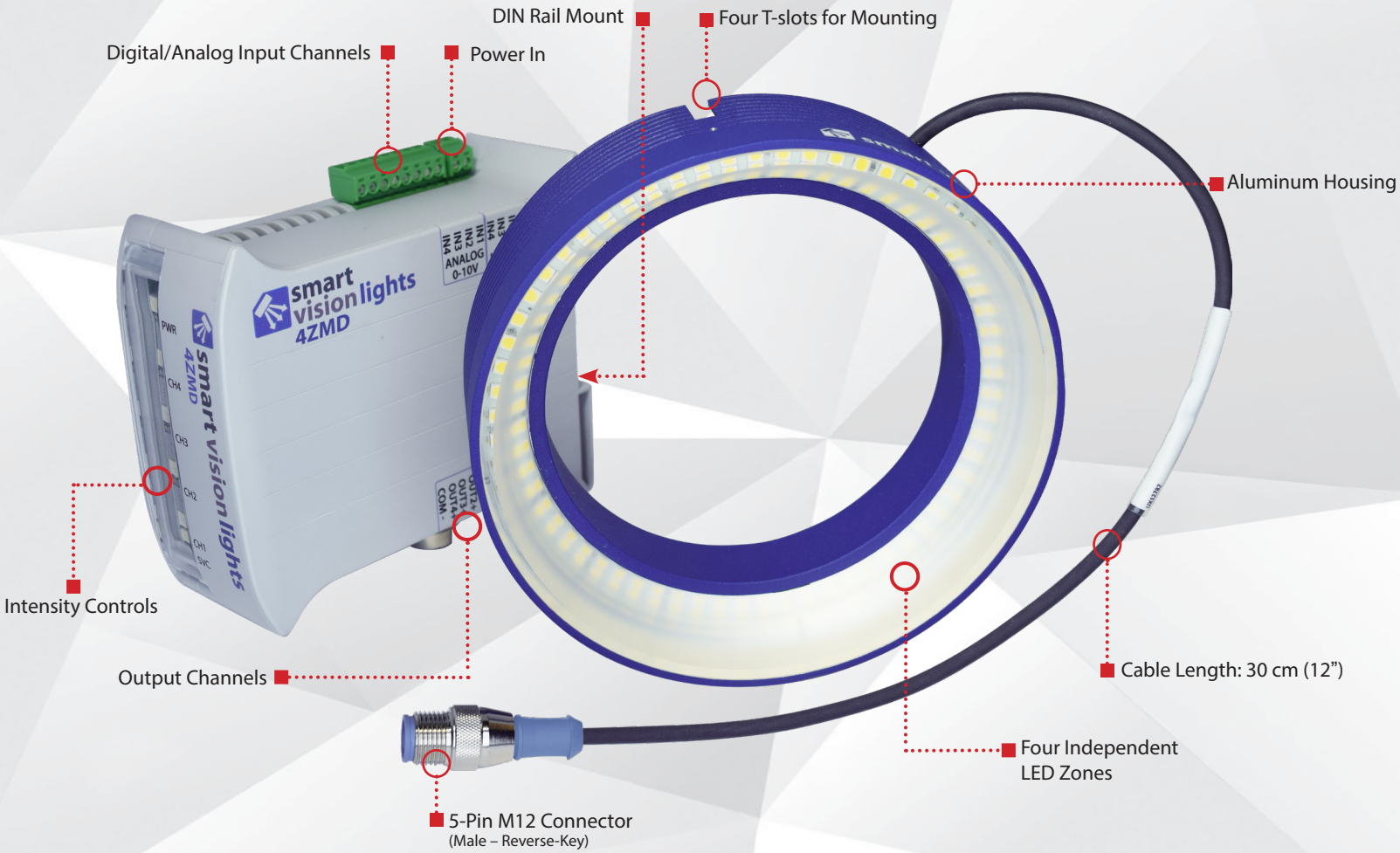


P R O D U C T D A T A S H E E T



RM140-4Z includes the light and 4ZMD-250.

