SEKONIC

SPECTROMASTER
C-700 / C-700R

www.sekonic.com

THE ULTIMATE COLOR CONTROL TOOL....
BECAUSE COLOR IS IMPORTANT

MERGING TECHNOLOGY FOR THE NEXT GENERATION OF IMAGE MAKERS

The gap between still and motion image capture has narrowed considerably, and so has lighting and the ability to control it. Now both still and motion shooters are faced with the choices and challenges of conventional and emerging light sources. With the many sophisticated and versatile cameras available today, a new generation of image capture professionals has entered the field. New camera and lighting technology has helped the way to media content that has never before been possible. New challenges, especially in lighting and specifically in color consistency have hindered the creative flow of many studio and on-location productions. Reproducing colors as they appear in the image has always been the essential goal and dream in photography and cinematography since its inception. Using color filters and yesterday's color measuring instruments, imaging shooters around the world managed to control color in their images.

Today's digital shooters remain unchanged in their desire to control color precisely, while the diversity of lighting sources is ever-changing. With the popularity of LED lighting, the need for a color meter that can measure it and all light sources has become critical to ensure accurate color fidelity.

The NEW Sekonic SpectroMaster C-700/C-700R is the first spectrometer that measures every light source (LED, HMI, Fluorescent and the natural light spectrum) PLUS wireless flash (C-700R only). In addition, with its CMOS linear sensor, the SpectroMaster C-700/C-700R makes it possible to capture spikes in light source output, especially fluorescent and LED lighting, providing unmatched color measurement accuracy.

THE WORLD'S FIRST* STAND-ALONE SPECTROMETER THAT MEASURES EVERY LIGHT PLUS WIRELESS FLASH

The C-700 series takes a quantum leap forward in color control technology for today's photographers. With a touch of your finger you can select ambient or flash color temperature measurement with just the filter compensation value you need. Balancing multiple light sources for clean neutral lighting has never been so quick and accurate. Popular light balancing and color correction filter brands have already been loaded to provide a familiar and convenient work-flow. Sophisticated features such as selective wireless flash triggering (C-700R only with PocketWizard® transceivers) truly offer photographers the first advanced Spectrometer designs with still and motion shooters in mind.

When your work demands motion, the C-700 really shines with uncompromising precision measurement and correction for LED, HMI and fluorescent lighting. Viewing and comparing the spectral energy distribution of your measured light sources provide real time validation of what your lightings are capable of doing and what you need to do to achieve your goals. Whether your white balancing, Multi-light balancing, creating color lighting effects or striving for accurate color reproduction, the C-700 series is the ultimate color control tool.

* - As of August 2015, by research of Sekonic Corporation

.....The Ultimate Color Control Tool.....

With still *or* moving *Images...*

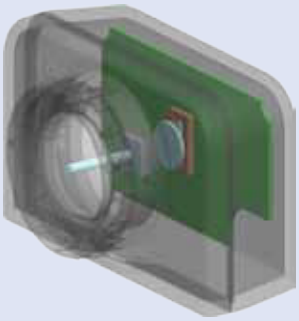
How do you tell the story?

Spectrometer (Color Meter)

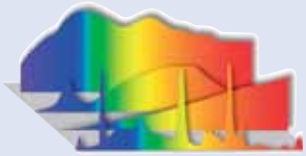
- ✔ Measures Color Temperature (K)
- ✔ Provides Color Compensation Data
- ✔ Provides Light Quality Information such as CRI and Spectrum distribution graph

Illuminance Meter

- ✔ Provides Lux, Foot-Candle, Lux Sec., Foot-Candle Sec. (Models sold in some countries do not display illuminance and exposure in "fc" or "fc·s" due to legal restrictions.)
- ✔ Conforms to Class A of JIS C 1609-1: 2006



Utilizing a CMOS Linear Image sensor, the C-700 series SpectroMaster measures any light sources with repeatable and precise accuracy.



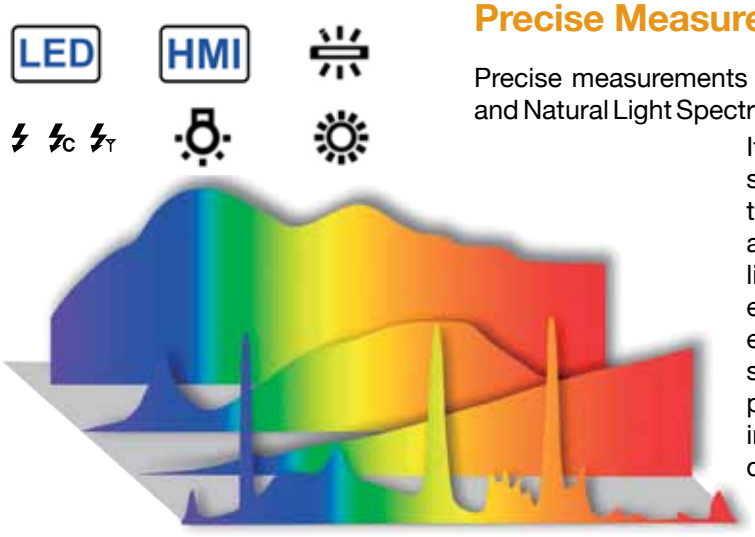
Precise measurements of LED, HMI, Fluorescent, Tungsten, Electronic Flash and Natural Light Spectrum set the C-700 series apart from other spectrometers.

