

# SPECTRA LED LIGHTS

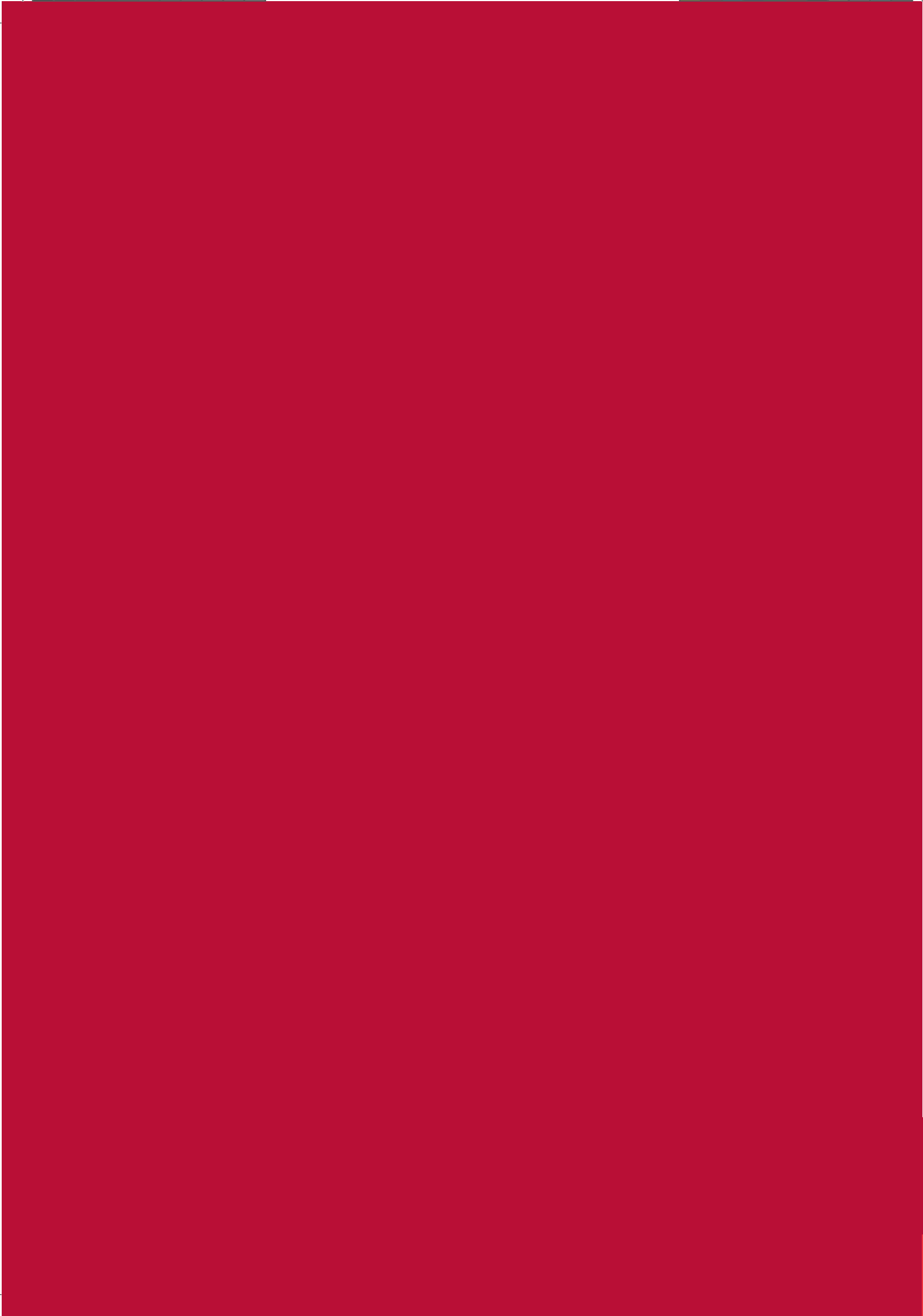
## TECHNICAL DATASHEET



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# INDEX FAMILY DATASHEET

<b>INTRODUCTION</b>	4
<b>PRODUCT FAMILY OVERVIEW</b>	5
<b>NOMENCLATURE</b>	5
<b>POSSIBLE SYSTEM COMBINATIONS</b>	6
<b>TECHNICAL DATA</b>	6
<b>TECHNICAL SPECIFICATIONS</b>	6
<b>OPTICAL SPECIFICATIONS (QUALITY OF LIGHT)</b>	7
CRI	7
CCT	8
LIGHT SPECTRUM	9
RADIATION PATTERN	11
<b>THERMAL CONSIDERATIONS</b>	12
<b>NORMS AND STANDARDS</b>	13
<b>SUGGESTIONS FOR MAXIMUM SAFETY AND LONGEST LIFETIME OF THE PRODUCT</b>	13
<b>LIST OF AVAILABLE SPARE PARTS</b>	14
<b>LOGISTIC DATA</b>	15





## Introduction

Today, LEDs are recognized as the most cutting-edge lighting technology, and this is true for the majority lighting applications. Well-designed LED fixtures and luminaries can provide the required surface illuminance with an improved uniformity, while using less energy compared to traditional light sources.

The technology is improving so rapidly in terms of luminous efficacy, color quality, thermal management, and cost, that choosing LEDs as continuous light source no longer means compromising on some of the benefits of conventional lighting technologies.

It must be said, however, that current LED product quality can vary significantly among manufacturers, so due diligence is required in their proper selection and use. LED performance is highly sensitive to thermal and electrical design weaknesses that can lead to a bad light quality or premature failure.

When it comes to videography and photography, lighting is of key importance, since it has a direct impact both on the technical value of the work and on its artistic content. That's why LED fixtures that are meant for these fields of application must excel in quality.

Manfrotto capitalizes on its decades of experience in the photo and video business and developed SPECTRA, a new family of LED lights, designed for demanding professionals.

This innovative range of LED lights offers several convincing benefits:

- **EXCELLENT COLOR RENDITION:**  
colors are reproduced with fidelity and the skin tone is natural;
- **DIMMABILITY:**  
Smooth 0-100% dimming, with no color shift and no flickering.
- **PORTABILITY:**  