Warranty <b>10</b> YEAR*	Compliant <b>IEC</b> 62471	Compliant <b>CE</b> RoHS	Rated <b>IP</b> <b>65</b>	Connector <b>5-PIN</b> <b>M12</b>
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## PRODUCT HIGHLIGHTS

- ✓ Four individual zones built into a single light
- ✓ Sold with the 4ZMD, which allows for continuous operation or OverDrive™ strobe mode for each channel
- ✓ Built-in individual intensity control channels for either continuous operation or OverDrive™ strobe mode
- ✓ PNP high-speed strobe input
- ✓ 5-pin M12 quick connect (reverse-key)





## PRODUCT DESCRIPTION

### RM140-4Z

The compact and powerful RM140-4Z Mini Ring Light is a low-angle ring light that works best for dark field ring applications. The light can also be used for radial illumination. The RM140-4Z series features an aluminum housing and is IP65 rated. The RM140-4Z has four zones, making it a quadrant light in which each individual zone can be controlled independently of each other.

### 4ZMD-250

The 4ZMD is an external driver that permits control of up to four separate light zones either independently or simultaneously, in any combination. The 4ZMD has independent intensity controls and built-in Multi-Drive™, allowing for a range to be set from 10%–100% for continuous operations or OverDrive™ strobe mode. **The maximum continuous current for the 4ZMD-250 is 250 mA when connected to the RM140-4Z.**

When connected to a LED Light Manager (LLM), each individual channel can be set to continuous on, off, any intensity level in between, and even OverDrive™ strobe mode. **For more information about the LLM, visit [smartvisionlights.com/products/llm](http://smartvisionlights.com/products/llm).**



## PRODUCT SPECIFICATIONS

### RM140-4Z

PER ZONE	CONTINUOUS OPERATION	OVERDRIVE™ STROBE MODE
Maximum Input Current	250 mA	2 A Maximum: strobe duration = 50 ms , Duty cycle = 10%
Input Connector	5-pin M12 connector (male – reverse-key)	
Ambient Temperature	-18°C–40°C (0°F–104°F)	
Weight	~365g	
IP Rating	IP65	
Warranty	10 years	
Compliances	CE, RoHS, IEC 62471	

### 4ZMD

OUTPUT PER CHANNEL	CONTINUOUS OPERATION	OVERDRIVE™ STROBE MODE
Electrical Input	24VDC +/- 5%	
Input Current	Max. 800 mA	Max. 6.4 A
Wattage	Max. 19.2 W	Max. 154 W
Operating Current (No Load)	70 mA	
Electrical Input Connector	2-position screw terminal block — 14 AWG max wire size	
Number of Input Channels	4	
Input Connector	8-position screw terminal block — 14 AWG max wire (4 for PNP and 4 for analog)	
Input Channel Current	PNP input: 4 mA @ 4VDC   10 mA @ 12VDC   20 mA @ 24VDC	
Strobe Duration	N/A	Min. 10 µs   Max. 50 ms (see SafeStrobe™ Technology for more information)
Duty Cycle	N/A	Max. 10% (see Duty Cycle for more information)
Analog Intensity	The output is adjustable from 10%–100% of intensity by applying 1–10VDC signal	OverDrive™ Strobe Mode: Apply 0VDC
Output Channels	4 channels for light zones	
Output Connector	5-pin M12 connector (female – reverse-key)	
Indicator Lights	Power on = Green light Individual channel = Yellow light Service = Red light	
Mounting	DIN rail	
Ambient Temperature	-18°C–40°C (0°F–104°F)	
Ambient Humidity	0-95% noncondensing	
Weight	~230 g	
Warranty	3 years	
Compliances	CE, RoHS	