The C-700R is the only spec-trometer to offer wireless radio triggering (with PocketWizard® transceivers) and measuring of electronic flash units. Selective zone control provides specific triggering and measuring of a flash group or unit.

Intuitive color touch screen offers easy navigation through Spectral distribution, lighting comparisons, CRI color data and more.

CMOS Linear Image Sensor:

The heart of the C-700 series SpectroMaster is the CMOS Linear sensor. It starts with the carefully designed and manufactured light diffusion receptor, which evenly distributes the light on to the internal sensor. A fiber optic internal rod tunnels the captured light passing it through Infrared cutting filters and heat-absorption glass to avoid any aberrations during the actual measurement and evaluation process. A collimated lens focuses the light into a narrow beam and finally a Douser releases the light onto the CMOS (Complementary Metal-Oxide-Semiconductor) linear image sensor for measurement.



Precise Measurement of All Light Sources:

Precise measurements of LED, HMI, Fluorescent, Tungsten, Electronic Flash and Natural Light Spectrum set the C-700 series apart from other spectrometers.

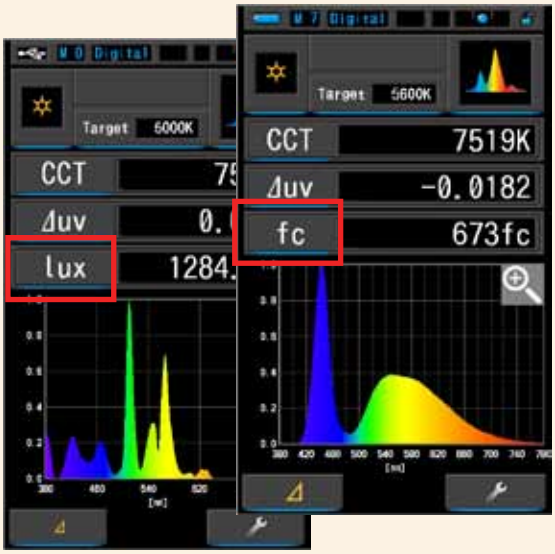
It can measure the true color temperature of a light source from 380 to 780 nanometers (nm). What makes the C-700 series truly unique and exceptional is its ability to not only measure conventional continuous light sources but also electronic flash, in addition to emerging light sources. Utilizing its measuring and evaluating process, it can capture spikes in light sources, especially those from fluorescent and LED's, providing unmatched color measurement accuracy in the an affordable end-user friendly spectrometer designed especially for the photo/video industry.

Wide Illumination Range:

Meeting the criteria for the Class A (JIS C 1609-1: 2006 "Illuminance meters Part 1: General measuring instruments") , the C-700 series offers premiere photometric metering performance. With a measuring range of 1 to 200,000lx (0.09 to 18,600fc) and 20 to 20,500lx·s (1.86 to 1,900fc·s) it offers a significant sensitive range in both continuous and flash output measurement.

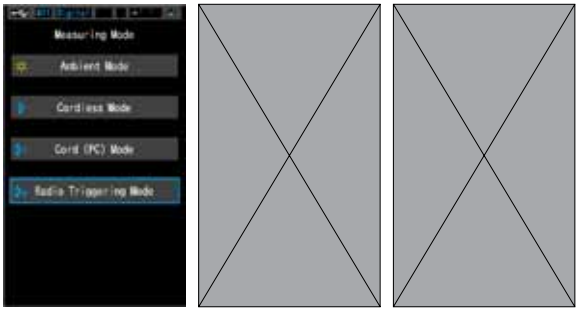
Cinematographers will especially appreciate the quick and easy selection from lux to foot-candles or lux seconds to foot-candle seconds. Balancing light ratios or checking light intensity on the set can be done quickly. Industrial users monitoring light levels to avoid excessive light exposure on museum pieces or plants in a horticultural environment will benefit from its simplicity of use and conformity to Japanese Industrial Standards (JIS).

Note: Models sold in some countries do not display illuminance and exposure in "fc" or "fc·s" due to legal restrictions.



Flash Measurement:

The only spectrometer to measure wireless flash, the C-700R features a built-in PocketWizard® wireless triggering system. Electronic flash units can be measured remotely. Flash units can be triggered up to 100 feet (30 meters) away using the wireless triggering radio and compatible PocketWizard® receivers. A convenient PC connector or cordless flash mode is also available to trigger flash units.



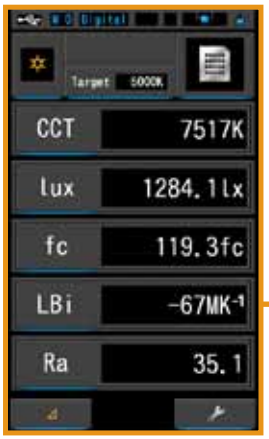
Radio Triggering Modes:

Radio triggering mode is selected on the Measuring mode screen. Radio Channels and Zones can be set for Standard or ControlTL® wireless mode. Channels and Zones are selected with a quick touch of your finger.

