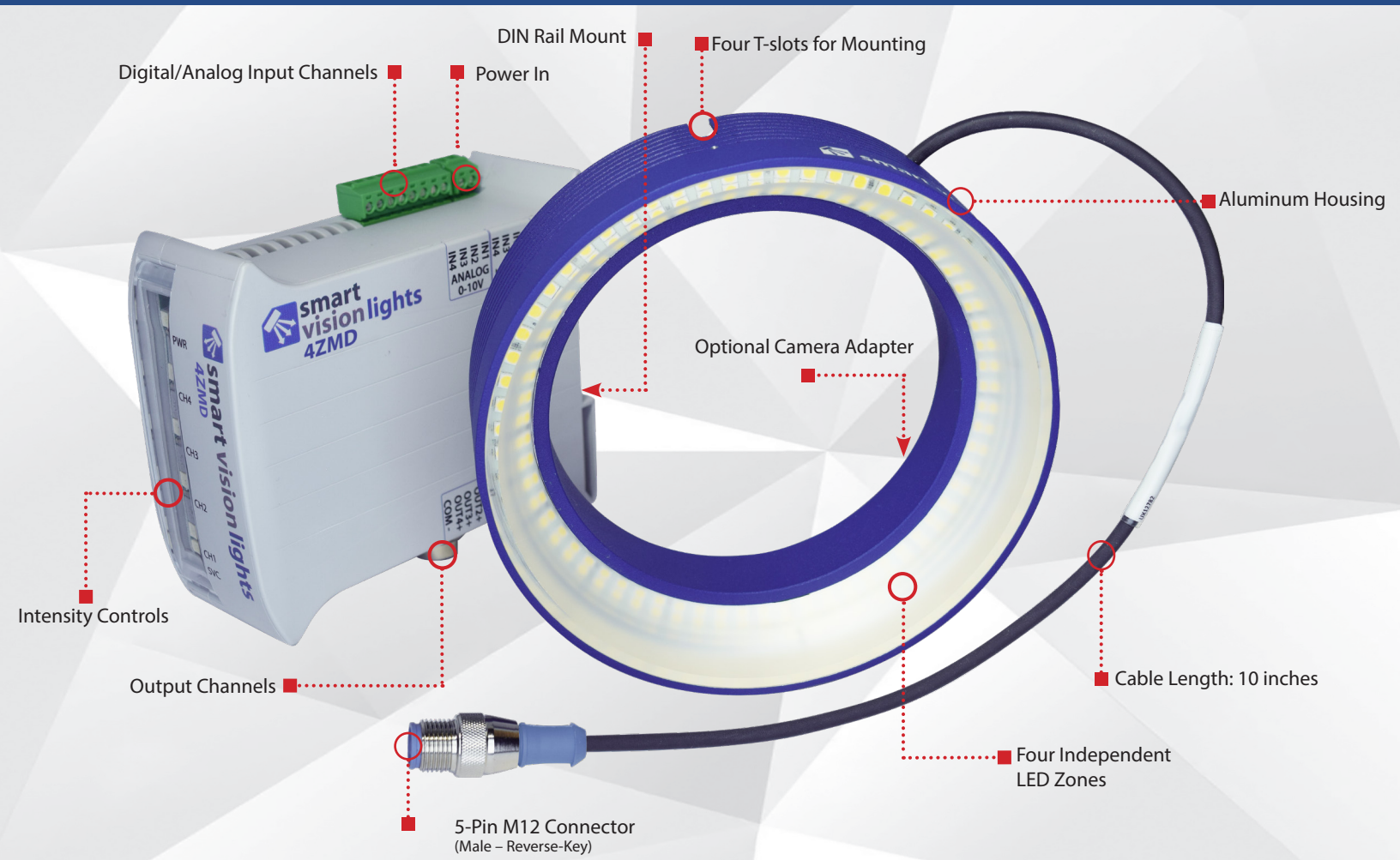
smart vision lights RM140-4Z *Miniature "Mini"* RING LIGHT KIT

FOUR-ZONE LIGHT AND EXTERNAL DRIVER

PRODUCT DATA SHEET



Warranty 10 YEAR* | Compliant IEC 62471 | Compliant CE RoHS | Rated IP 65 | Connector 5-PIN M12

PRODUCT HIGHLIGHTS

- ✓ Four individual zones built into a single light
- ✓ 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 provides a blended angle for a broad range of lighting. 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.**