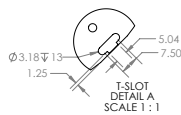
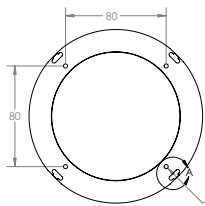
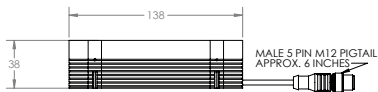
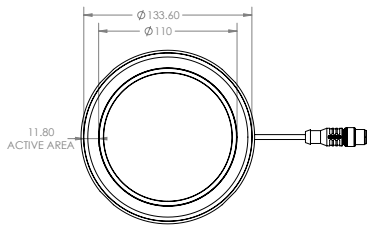


## RESOURCE CORNER

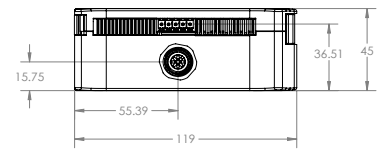
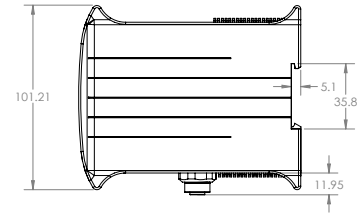
Additional resources, including CAD files, videos, and application examples are available on our website.



## PRODUCT DRAWING



4X  $\varnothing$  3.30  $\Psi$  7.80  
M4X0.7 - 6H  $\Psi$  6



CAD files available on our website.  
Dimensions are in mm.



## LIGHT PATTERNS

### LIGHTING ILLUMINATION FOR THE RM140-4Z

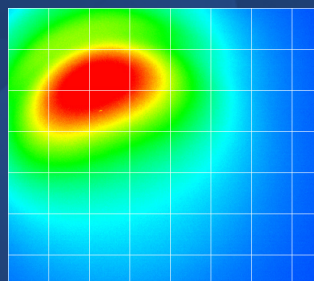
Continuous Operation Mode		
Typical Output Performance	Illuminance (Lux)	
Distance = 100 mm	1 Zone	All Zones
		12,000
<i>Illumination measurement taken on White Light, 4800 K</i>		

OverDrive™ Mode		
Typical Output Performance	Illuminance (Lux)	
Distance = 100 mm	1 Zone	All Zones
		96,000
<i>Illumination measurement taken on White Light, 4800 K</i>		

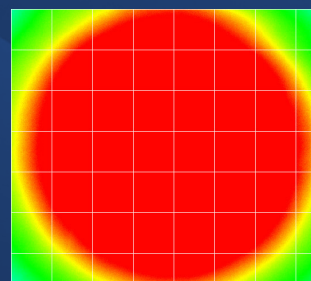
Smart Vision Lights recommends using the RM140-4Z at a working distance between 50 mm and 200 mm.

**The RM140-4Z Mini Ring Light produces a uniform light pattern.**

Working Distance = 100 mm



One Zone



Four Zones

(Grid set to 20 mm x 20 mm)

## MULTI-DRIVE™

Multi-Drive™ offers the best of both worlds. Continuous operation or OverDrive™ mode (high-output strobe/pulse) available in a single driver. Other advantages of Multi-Drive™ include faster imaging and capture/freeze motion on high-speed lines.



With Multi-Drive™ users can run the driver continuously or in OverDrive™ at any allowed intensity by simply setting the product configuration. OverDrive™ operation has **up to eight times** the power versus continuous operation.

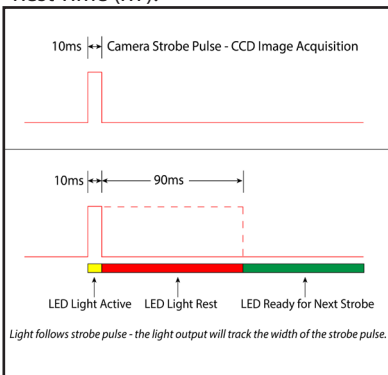
## SAFESTROBE™ TECHNOLOGY

SafeStrobe™ is a unique technology that applies safe working parameters to ensure high-current LED's are not damaged by driving them beyond their limits, such as maximum strobe time or duty cycle. SafeStrobe™ is built into the 4ZMD.