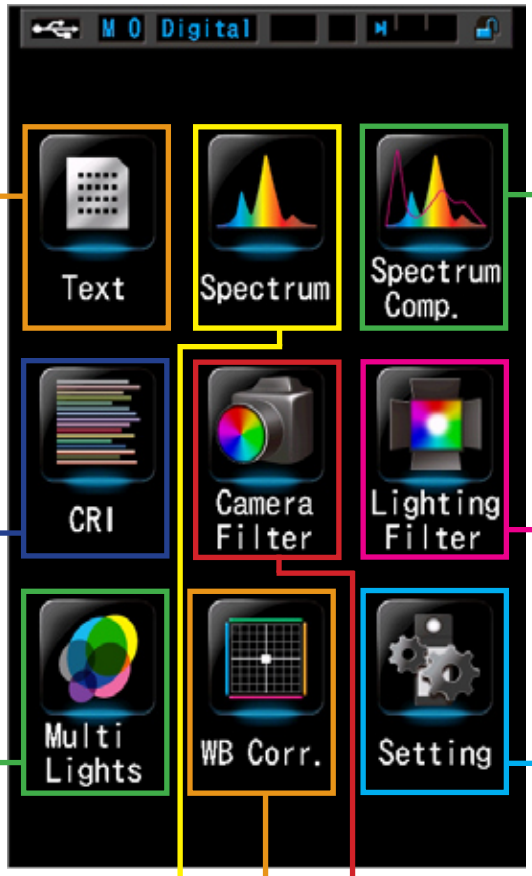
Various Display Modes with Intuitive Color Touch Screen

The C-700's 4.3" large color touch dot-matrix screen displays various modes and functions in a logical and intuitive layout. The main selection screen displays the quick icons for the following Display Modes.

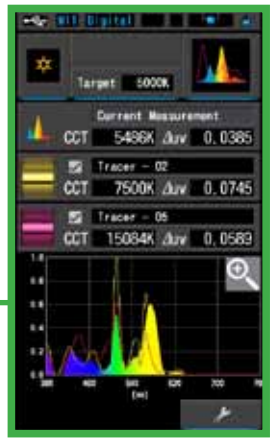
Text



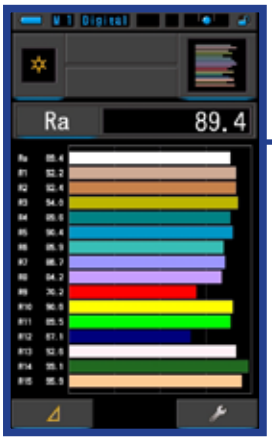
Display Mode Selection Screen



Spectrum Comparison

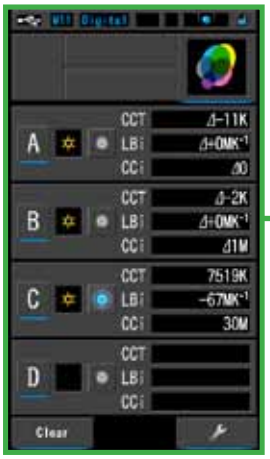


CRI



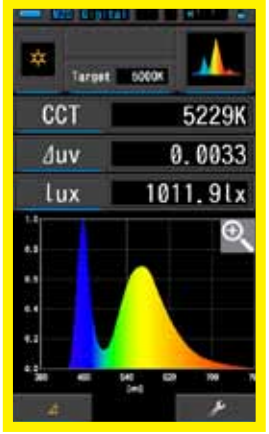
Lighting Filter

Multi Lights

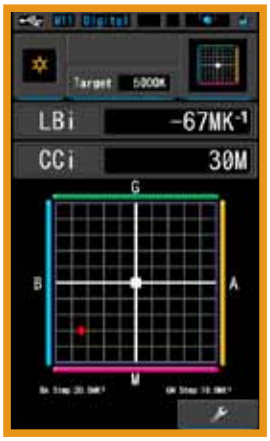


Setting

Spectrum



White Balance Correction



Camera Filter

Expanded Measurement and Compensation Values

The C-700 series SpectroMaster offers a wide selection of measuring values and various compensation solutions. Access to these values can be quickly selected by a tap of your finger on the appropriate icon.

No.	Indication	Display Item Name	Description
1	CCT	Color Temperature Display	In Digital Mode: Displays correlated color temperature
	PCT		In Film Mode: Displays photographic color temperature
2	Δuv	Deviation	Displays deviation from the black-body radiation
3	Lux, fc	Illuminance	Displays illuminance in lux or foot-candle
4	Hlx, Hfc	Exposure	Displays exposure in lux-second or foot-candle-second
5	CCi	CC Index Correction	Displays the CC correction value in CC index
6	CCcf	CC Camera Filter Correction	Displays the CC corrected value in the compensation filter name. The filter brand is selected in the Measuring screens and Setting Mode
	CClf	CC Lighting Filter Correction	
7	LBi	LB Index Correction	Displays the LB (Light Balancing) corrected value in LB index
8	LBcf	LB Camera Filter Correction	Displays the LB corrected value in the compensation filter name. The filter brand is selected in the Measuring screens and Setting Mode
	LBlf	LB Lighting Filter Correction	
9	Ra	Average CRI	Displays the average value of CRI (Color Rendering Index) R1 to R8
10	R1 to R15	CRI Number	Displays Individual CRI number from R1 to R15

* Models sold in some countries do not display illuminance and exposure in "fc (fc·s)" due to legal restrictions.