Lightweight and the ability to be powered by long lasting batteries to meet the requirements of professionals who shoot on location.
- **FLICKER-FREE TECHNOLOGY:**  
No flickering, at any shutter angle or frame rate.
- **DURABILITY**  
Rugged and reliable design and LED lifetime of more than 50Kh.
- **VERSATILITY:**  
Perfect continuous lighting for videography, but also great as secondary lights for still photography in low light situations.
- **QUIET:**  
Silent running lighting fixture.
- **NO HEAT:**  
Cool to the touch.
- **FUTURE PROOF:**  
The partnership with established LED manufacturers assures that products belonging to Spectra range and their future releases, will always embed the best state-of-art LED technology.





## Product family overview

Manfrotto Spectra range consists of a complete family of high performance LED lights which come in different sizes, offering increasing light output, and with varying levels of specification to meet many different requirements.

Spectra 500S	Spectra 500F	Spectra 900S	Spectra 900F	Spectra 900FT
				
MLS500S	MLS500F	MLS900S	MLS900F	MLS900FT

Lightweight, high light output and state of the art color rendition.  
To be used both on camera and off camera, on a light stand or hand held boom.

## Nomenclature

- **SPOT LIGHT**  
A light source having a narrow beam angle ( $<30^\circ$ ) is usually referred to as «SPOT». Such a light source is used in situations that require the focus of the light beam on just the subject.
- **FLOOD LIGHT**  
A light source having a wide beam angle ( $\geq 50^\circ$ ) is usually referred to as «FLOOD». Such a light source is used in situations that require the illumination of a larger area.
- **TUNABLE WHITE**  
Some models in the Spectra Range are provided with this feature, which allows the user to change color temperature from warm white ( $3200^\circ\text{K}$ ) to cold white ( $5600^\circ\text{K}$ ).
- **HOW TO READ PRODUCT CODES**  
The following example clarifies how to read product codes of Manfrotto Spectra range.

MLS900FT

MLS900FT= Manfrotto Lighting  
 MLS900FT=Spectra  
 MLS900FT= Beam angle: S= Spot; F= Flood  
 MLS900FT= Tunable white





## Possible System Combinations

### 1. COMPATIBLE LIGHT STANDS

To use Spectra LED lights off camera, on a lighting stand, we recommend to choose Manfrotto Babylighting Stands.