## DUTY CYCLE (OVERDRIVE™ MODE ONLY)

**This section applies only when light is in OverDrive™ mode.**

The Duty Cycle (D) is related to the Strobe Time (ST) and Rest Time (RT).



Maximum Duty Cycle for OverDrive™ light is 10% (0.1)

Calculating Rest Time

$$RT = \frac{ST}{D} - ST$$

RT = Rest Time  
ST = Strobe Time  
D = Duty Cycle

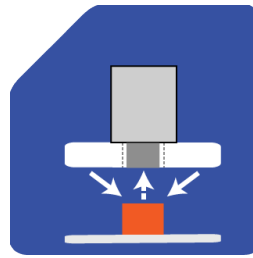
Example

$$RT = \frac{10 \text{ ms}}{0.1} - 10 \text{ ms} = 90 \text{ ms}$$

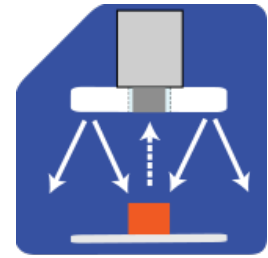
Rest Time is 90 ms for 10 ms Strobe Time

## ILLUMINATION

RM140-4Z Series of Mini Ring Lights works best for:



Dark Field



Radial

## EYE SAFETY

According to IEC 62471:2006. Full documentation upon request.



### Notice

**Exempt Group:** No photobiological hazard to eyes or skin even for continuous, unrestricted use. Applicable for wavelengths 625, 850, and 940.

### Caution

**Risk Group 1:** Possibly hazardous optical radiation emitted from this product. Do not stare at operating lamp. May be harmful to eyes. Safe for most applications except prolonged exposure. Applicable for wavelengths 470, 505, 530, and WHI.

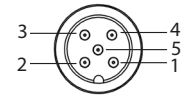
## OUTPUT CONFIGURATION

### Using the Reverse-Key 5-pin M12 Connector

When connecting a Smart Vision Lights four-zone lights to the 4ZMD, a reverse-key 5-pin M12 cable is required. All Smart Vision Lights four zone lights come equipped with a 5-pin reverse-key connector.

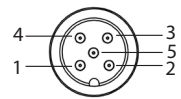
The reverse-key 5-pin M12 connector simplifies connecting lights to the 4ZMD, with very little wiring needed.

4ZMD



Reverse-Key 5-pin M12 Connector (female)

RM140-4Z



Reverse-Key 5-pin M12 Connector (male)

5-Pin M12 Connectors (Female) Pin Layout

Pin	Channel	Color
1	Common	Brown
2	1	White
3	2	Blue
4	3	Black
5	4	Green/Yellow

#### NOTE:

Smart Vision Lights uses reverse-key cables that have a blue-grey tip on the connectors.

## INPUT CONFIGURATION

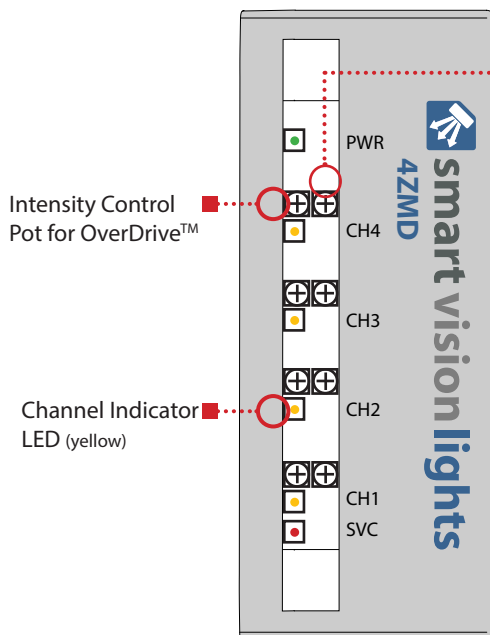
### Using Input Terminal Block

Input terminal block is also used when connecting to the LED Light Manager (LLM). Smart Vision Lights recommends using the cable provided (part number: IC-400) to connect the 4ZMD driver to the LLM.