Customize Your Meter

All settings and preferences can be selected and adjusted within this Setting menu.

Tool Box

Frequently used settings such as switching between Digital or Film mode, setting Memory Titles, etc. can be selected in the Tool Box by tapping your finger on the wrench icon located on all Measuring screens.

No.	Name	Description
1	Digital / Film	Selection screen for Digital or Film capture.
2	Preset Selection (Digital)	Selection screen to apply preset preferences such as camera or lighting filter settings or change the target color temperature.
3	Preset Selection (Film)	
4	Memory Title	Creates special titles for memorized values.
5	Memory Management	Memorized values can be cleared, renamed or recalled.
6	Radio Channel / Zone	Sets the channel or zones of radio to use.

Other Functions

- ✔ Up to 99 readings can be memorized (pic 1).
- ✔ Contrast Function to show the difference between standard value and currently being measured value (pic 2).
- ✔ Dark calibration can be done by turning the Light Selection Ring to set to the dark calibration position or perform it from Setting menu without a cap to cover the light receiving section (*pic 3*).
- ✔ Two AA batteries or rechargeable batteries conveniently provide portable power (*pic 4*). A USB cable provides continuous power duringmeasurement, firmware updates, data uploads or downloads and custom settings.
- ✔ 270° swivel head

Pic 1

Pic 2

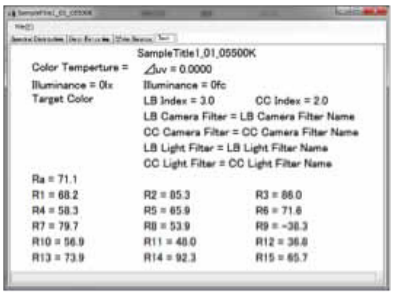
Pic 3


Pic 4

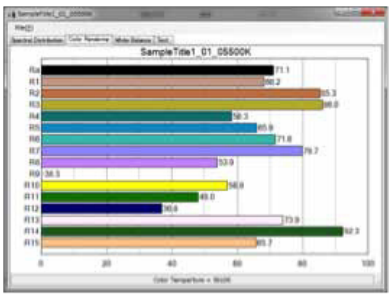
C-700 Series Utility Software:

The C-700 series Utility (included with the meter) offers an easy ways to make meter settings such as shutter speed increments, filter brand selection and Illuminance units (lux or fc). Memorized data can be evaluated and analyzed using the advantage of a larger screen from a desktop or notebook computer. The latest firmware can be quickly and easily updated to the meter.

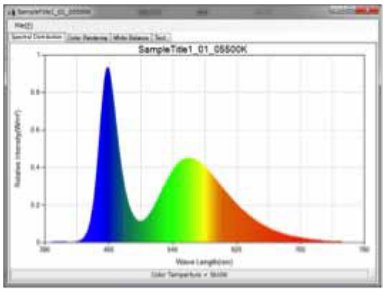
- ✔ Analyzes and saves the memorized data in the computer.
- ✔ Provides convenient selection and adjustment of meter settings.
- ✔ Quick view of Meter Information (serial number, user name, etc)
- ✔ Updates the meter and Utility Software



Memory Data (Text Screen

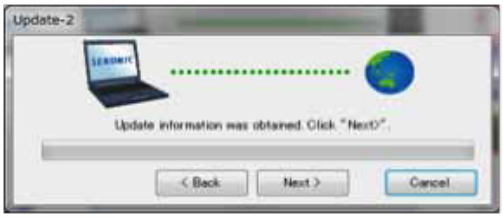


Memory Data (CRI Screen)



Memory Data (Spectrum-Screen)