### 2. ALTERNATIVE SUPPORTS

Manfrotto Arms, clamps and other accessories are useful tools to create alternative supporting solutions.

### 3. ACCESSORIES

Spectra LED lights can optionally be powered by mains through an AC adapter, sold separately. The AC adaptor can run with, but will not charge, the batteries inside the fixture. The AC adapter comes with an international plug set

PRODUCT TYPE	COMPATIBLE ADAPTER TYPE	COMPATIBLE ADAPTER ORDER CODE
900S, 500S	SPECTRA AC ADAPTOR 12V 0.5A	ADAPTOR12V0.5A
500F, 900F, 900FT	SPECTRA AC ADAPTOR 12V 1.25A	ADAPTOR12V1.25A

## Technical Data<sup>1</sup>

### TECHNICAL SPECIFICATIONS

Luminance values of Spectra LED Fixtures are shown in Table 1.

	Luminance (lux)		
	@1m	@1,5m	@2m
500 S	300	135	75
500 F	550	245	137
900 S	900	400	225
900 F	900	400	225
900 FT	540	240	135

Table 1: Technical Specifications

Manfrotto Spectra LED Fixtures can be easily operated by Alkaline AA batteries. Rechargeable AA and Lithium-Ion AA batteries can be used as well. Lithium-Ion AA batteries can power the light for a longer period, even though they may warm up during operation and may trigger the unit's internal protection, causing the fixture to shut down until an acceptable operating temperature is reached.

<sup>1</sup> Due to the special conditions of the manufacturing processes of LEDs, the typical data of technical parameters can only reflect statistical figures and do not necessarily correspond to the actual parameters of each single product.





All LED lights can be powered by mains voltage in the range 100-240VAC through an AC adapter, optionally available (see chapter "Logistic Data")

The models Spectra 900F and Spectra 900FT are provided with D-tap input; the optional D-Tap Adapter Cable facilitates the operation of the fixture with various power sources utilizing D-Tap plugs.

	Nr of batteries	Battery lifetime AA Alkaline	Battery lifetime AA Lithium	AC power capability
500 S	4	90 min	480 min	100-240VAC via AC adapter
500 F	6	70 min	200 min	100-240VAC via AC adapter
900 S	6	75 min	360 min	100-240VAC via AC adapter
900 F	6	20 min	60 min	100-240VAC via AC adapter, D-tap
900 FT	6	55 min	150 min	100-240VAC via AC adapter, D-tap

Table 2: Specification on batteries and AC power adaptor

Spectra LED Fixtures are compact and lightweight. They are provided with ¼" attachment and hotshoe attachment via Ball Head. The Ball Head is included in the packaging and allows pan and tilt orientation of the LED device.

	Weight	Dimensions Height x Width (incl Knob) x Length	Top attachment
500 S	130 g	92,9 x 113 x 44,2 mm	¼" and hotshoe via Ball Head
500 F	230 g	92,7 x 154,9 x 44,5 mm	¼" and hotshoe via Ball Head
900 S	237 g	113.8 x 152 x 48 mm	¼" and hotshoe via Ball Head
900 F	297 g	108.2 x 171.4 x 46.4 mm	¼" and hotshoe via Ball Head
900 FT	314 g	108.2 x 171.4 x 46.4 mm	¼" and hotshoe via Ball Head

Table 3: Dimensional specifications

## OPTICAL SPECIFICATION (QUALITY OF LIGHT)

### - CRI

CRI stands for Color Rendering Index. It is the ability of a light source to accurately render the color of an object. The color appearance of an object is determined by the color it reflects to the human eye.