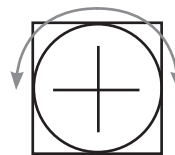
LLM Output Channels	4ZMD Input Channels
DO1	PNP IN1
DO2	PNP IN2
DO3	PNP IN3
DO4	PNP IN4
DO5/AO1	Analog 1
DO6/AO2	Analog 2
DO7/AO3	Analog 3
DO8/AO4	Analog 4

## ADJUSTING INTENSITY

The 4ZMD allows for the control of up to four individual channel intensity levels. Depending on how each channel is wired, its intensity can be adjusted for either continuous operation or OverDrive™ strobe mode. Each channel intensity can be adjusted either in continuous operation or OverDrive™ strobe mode, but not both modes simultaneously. Each channel has a yellow indicator light that will illuminate when the channel is active.



Intensity Control Pot for Continuous Operation



270° turn pot  
**Clockwise** = Increase intensity  
**Counterclockwise** = Decrease intensity

#### NOTE:

When in continuous operation, channel intensity can be individually adjusted using 1–10 V DC on the analog input.

#### NOTE:

When managing the 4ZMD with the LED Light Manager (LLM), turn the intensity pots on the front of the 4ZMD fully clockwise to ensure intensity is completely controlled by the LLM.

## UNDERSTANDING ZONES

The RM140-4Z has four individual built-in zones that can act independently. Each zone can be set to continuous on, off, any intensity level in between, and even OverDrive™ strobe mode. Intensity levels can be set by programming a LLM to control the zones or using the intensity controls on the front of the 4ZMD (see Managing Zones and Adjusting Intensity).

The RM140-4Z allows any combination of the four zones to be turned on at the same time, including adjacent and opposing zones.