Product Setting Screen



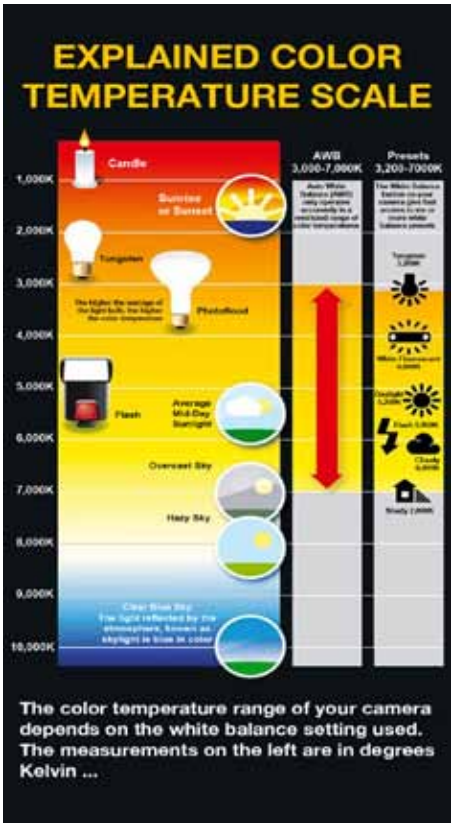
Update Screen

Product Information Screen

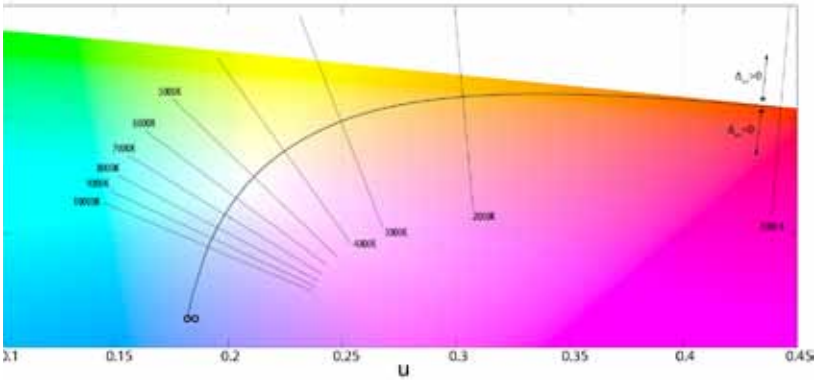
What is Color Temperature?

Color temperature is a way of describing the color of a light source in a numeric value. It is usually expressed as either warm (yellowish) or cool (bluish), and measured in Kelvin (K). Color temperatures over 5,000K are called cool colors (bluish white). Clear blue skies, electronic flash and certain continuous light sources are examples of 'cool' blue light. Lower color temperatures (under 3,000 K) are called warm colors (orange or red), candles, sunsets and tungsten bulbs are examples of these types of light sources.

The Kelvin Color Temperature scale is based on heating an object at various degrees of physical heat and recording the color changes. For example, if we heat up a lamp filament at some point, the filament will get hot enough to begin to glow. As it gets hotter, its glowing color will change, moving from deep reds, such as a low burning fire, to oranges and then yellows and finally up to white super-hot. Light sources that glow in this manner are considered "incandescent radiators" (like blackbody) and the advantage to them is that they have a continuous spectrum of light. This means that they radiate light energy at all wavelengths of their spectrum, thus render all the colors of a scene being illuminated by them, equally. Only light from sources functioning in similar ways can meet the definition of color temperature.



What is Correlated Color Temperature (CCT)?



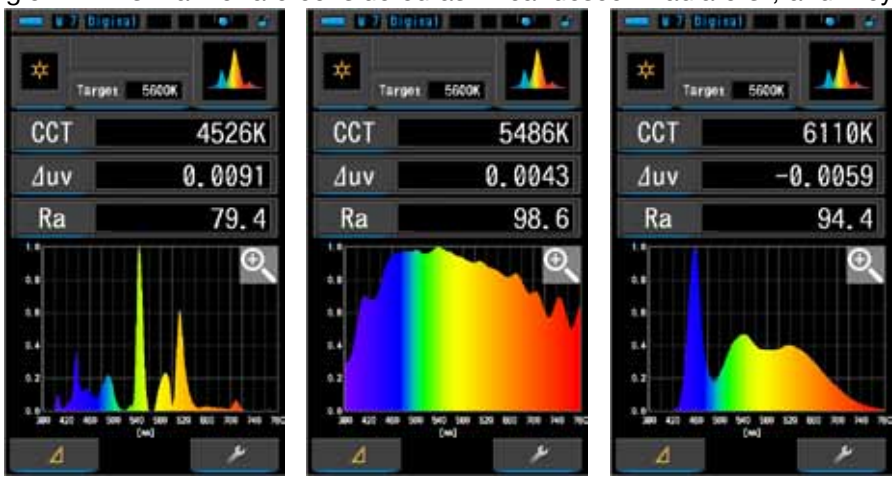
Light sources that are not incandescent radiators (light that glows in different colors as they get hotter, such as a blackbody radiator) have what is referred to as a "Correlated Color Temperature" (CCT). Their reference to any part of the color temperature chart is strictly visually based. Lights with a correlated color temperature do not have an equal radiation at all wavelengths in their spectrum. These types of light sources create a disproportionate level (high & low) of color rendering. Light sources within this category are measured in their ability to accurately render all colors of their spectrum, in a scale called the Color Rendering Index (CRI). Incandescent radiators (such as the ideal blackbody radiator) have a CRI of 100 (the best value).

Why is Color Temperature important?

In order to record or view colors and details accurately in a scene, it is necessary to illuminate the subject with a light source that produces the correct color temperature. In the case of photography or Cine/Video applications, the color temperature of the light source should be balanced to the type of capture media (film/digital). It is critical that the camera is set (white balanced) to the same color temperature of the light source to achieve neutral whites and blacks without any color cast. If the color temperature of a light source is higher than the camera settings (or film used), the image will result in a bluish tint especially in neutral areas such as white backgrounds. Lower color temperatures will record in images with a reddish/orange tint. It is important to recognize these color temperature effects in order to accurately capture the true colors in the final image especially with commercial images or productions.

Are all light sources the same color temperature?

As explained earlier, the color temperature of a light source is based on how it compares to a heated object such as a filament from a light bulb (black body radiator). As this object heats up at some point it will get hot enough to begin to glow. As it gets hotter, its glowing color will change, moving from deep reds up to super-hot white. Light sources that glow in this manner are considered as “incandescent radiators”, and they have a continuous spectrum of light. This means that they radiate light energy at all wavelengths of their spectrum. Light sources that are not “incandescent radiators” don’t react in the same way as they emit energy in different ways and from different power sources. All light sources have varying color temperatures and are often within a projected range that can be classified as closer to warmer (Tungsten balanced), or cooler, (daylight balanced) temperature. However, they may not render color accurately or at all throughout the spectrum even though they have same color temperature.