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)	
Operating Temperature	-10° - 40° C (14°-104° F) | RH max 80% non-condensing humidity	
Weight	~365g	
IP Rating	IP65	
Warranty	10 years	
Compliances	CE, RoHS, IEC 62471	

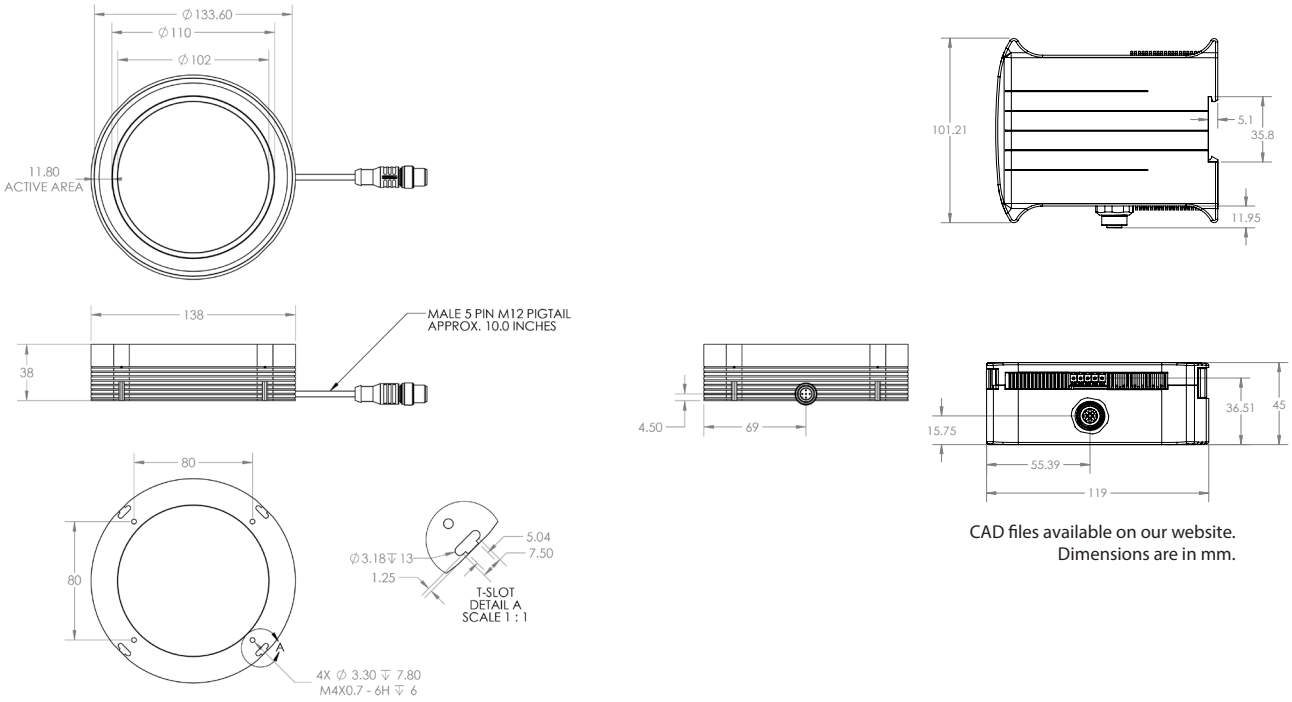
4ZMD

OUTPUT PER CHANNEL	CONTINUOUS OPERATION	OVERDRIVE™ STROBE MODE
Electrical Input	24VDC +/- 5%	
Input Current	Max. 800 mA	Max. 6.4 A
Input Power	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 limit 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)	
Status Indicators	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



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

LIGHT PATTERNS

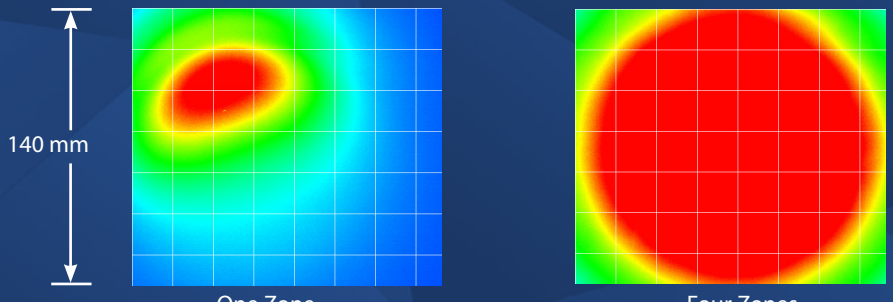
LIGHTING ILLUMINATION FOR THE RM140-4Z

Continuous Operation Mode		
Typical Output Performance	Illuminance (Lux)	
Distance = 100 mm	1 Zone	All Zones
	12,000	35,000
Illumination measurement taken on White Light, 4800 K		

OverDrive™ Mode		
Typical Output Performance	Illuminance (Lux)	
Distance = 100 mm	1 Zone	All Zones
	96,000	280,000
Illumination measurement taken on White Light, 4800 K		

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.