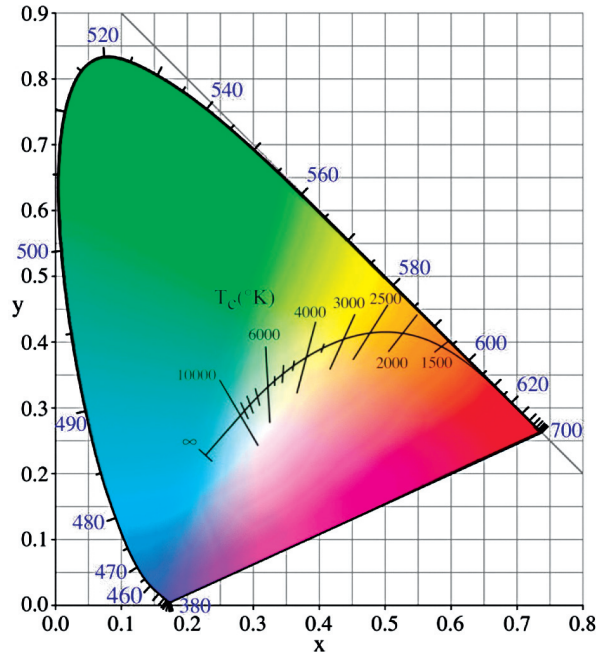
If the light source that is illuminating an object does not supply a certain wavelength, the object will not be able to reflect the appropriate color back to the eye (example: a blue light illuminating an orange fruit will render the fruit blue). CRI is measured and calculated by comparing the light source under test to a series of standard illuminants across the visible light spectrum. The highest CRI obtainable is the output of a black body radiator with a value of 100, which represents the benchmark.

The CRI measurements for Manfrotto Spectra LED lights are shown in table Table 4. Note that Manfrotto Spectra LED fixtures have an extremely high Color Rendition Index (CRI>90).



- CCT

CCT stands for Correlated Color Temperature. The Color Temperature of a light source indicates the specific color of light that a black body radiator emits at a given physical temperature. As the temperature of a black body radiator increases, the hue shifts from yellow-orange, to white, to blue. The sun and an incandescent bulb are examples of black body radiators. LED are not thermal radiators (that is, the light that is emitted is not a direct consequence of the material temperatures, but of the physics of semiconductors) thus the correlated color temperature of an LED correlates the color of the LED to the color of a black body radiator at a given temperature. The units of color temperature is Kelvin. The color temperature of a tungsten incandescent bulb is 3200K. The color temperature of the sun is 5600K.



Picture 1: Black Body Curve in the CIE 1931 Chromaticity diagram

The CCT measurements for various Manfrotto products is shown below.

	Color temperature	CRI	Beam angle
500 S	5600K	>90	35°
500 F	5000K	>90	54°
900 S	5600K	>90	35°
900 F	5600K	>90	54°
900 FT	from 3200K to 5600K	>90	54°

Table 4: Optical specifications

Due to peculiar condition of the manufacturing process of LEDs, the optical and electrical parameters may vary significantly among chips of the same production batch.

In order to guarantee a perfect light uniformity, all products belonging to Manfrotto Spectra range embed LEDs with selected and precisely controlled color bins. All values are measured at typical ambient temperature of 25°C.





## - LIGHT SPECTRUM

The family name SPECTRA has been inspired by the visible light spectrum, i.e. the portion of the electromagnetic spectrum, whom the human eye will respond to (from about 390 to 700 nm).

The more uniform is the light spectrum of an emitting light source, the better the quality of the emitted white light. When it comes to photography and videography, the light spectrum of the light source has extreme relevance, since it has a direct impact on the quality of the final result. Professional videographers and/or photographers need LED light sources having a uniform spectrum, without a peak of intensity at a wavelength of 520–570 nm, correspondent to green light.

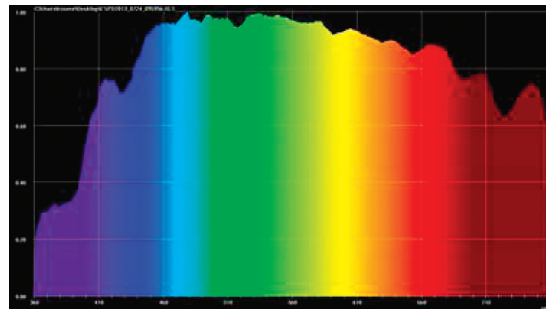
LEDs used in SPECTRA LED fixtures are customized for Manfrotto, to better suit to video and photo applications. Moreover, components are selected among production batches, in order to guarantee the same level of performances for each and every LED device.

In this document, a comparison between the light spectrum of different light sources is presented.