How does color temperature adjustment improve my images?

Photographers and Cinematographers have frequently used color temperature adjustments to convey a “warmer” or “cooler” tone to their images. In many instances moving away from what is the “accurate” color temperature can generate stylized results. To make an image look more naturally illuminated, (or warmer afternoon lighting) lowering the color temperature below 3400K will yield the desired effect. For more commercial or industrial images, color temperature can be raised above 5000K to create a more artificial illumination, (or cooler tone) to convey a more commercial studio look with the appearance of increased contrast. However, some colors and tones within the scene may not render correctly and details in the highlights and shadows could be lost or blocked in both cases.

Correcting multiple light sources with different color temperatures

When there are multiple light sources in your image (for example artificial and natural light) they will also be multiple color temperatures altering areas of the image. To compensate and balance the color temperature of these light sources, it’s necessary to place LB (Light Balancing) gels in front of them, so that they balance or evenly matches the primary (dominate) light source. You can also use specific colors to change indoor or incandescent lights to have a color temperature similar to daylight or daylight to indoor, incandescent to fluorescent or whichever scenario fits your needs. It is important that individual light sources should be measured as they will be used when you measure the color temperature of them. In the case of any artificial lighting, (such as flash, HMI or florescent studio lighting) it is critical that any light shaping tools (such as umbrellas, soft boxes or bounce cards) intended for use in the final image be measuring on the light source.

A: The image was captured at 6000K to match the outside window light. As a result, the shadow at the right side of subject has an orange cast.

B: The image was captured at 2800K to match the indoor tungsten light. As a result, shadow at the right side of subject has a bluish cast.

C: This image was captured at 6000K to match the outside window light. Indoor tungsten light was balanced by using light balancing filter to match the outdoor lighting. As a result, the subject has a neutral cast. All colors are reproduced correctly.

Color correcting and Light Balancing filters

Light Balancing filters are placed in front of light sources to adjust their color temperature. CTO (Color Temperature Orange) filters will lower cooler (bluish light) color temperature light sources such as flash, HMI's, florescent or LED lights and provide warmer tones. CTB (Color Temperature Blue) filters will raise warmer (yellowish light) color temperatures light sources such as tungsten or natural lights providing cooler tones. Color correcting filters are, Plus/Minus green filters that compensate for green tones that are commonly found in fluorescent light sources.

The image on the left was photographed under fluorescence lighting with the camera set to daylight conditions. The image on the right was photographed after the fluorescence lights were light balanced with gels to match the camera settings.

What is CRI and why is it important?

CRI (Color Rendering Index) is a quantitative measure revealing the ability of a light source to represent the colors of various objects faithfully in comparison with an ideal or natural light source. The Color Rendering Index (CRI) is a scale from 0 to 100, which describes how a light source makes the color of an object appear to the human eye and how well subtle variations in colors and shades are revealed. The higher the CRI, the better the color rendering ability. A Black Body Radiator (i.e.: a filament from a light bulb) is considered the "reference" light source and they produce a CRI value of 100. CRI values can be evaluated from R1 through R8 (color rendering index) and R9 through R15 (special color rendering index). Each R value represents a color for specific color rendering performance for the measured light source. Ra is commonly used because it represents an average color rendering performance of a light source from R1 through R8. It is important to measure various different light sources for their CRI values before using them for a shoot or production.

Color Meters vs. Spectrometers

Traditional color meters for photo/video and cine applications were designed to match film sensitivity by using three photo sensors with R, G, B color filters. Since more images are captured with digital cameras, professionals have noticed that traditional color meters may not match their digital cameras as they expect because the digital sensor is designed to match the sensitivity of human eyes. In addition, it is difficult for three photo sensors with color filters to read the spikes that some light sources can produce such as LED or Fluorescents. Instead, the Spectrometers like the C-700 series can analyze the light from 380nm to 780nm and provide a more precise measurement, which matches the human eyes sensitivity standardized by the CIE (Commission Internationale de l'Eclairage). Through its advanced measuring system, it provides full spectral data of the light source along with CRI information as well as intensity of light (illumination). Industrial spectrometers do not show LB or CC filters correction, however the C-700 series does provide the necessary information required to capture images in their true colors.

Where is color temperature important?

Color temperature is important when it comes to accurate representation of art on display in a gallery, commercial lighting for studio portraits, cinematography, advertising, and industrial manufacturing of products. It is critical in medical facilities that require accurate color temperature to diagnose health issues as well as surgical procedures. Also it is important in public facilities to effectively illuminate areas for safety (usually cooler color temperature) that increases awareness in such situations as roadways, sidewalks, ATM's, construction zones, etc.

Lighting Filters Compensation

Inspection Lights Control

Available Light Management For Color Proof

Light Control in Gallery or Museum

Light Source Management in Rental Studio

Camera Filters Compensation

How does color temperature effect the way we see?

The human eyes adjust automatically to subtle changes from light sources in brightness levels as well as differences in the color. However our eyes alone are not the sole determining factor in the interpretation of the color of light or its brightness. Our brains are continuously using stored information, our senses as well as our eyes to make the final determination of what we see and what we think we see. If you enter an indoor room, it is common to find warmer color temperature lighting, which promotes comfort and relaxation. Warmer color temperatures are frequent used deliberately in homes as they promote comfort and relaxation, whereas cooler color temperatures are commonly used in office, industry or manufacturing to promote focus and productivity.