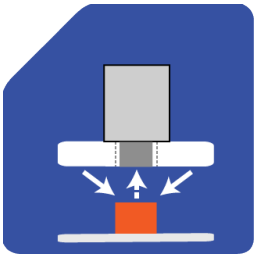
With Multi-Drive™ users can run the driver continuously or in OverDrive™ at any allowed intensity by simply setting the product configuration. OverDrive™ operation has **up to eight times** the power versus continuous operation.

SAFESTROBE™ TECHNOLOGY

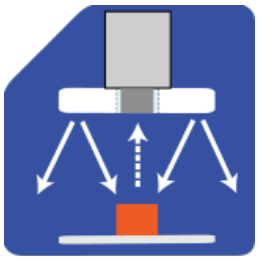
SafeStrobe™ is a unique technology that applies safe working parameters to ensure high-current LED's are not damaged by driving them beyond their limits, such as maximum strobe time or duty cycle. SafeStrobe™ is built into the 4ZMD.

ILLUMINATION

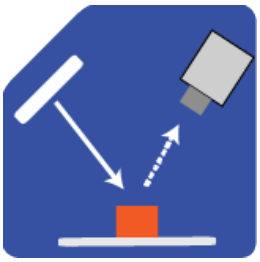
RM140-4Z Series of Mini Ring Lights works best for:



Dark Field



Radial

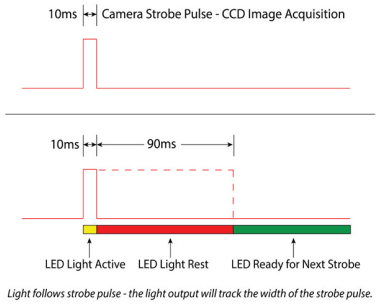


Bright Field

DUTY CYCLE (OVERDRIVE™ MODE ONLY)

This section applies only if light is in OverDrive™ strobe mode.

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



Light follows strobe pulse - the light output will track the width of the strobe pulse.

Calculating Rest Time

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

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

Example

$$90\text{ ms} = \frac{10\text{ ms}}{.1} - 10\text{ ms}$$

Rest Time is 90 ms for 10 ms Strobe Time

Calculating Strobe Rate

$$SR = \frac{D}{ST}$$

SR = Strobe Rate (strobes per second)
ST = Strobe Time (seconds)
D = Duty Cycle

Example

$$1000 = \frac{0.1}{0.0001}$$

Strobe Rate is 1000 strobes per second

Calculating Duty Cycle

$$D = ST \times SR$$

SR = Strobe Rate (strobes per second)
ST = Strobe Time (seconds)
D = Duty Cycle

Example

$$0.1 = 0.0001 \times 1000$$

Duty Cycle is 10% (0.1)

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

Maximum Strobe Frequency is 1/ calculated duty cycle or 4,000 strobes per second, whichever is less.

EYE SAFETY

SMART VISION LIGHTS IEC 62471 COMPLIANT

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.

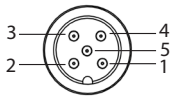
OUTPUT CONFIGURATION

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.

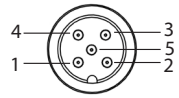
The reverse-key 5-pin M12 connector simplifies connecting lights to the 4ZMD, with very little wiring needed.