### SUNLIGHT

The sun is a black body thermal radiator and thus emits close relative intensities of wavelengths across the visible spectrum.

CCT	CRI
5448 °K	99

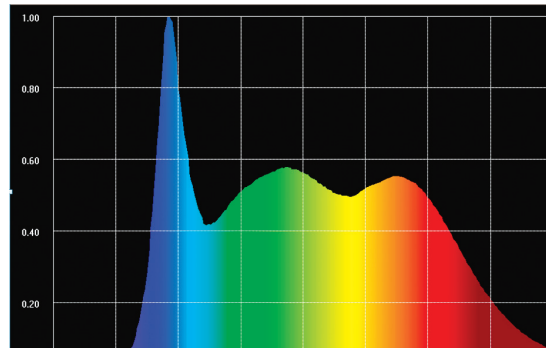


Picture 2: Light Spectrum of the Sun

### LEDS EMBEDDED IN MANFROTTO SPECTRA LED FIXTURES.

The light spectrum of Manfrotto LED fixtures is shown below. Note uniformity of the relative intensities across the visible light spectrum. No peak in the green area is visible. LED have been optimized for color temperature, CRI, and brightness.

CCT	CRI
5646 °K	96

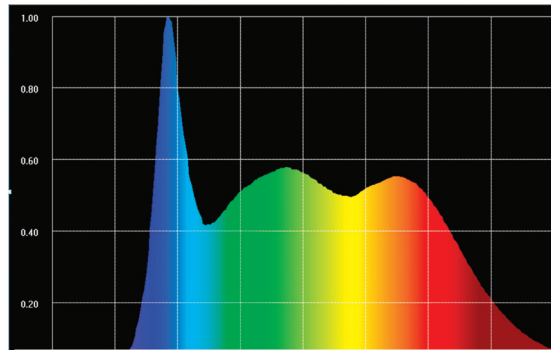


Picture 3: Light Spectrum of LEDs embedded in the following SPECTRA models: 500S, 900S, 900F, 900FT





CCT	CRI
5350 °K	93

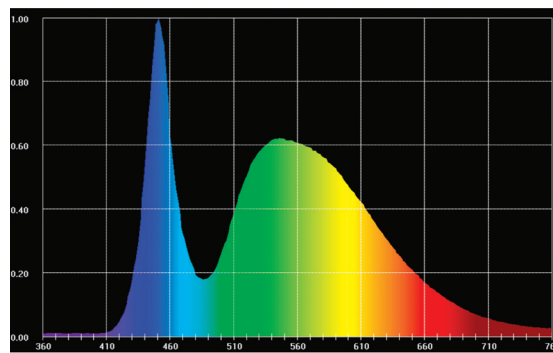


Picture 4: Light Spectrum of LEDs embedded in the following SPECTRA models: 500F

### LIGHT SPECTRUM BY BAD-QUALITY LED LIGHTS

Budget competition measures deficient color spectra and corresponding low CRI. The values and the spectrum shown below, are the result of real measurements on some LED lights available in the market. Note the single phosphor peak in the green portion of the spectrum. This green emphasis results in high brightness and high CCT, but low CRI. Skin tones will photograph with missing red tones and appear green.

CCT	CRI
5850 °K	73



Picture 5: Light spectrum of bad quality LEDs; based on real measurements



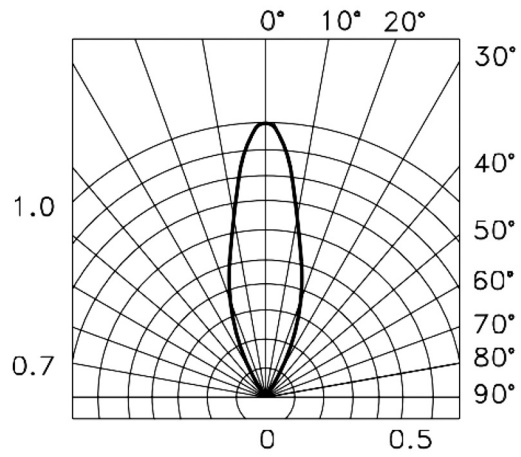


- RADIATION PATTERN

The different packages and types of LEDs generate different spatial radiation patterns. The following diagrams show the angle-dependent distribution of radiation of Spectra LED fixtures. Exact measurements of the beam angle for the different models are given in Table 4.