Auto white balance vs. color temperature measurements

White Balance (WB) is the process of calibrating a still or motion camera, to ensure that unrealistic color casts don't appear in neutral areas of the recorded image. It is also important that these color casts don't taint the true color of other tones and colors within the scene. White balancing takes into account the color temperature of a light source as it sets the camera to render the colors accurately. In order to white-balance a camera, it's necessary to use a standard White Balance grey or white card to set a point of known reference for the camera. Many shooter rely on Auto White Balance (AWB), which typically finds the brightest portion of your frame and sets that as a standard white. However, Auto White Balance can create unwanted blue, orange or even green color casts under various light sources. For the greatest color accuracy, measuring and balancing all light sources before calibrating for White Balance yields the most consistent results.

SPECIFICATIONS
SHEET

Specification and Comparison Chart



Product Name and Model		C-7000	C-700R	C-800
Illuminance Meter Class		* Class A of JIS C 1609-1: 2006 “Illuminance meters Part 1: General measuring instruments” * DIN 5032 Part 7 Class C	* Class A of JIS C 1609-1: 2006 “Illuminance meters Part 1: General measuring instruments”	* Class A of JIS C 1609-1: 2006 “Illuminance meters Part 1: General measuring instruments”
Sensor		CMOS linear image sensor	CMOS linear image sensor	CMOS linear image sensor
Spectral Wavelength Range		380nm to 780nm	380nm to 780nm	380nm to 780nm
Output Wavelength Pitch		1nm (Requires the C-7000 Utility to output memorized data)	N/A	N/A
Spectral Bandwidth		Approx. 11nm (half bandwidth)	Approx. 11nm (half bandwidth)	Approx. 11nm (half bandwidth)
Measuring Mode	Ambient light:	Yes	Yes	Yes
	Cord flash	Yes	Yes	Yes
	Cordless flash	Yes	Yes	Yes
	Radio triggering	No	Yes	No
Measuring Range	Ambient light:	1 to 200,000lx (= 0.1 to 18,600fc),	1 to 200,000lx = 0.09 to 18,600fc	1 to 200,000lx = 0.09 to 18,600fc
		1,563 to 100,000K (more than 5lx required)	1,600 to 40,000K (more than 5lx required)	1,600 to 40,000K (more than 5lx required)
	Flash Light:	20 to 20,500lx•s = 1.86 to 1,900 fc•s	20 to 20,500lx•s = 1.86 to 1,900 fc•s	20 to 20,500lx•s = 1.86 to 1,900 fc•s
		1,563 to 100,000K	1,600 to 40,000K	1,600 to 40,000K
Accuracy (Standard Illuminant A)		Illuminance: ±5% ± 1 digit (1 to 2,990lx), ±7.5% ± 1 digit (3,000 to 200,000lx)	Illuminance: ±5% ± 1 digit (1 to 2,990lx), ±7.5% ± 1 digit (3,000 to 200,000lx)	Illuminance: ±5% ± 1 digit (1 to 2,990lx), ±7.5% ± 1 digit (3,000 to 200,000lx)
		x,y: 0.003 (Standard Illuminant A, 800lx)	CCT: ±4MK-1(800lx)	CCT: ±4MK-1(800lx)
Repeatability (Standard Illuminant A)		Illuminance: 1% + 1 digit (30 to 200,000lx), 5% + 1 digit (1 to 29.9lx)	Illuminance: 1% + 1 digit (30 to 200,000lx), 5% + 1 digit (1 to 29.9lx)	Illuminance: 1% + 1 digit (30 to 200,000lx), 5% + 1 digit (1 to 29.9lx)
		x,y: 0.001 (500 to 200,000lx)	CCT: 2MK-1 (500 to 200,000 lx)	CCT: 2MK-1 (500 to 200,000 lx)
		x,y: 0.002 (100 to 499lx)	CCT: 4MK-1 (100 to 499 lx)	CCT: 4MK-1 (100 to 499 lx)
		x,y: 0.004 (30 to 99.9lx)	CCT: 8MK-1 (30 to 99.9 lx)	CCT: 8MK-1 (30 to 99.9 lx)
		x,y: 0.008 (5 to 29.9lx)	CCT: 17MK-1 (5 to 29.9 lx)	CCT: 17MK-1 (5 to 29.9 lx)
Visible-region Relative Spectral Response Characteristics (f1’)		Within 9%	Within 9%	Within 9%
Cosine Response (f2)		Within 6%	Within 6%	Within 6%
Temperature Drift (fT) (Standard Illuminant A 1,000lx)		Illuminance: ±5% of indicated value	Illuminance: ±5% of indicated value	Illuminance: ±5% of indicated value
		x,y: ±0.006	CCT: ±12MK-1	CCT: ±12MK-1
Humidity Drift (fH) (Standard Illuminant A 1,000lx)		Illuminance: ±3% of indicated value	Illuminance: ±3% of indicated value	Illuminance: ±3% of indicated value
		x,y: ±0.006	CCT: ±12MK-1	CCT: ±12MK-1