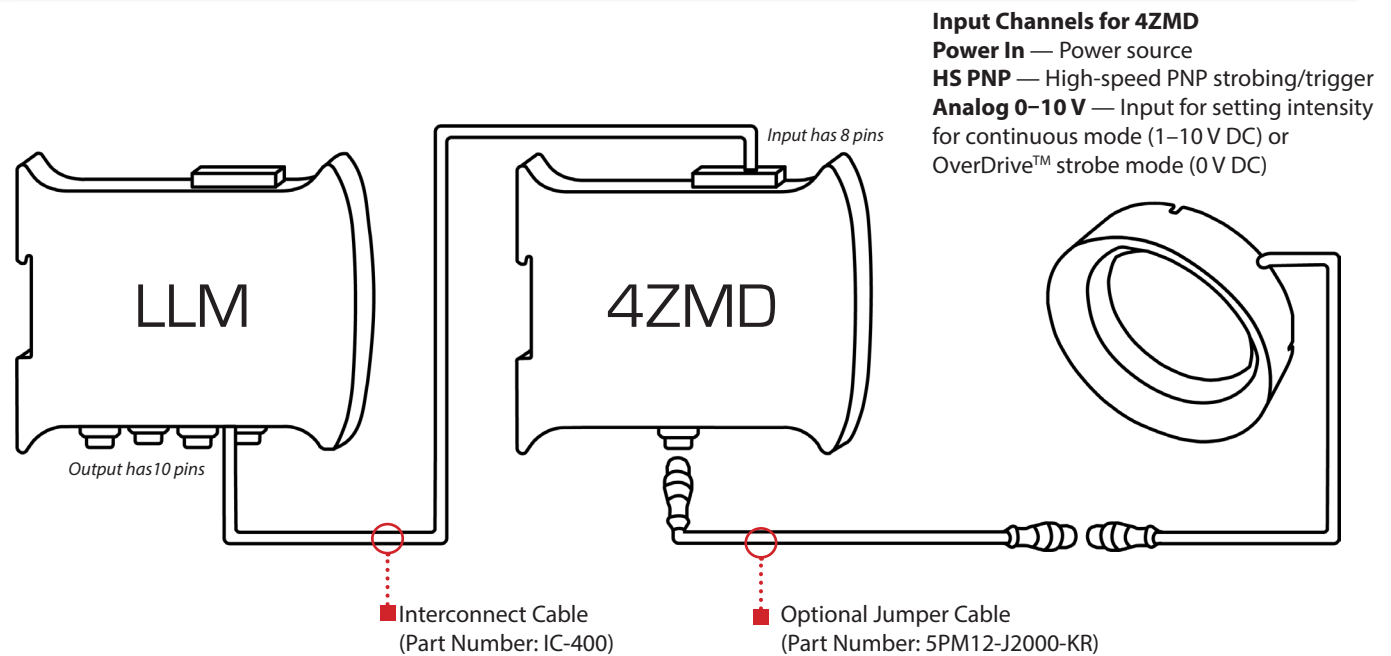


## MANAGING ZONES

Connect the LLM to the 4ZMD driver. The LLM allows for easy control of each individual zone. The event programmed within the LLM can contain multiple sequences. Users can set each zone independently to continuous on, off, or any intensity level in between, and even OverDrive™ strobe mode.


For more information about the LLM, visit: [smartvisionlights.com/products/llm](http://smartvisionlights.com/products/llm).

## WIRING CONFIGURATION

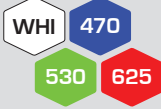




## PART NUMBER

**RM140-4Z** — 

**COLOR:**



### Part Number Examples:

**RM140-4Z-625** (RM140-4Z, 625 nm red wavelength, and 4ZMD-250)

Additional wavelengths available upon request



## MOUNTING THE RM140-4Z

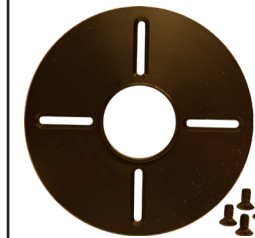
Mounting options include four T-slots and four M4 threaded holes on the RM140-4Z.

### Hardware included with light:

- (2) M4 x 8 mm screws (hex)
- (2) M5 x 10 mm screws (hex)
- (2) T-nuts



### Optional Mounting Equipment



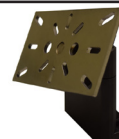
The **optional ADP002-KIT** can be used to mount a camera or lens directly to the RM140-4Z.

### Optional Camera Mounts

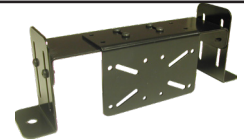
Easily mount your camera with RM140-4Z attached to any fixture using one of these brackets.



