or less (at 35°C) with no condensation
Other	User calibration function (multi-calibration/manual calibration) *2, Measurements for automatic average function, Print ON/OFF function. CR-400 measurement data import function *2, All color space print ON/OFF function, Data protection ON/OFF function. Back light ON/OFF function. Buzzer ON/OFF function. Display color limit function, Remote mode (stored data output), Character input function (alphanumeric)

*2 indicates that part of or all functions are not available when the measurement head is not connected.

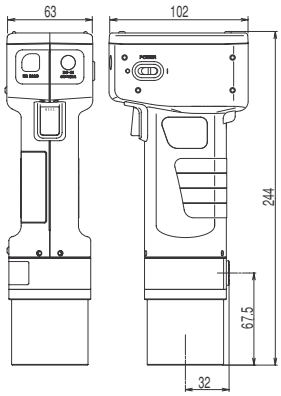
Dimensions

Units : mm

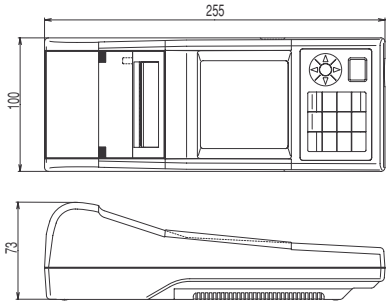
Measuring Head **CR-400**



Measuring Head **CR-410**



Data Processor **DP-400**



Standard/Optional accessories

	Measuring Head CR-400	Measuring Head CR-410	Data Processor DP-400
Color Data Software **ChromaMagic CR-S3w**	○	○	○
CR-400 Utility Software **CR-S4w**	○	○	○
White Calibration Plate **CR-A43**	●		
White Calibration Plate **CR-A44**		●	
Protective Cap **CR-A72**	●		
Protective Cap **CR-A104**		●	
RS-232C Cable **CR-A101**(Head-DP)	○	○	●
RS-232C Cable **CR-A102**(for PC)	○	○	○
AC Adapter **AC-A17**	●	●	●
Wrist Strap **CR-A73**	●	●	
Shoulder Strap **SS-01**			○
Hard Case **CR-A103**	○	○	○
Roll Paper (one roll)			●
Roll Paper **DP-A22**(five rolls)			○
4 AA Size Batteries			●
4 AAA Size Batteries	●	●	
Glass Light-Projection Tube **CR-A33a/f**	○		
Light-Projection Tube **CR-A33c/d**	○		
Glass Light-Projection Tube **CR-A33e**		○	
Granular-Materials Attachment **CR-A50**	○	○	
Pivoting Base **CR-A12**	○		
Color Tiles	○		

● Standard accessory
○ Optional accessory

Specifications are subject to change without 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 a fire or electric shock.

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