• **Spot distribution**

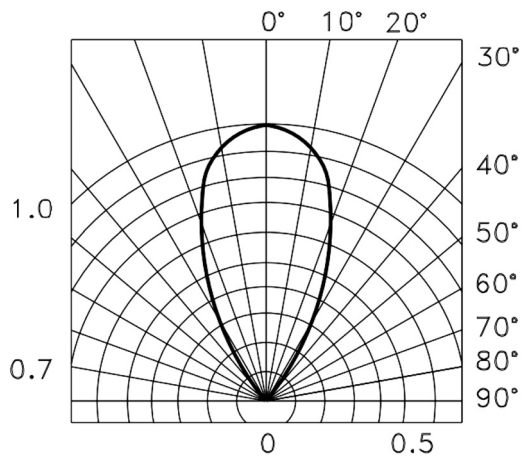
SPATIAL DISTRIBUTION



Picture 6: Light Spectrum of LEDs embedded in the following SPECTRA models: 500S, 900S

• **Flood distribution**

SPATIAL DISTRIBUTION



Picture 7: Radiation pattern of the following models: 500F, 900F, 900FT





## • Thermal considerations

LED components are extremely sensitive to temperature. A non-proper design of the circuitry, in terms of thermal management, can cause an overheating of LEDs, which is responsible for a shorter lifetime and color shift.

In Manfrotto Spectra LED Fixtures, particular design techniques have been implemented, in order to properly dissipate heat from LEDs. Explanations are given hereafter.

The operational ambient temperature is in the range  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ .

SPECTRA MODEL: 500S, 900S

No active thermal protection. Passive thermal protection verified by design.

SPECTRA MODEL: 500F

The 500F has multiple temperature sensors that constantly monitor LED temperature and battery temperature. If the 500F is used in an abnormal temperature condition (high ambient temperature, improper/damaged batteries, etc) and either the LED or battery temperature exceeds the maximum operating temperature, the “Boost” feature (if on) will first automatically turn off and it will be made unavailable until the temperature returns to normal operating temperatures (for more details on the “Boost” feature, please refer to Spectra 500F instruction manual).

If the temperature continues to remain high (or if the “Boost” feature was not on in the first place), the main LED will automatically turn off and the battery indicator LED will flash RED.

This is the overtemperature mode, and the button and knob will be unresponsive to allow the unit to cool to normal operating temperatures. To return the 500F to normal operating mode, the unit must be turned off and then turned back on.



SPECTRA MODEL: 900F, 900FT

The 900F and 900FT has a temperature sensor that constantly monitors the battery temperature. If the 900F is used in an abnormal temperature condition (high ambient temperature, improper/damaged batteries, etc) and the battery temperature exceeds the maximum operating temperature, the white LED will signal 3 sets of triple flashes and shut down. If the 900FT is used in an abnormal temperature condition, the tungsten LED will signal 3 sets of triple flashes and shut down. This is the overtemperature mode, and the knob will be unresponsive to allow the unit to cool to normal operating temperatures. To return the 900F and 900FT to normal operating mode, the unit must be turned off and then turned back on.





## Norms and Standards

Manfrotto Spectra LED Fixtures comply with the following standards and regulatory requirements:

1. **CE EMC Directive (2004/108/EC) per EN 61000-6-3, EN 61000-3-2, EN61000-3-3, EN61000-6-1**
2. **Electromagnetic compatibility: FCC Part 15, Subpart B, Class B**
3. **RoHS Compliant**
4. **Photobiological Safety: IEC 62471.**

The standard deals with the safety implications for the eyes, due to LED sources emitting visible optical radiation.

The evaluation of photobiological safety is carried out according to the standard IEC 62471:2006 (“Photobiological safety of lamps and lamp systems”) – mandatory within the European Community. Following the definition of the risk grouping system of the mentioned IEC standard, Spectra LED fixtures fall into the class Risk Group 1 (RG1) defined as “low risk”.

Therefore, under real circumstances (regarding exposure time, pupils, observation distance), it is assumed that there is no endangerment to the eye from these devices.