4ZMD



Reverse-Key 5-pin M12 Connector (female)

RM140-4Z



Reverse-Key 5-pin M12 Connector (male)

NOTE:

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

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

INPUT CONFIGURATION

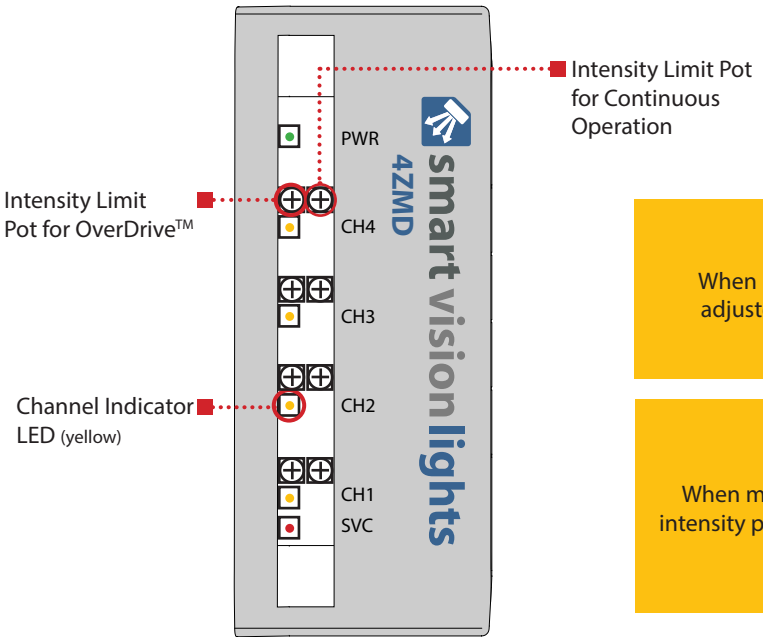
Using Input Terminal Block

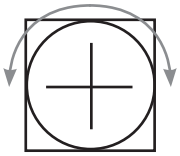
Input terminal block is also used when connecting to the LED Light Manager (LLM). Smart Vision Lights recommends using the cable provided (part number: IC-400) to connect the 4ZMD driver to the LLM.

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.





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

NOTE:

When in continuous operation, channel intensity can be individually adjusted using 1–10VDC on the analog input, within the limit set by the potentiometer

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.

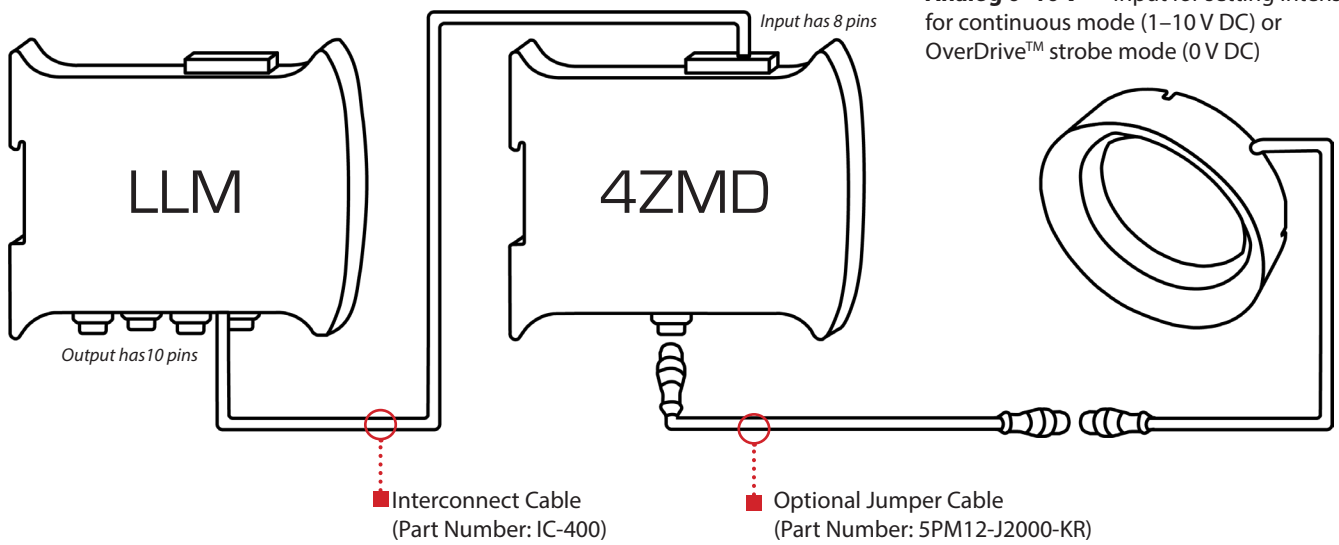
MANAGING ZONES

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.

WIRING CONFIGURATION

Input Channels for 4ZMD
Power In — Power source
HS PNP — High-speed PNP strobing/trigger
Analog 0–10 V — Input for setting intensity for continuous mode (1–10 V DC) or OverDrive™ strobe mode (0 V DC)



PART NUMBER

RM140-4Z – □□□ – □□□

COLOR:
WHI 470 530 625

KIT
Kit includes light and external driver

Additional wavelengths available upon request.
Individual parts can be ordered for replacement upon request.