Power Source		AA (1.5v) x 2 pcs, USB bus power	AA (1.5v) x 2 pcs, USB bus power	AA (1.5v) x 2 pcs, USB bus power
Measurement Time	Ambient light:	Auto - Max.: 15 sec., Min.: 0.5 sec.	Auto - Max.: 15 sec., Min.: 0.5 sec.	Auto - Max.: 15 sec., Min.: 0.5 sec.
		Manual - 0.1s, 1sec.	N/A	N/A
	Flash Light:	1 to 1/500 sec. (in 1 step)	1 to 1/500s (plus 1/75, 1/80, 1/90, 1/100, 1/200, 1/400)	1 to 1/500s (plus 1/75, 1/80, 1/90, 1/100, 1/200, 1/400)
Display Mode		Text mode, Spectrum mode, CRI mode, TM-30 mode, SSI mode, TLCI/TLMF mode, CIE1931 (CIE1964) mode, CIE1976 mode, Spectrum Comparison mode, CRI Comparison mode, CIE1931 (CIE1964) Comparison mode, CIE1976 Comparison mode	Text mode, Spectrum mode, Spectrum comparison mode, CRI mode, Camera filter mode, Lighting filter mode, Multi Lights Mode, White Balance Correction Mode	Text mode, Spectrum mode, Spectrum comparison mode, CRI mode, CRI comparison mode, TM-30 mode, SSI mode, TLCI/TLMF mode, Filter mode (Camera / Lighting), Multi Lights Mode, White Balance Correction Mode
Measuring Capability (Display Item)		Correlated Color Temperature (Tcp),Deviation (⊿uv), Tristimulus value (XYZ / $X_{10}Y_{10}Z_{10}$), CIE1931/1964 (xyz / $x_{10}y_{10}z_{10}$), CIE1976 (u', v' / u'$_{10}$v'$_{10}$), Dominant wavelength (λd), Excitation purity (Pe), Peak wavelength (λp), Lux(lx) or Foot-Candle(fc) – ambient light, Lux Second(Hlx) or Foot-Candle Second(Hfc) – flash light, PPFD, TM-30 (Rf, Rg), SSI (Tungsten, Daylight, SSI1, SSI2), TLCI/TLMF, CRI (Ra, R1 to R15)	Correlated color temperature (CCT), Photographic color temperature (PCT), Deviation (Δ uv), LB/CC filter number (camera/gel), LB/CC index,Lux(lx) or Foot-Candle(fc) – ambient light, Lux Second(Hlx) or Foot-Candle Second(Hfc) – flash light, CRI (Ra, R1 to R15)	Correlated color temperature (CCT), Deviation (Δ uv), LB/CC filter number (camera/gel), LB/CC index, cc number, Lux(lx) or Foot-Candle(fc) – ambient light, Lux Second(Hlx) or Foot-Candle Second(Hfc) – flash light, CRI (Ra, R1 to R15), Rf, Rg, SSI (daylight, tungsten, selected light source), TLCI, TLMF, x, y, Hue, Saturation,
Other Functions		Up to 999 memory, Preset function, Auto power off, Auto dimmer, 2 or 10 deg. filed of view setting, Continuous/Single measurement selection	Digital/Film mode, Data memory: 99 data, Preset function, Auto power off, Auto dimmer	Data memory: 99 data, Preset function, Auto power off, Auto dimmer
Display languages		English, Japanese, Chinese (Simplified)	English, Japanese, Chinese (Simplified)	English, Japanese, Chinese (Simplified)
Interface		USB 2.0 (Mini B)	USB 2.0 (Mini B)	USB 2.0 (Mini B)
Operating Temperature		'-10 to 40 deg. C	'-10 to 40 deg. C	'-10 to 40 deg. C
Storage Temperature		'-10 to 60 deg. C	'-10 to 60 deg. C	'-10 to 60 deg. C
Dimensions		73mm (w) x 183mm (h) x 27mm (d) = 2.9" (w) x 7.2" (h) x 1.1" (d) (excluding protruding part of light receiving) max. thickness 40mm (d) = 1.6" (d)	73mm (w) x 183mm (h) x 27mm (d) = 2.9" (w) x 7.2" (h) x 1.1" (d) (excluding protruding part of light receiving) max. thickness 40mm (d) = 1.6" (d)	73mm (w) x 183mm (h) x 27mm (d) = 2.9" (w) x 7.2" (h) x 1.1" (d) (excluding protruding part of light receiving) max. thickness 40mm (d) = 1.6" (d)
Weight		230g = 8.1oz (without batteries)	238g = 8.4oz (without batteries)	230g = 8.1oz (without batteries)
Standard Accessory	Software/Utility	Yes (included in the package)	Yes (Downloaded from website)	Yes (Downloaded from website)
	Operating Manual	Yes (Downloaded from website)	Yes (Downloaded from website)	Yes (Downloaded from website)
	USB cable	Yes (included in the package)	No (optional)	No (optional)
	Start Up Guide	Yes (included in the package)	Yes (included in the package)	Yes (included in the package)
	Strap	Yes	Yes	Yes
	Synchro terminal cap	Yes (built-in)	Yes (built-in)	Yes (built-in)
	Soft case	Yes	Yes	Yes

Features and specifications are subject to change without notice.