As a matter of principle, however, it should be mentioned that intense light sources have a secondary exposure potential due to their blinding effect.

## Suggestions for maximum safety and longest lifetime of the product

- The products have been designed for safety and long lifetimes under normal use. Maintain the normal operating ambient temperatures (see chapter “Thermal considerations”). Similar to other electronics, do not store in high moisture environments.
- Do not place on hot surfaces.
- For safety reasons and under the terms of the warranty, Spectra LED lights must not be opened or repaired.
- Spectra LED Fixtures are not a toys designed to be played with by children.



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13





## List of available spare parts

SPECTRA 500S		
Product Code: MLS500S		
	Part Name	Manfrotto Code
1	500S Battery Door	R1053114
2	204 Full CTO Gel	R1053115
3	206 1/4 CTO Gel	R1053116
4	250 1/2 White Diffusion Gel	R1053117
5	Ball Head Shoe Mount	R1053118
6	Socket Head Screw	R1053119

SPECTRA 500F		
Product Code: MLS500F		
	Part Name	Manfrotto Code
1	500F Battery Door	R1053120
2	204 Full CTO Gel	R1053121
3	206 1/4 CTO Gel	R1053122
4	250 1/2 White Diffusion Gel	R1053123
5	Ball Head Shoe Mount	R1053124
6	Socket Head Screw	R1053125

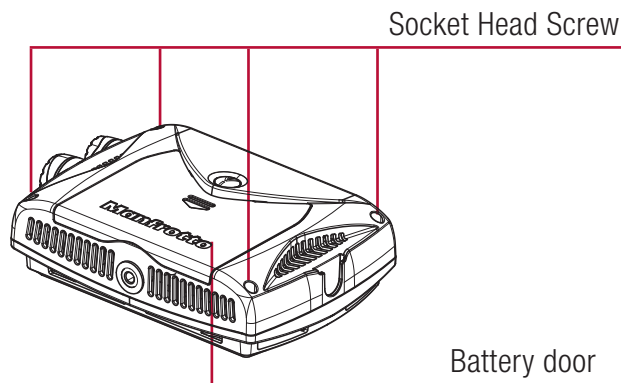
SPECTRA 900S		
Product Code: MLS900S		
	Part Name	Manfrotto Code
1	900S Battery Door	R1053126
2	204 Full CTO Gel	R1053127
3	206 1/4 CTO Gel	R1053128
4	250 1/2 White Diffusion Gel	R1053129
5	Ball Head Shoe Mount	R1053130
6	Socket Head Screw	R1053131



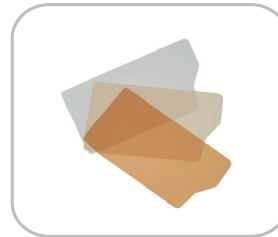


SPECTRA 900F		
Product Code: MLS900F		
	Part Name	Manfrotto Code
1	900F Battery Door	R1053132
2	204 Full CTO Gel	R1053133
3	206 1/4 CTO Gel	R1053134
4	250 1/2 White Diffusion Gel	R1053135
5	Ball Head Shoe Mount	R1053136
6	Socket Head Screw	R1053137

SPECTRA 900FT		
Product Code: MLS900FT		
	Part Name	Manfrotto Code
1	900FT Battery Door	R1053138
2	250 1/2 White Diffusion Gel	R1053139
3	Ball Head Shoe Mount	R1053140
4	Socket Head Screw	R1053141



Accessories included in the packaging:



### Logistic Data

Item number	Item description label	EAN	UPC
MLS500S	SPECTRA 500 S LED FIXTURE	8024221624984	719821366911
MLS500F	SPECTRA 500 F LED FIXTURE	8024221624991	719821366928
MLS900S	SPECTRA 900 S LED FIXTURE	8024221625004	719821366935
MLS900F	SPECTRA 900 F LED FIXTURE	8024221625011	719821366942
MLS900FT	SPECTRA 900 FT LED FIXTURE	8024221625028	719821366959
ADAPTOR12V0.5A	SPECTRA AC ADAPTOR 12V 0.5A	8024221630718	719821372899
ADAPTOR12V1.25A	SPECTRA AC ADAPTOR 12V 1.25A	8024221630725	719821372905



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