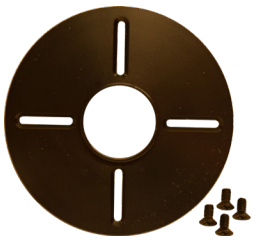
Part Number Examples:

RM140-4Z-625	RM140-4Z, 625 nm red wavelength (light only)
RM140-4Z-625-KIT	RM140-4Z, 625 red wavelength, and 4ZMD-250

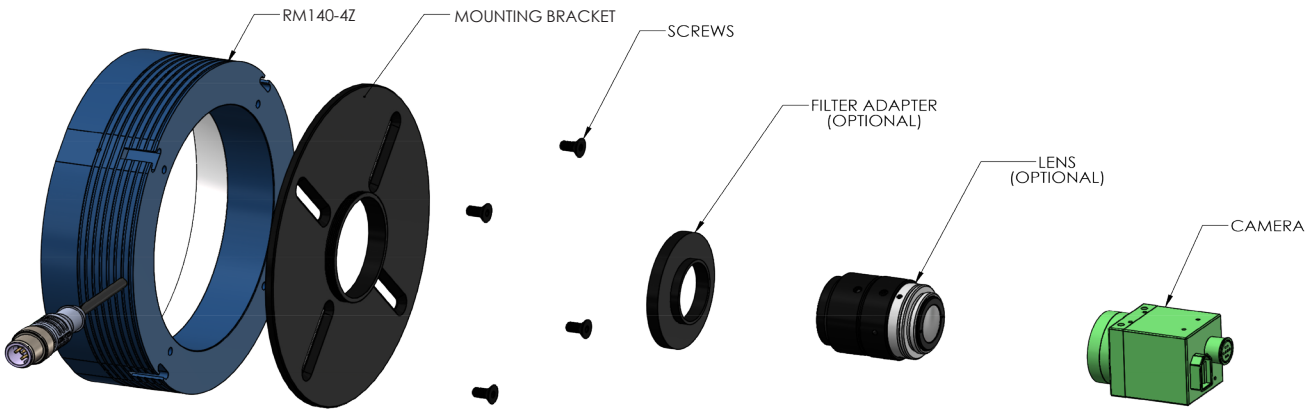
MOUNTING THE RM140-4Z

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 ADP0002-KIT** can be used to mount a camera or lens directly to the RM140-4Z.

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

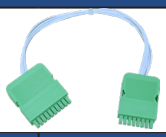
Jumper Cable

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

*For connecting an LLM to the 4ZMD

Camera Adapter

Description	Part Number
Camera Adapter	DF55-46

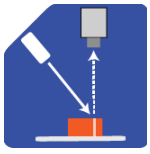
GLOSSARY

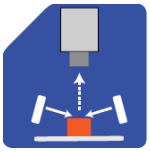
This glossary covers all Smart Vision Lights product families; some content in this section may not apply to this specific light.

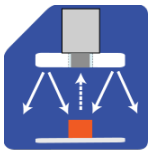
TERMINOLOGY

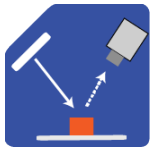
OverDrive™ Lights include an integrated high-pulse driver for complete LED light control. OverDrive™ light part numbers start with OD.
Continuous Operation Light stays on continuously.
Multi-Drive™ Combines continuous operation and OverDrive™ strobe (high-pulse operation) mode into one easy-to-use light.
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.

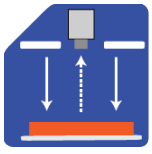
TYPES OF ILLUMINATION

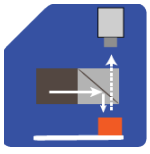

Projector

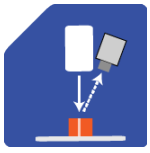

Dark Field

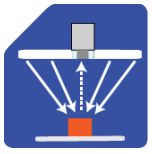

Radial

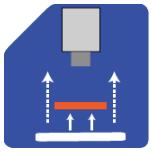

Bright Field


Direct


Axial

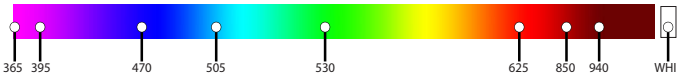

Line


Diffuse Panel


Backlight

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.*

SHORT WAVE **INFRARED**

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.*