BKT0004



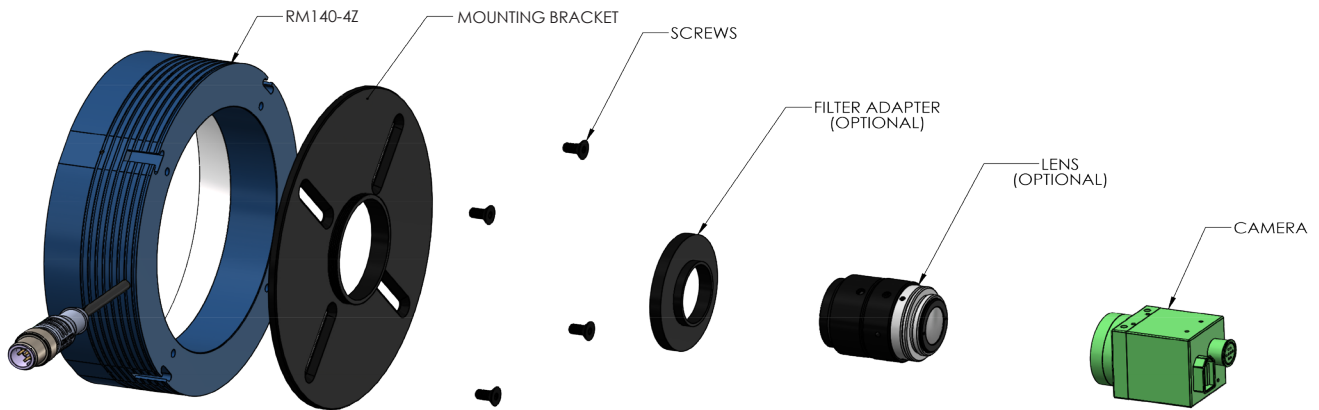
PB30-M10



BKT0006



## CAMERA MOUNTING ADAPTER FOR RM140-4Z





## ACCESSORIES

Step-Up Kits	
Lens Thread Size	Part Number
25 mm	SU25.5-46
27 mm	SU27-46
30.5 mm	SU30.5-46
34 mm	SU34-46
35.5 mm	SU35.5-46
37 mm	SU37-46
39 mm	SU39-46
40.5 mm	SU40.5-46
43 mm	SU46-46

Step-Down Kits	
Lens Thread Size	Part Number
49 mm	SD49-46
52 mm	SD52-46
55 mm	SD55-46
58 mm	SD58-46
62 mm	SD62-46
67 mm	SD67-46
72 mm	SD72-46

Jumper Cable	
Lengths	Part Number
2000 mm	5PM12-J2000-KR

Mounting Bracket	
Description	Part Number
Camera Mount	ADP0002-KIT

Interconnect Cable	
Lengths	Part Number
400 mm	IC-400

Camera Adapter	
Description	Part Number
Camera Adapter	DF55-46



## GLOSSARY

This glossary covers all Smart Vision Lights product families; some content in this section may not apply to this specific light.

### TERMINOLOGY

**OverDrive™** Lights include an integrated high-pulse driver for complete LED light control. OverDrive™ light part numbers start with OD.

**Continuous Operation** Light stays on continuously.

**Multi-Drive™** Combines continuous operation and OverDrive™ strobe (high-pulse operation) mode into one easy-to-use light.

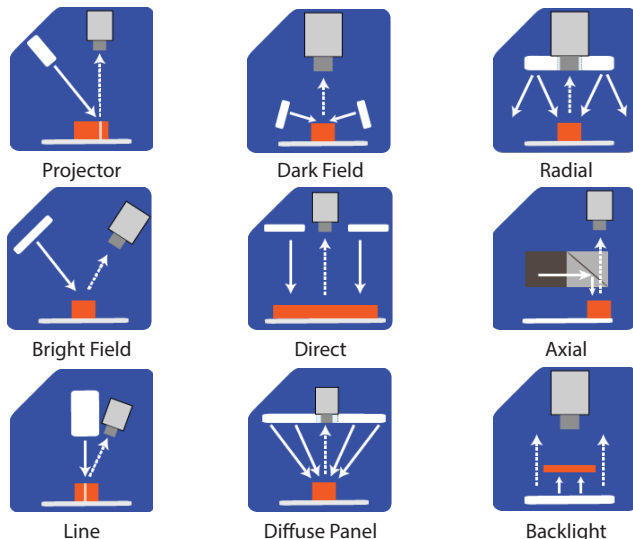
**Built-In Driver** The built-in driver allows full function without the need of an external controller.

**Camera to Light** Connecting the light directly to the camera, without the need for additional controllers or equipment.

**Polarizers** Filters that reduce reflections on specular surfaces.

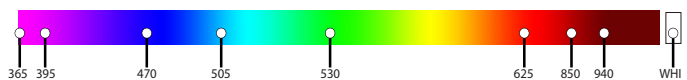
**Diffusers** Used to widen the angle of light emission, reduce reflections, and increase uniformity.

### TYPES OF ILLUMINATION



### COLOR/WAVELENGTHS LEGEND

Wavelengths options range from 365 nm to 1550 nm.  
Additional wavelengths available for many light families.



\*See Part Number section for **this light's** available standard wavelengths.



Shortwave infrared LEDs are available in 1050 nm, 1200 nm, 1300 nm, 1450 nm, and 1550 nm.\*

\*Check Part Number section to see if **this light** is available in SWIR wavelengths.