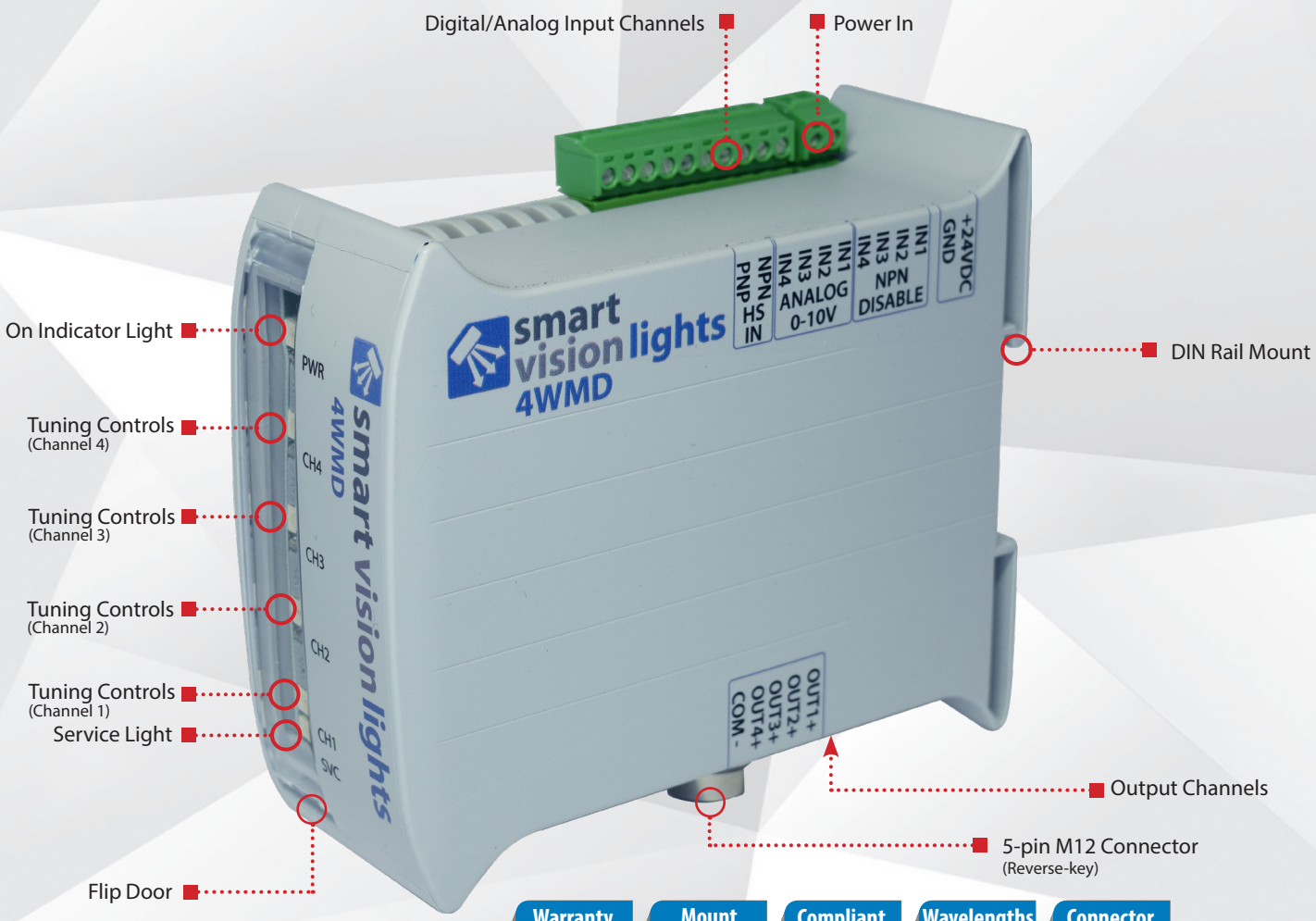
smart vision lights 4WMD Four-Wavelength DRIVER

EXTERNAL DRIVER

PRODUCT DATA SHEET



Warranty	Mount	Compliant	Wavelengths	Connector
3 YEAR	DIN RAIL	CE RoHS	UP TO 4	5-PIN M12 (Reverse-key)

PRODUCT HIGHLIGHTS

- ✓ Drive lights with multiple wavelengths, including standard colors, UV, NIR, and SWIR
- ✓ Up to four individual channels that can be controlled independently of one another
- ✓ 5-pin M12 quick connect (reserve key)
- ✓ Built-in Multi-Drive™ allows light to work in continuous operation or OverDrive™ strobe mode
- ✓ Separate control for each channel to tune intensity for either continuous operation or OverDrive™ strobe mode

PRODUCT DESCRIPTION

The 4WMD is a four-channel external driver developed for multi-wavelength lights. The 4WMD permits up to four individual wavelengths to be controlled independently of each other. This external driver includes Multi-Drive™, which allows a single channel to drive LEDs in continuous operation or OverDrive™ strobe mode separate from the other channels. For quick and easy adjustments, each output channel has its own tuning control located on the front of the driver. Wavelength tuning can be controlled for continuous operation using the analog input channels as well. The 4WMD can be used with any combination of up to four LED wavelengths, including white, red, blue, green, UV, IR, and SWIR. Additional wavelength options are available.

PRODUCT SPECIFICATIONS

PER CHANNEL	Standard	High-Current
Electrical Input	24VDC +/- 5%	
Electrical Input Connector	2-position screw terminal blocks – 14 AWG max wire size	
Operating Current (No Load)	70 mA	110 mA
Number of Input Channels	4	
Input Connector	10-position screw terminal block – 14 AWG max wire size (4 for channel control, 4 for analog, and 2 for PNP/NPN strobing/trigger)	
On/Off Trigger Input	PNP trigger: +4VDC or greater to activate (max 26VDC) NPN trigger: GND (<1VDC) to activate	
Input Channel Current	PNP input: 4 mA @ 4VDC | 10 mA @ 12VDC | 20 mA @ 24VDC NPN input: 15 mA @ Ground (0VDC)	
Analog Intensity	Continuous Operation: The output is adjustable from 10%–100% of intensity by applying 1–10VDC signal OverDrive™ Strobe Mode: Apply 0VDC	
Output Channels	4 channels for LED tuning control	
Output Connectors	One 5-pin M12 reverse-key connector 5-position screw terminal block – 14 AWG max wire size	
Indicator Lights	Power on = Green light Individual channels = Yellow light Service = Red light	
Mounting	DIN rail	
Dimensions	H = 102 mm (4.0"), L = 119 mm (4.7"), W = 45 mm (1.8")	H = 102 mm (4.0"), L = 119 mm (4.7"), W = 70 mm (2.8")
Ambient Temperature	-18ºC–40ºC (0ºF–104ºF)	
Ambient Humidity	0%–95% non-condensing	
Weight	~233 g	~425 g
Compliances	CE, RoHS	
Terminal Block Plugs (Included with 4WMD)	2-position terminal block plug 5-position terminal block plug 10-position terminal block plug	

OUTPUT PER CHANNEL (MAX)	4WMD-100	4WMD-250	4WMD-750	4WMD-2000
Maximum LED Continuous Current	100 mA	250 mA	750 mA	2 A
Maximum LED OverDrive™ Current	1 A	2 A	6 A	12 A

TOTAL INPUT PER UNIT (MAX)	4WMD-100	4WMD-250	4WMD-750	4WMD-2000
Continuous Input Current	440 mA	800 mA	2.1 A	5.4 A
Continuous Input Power	10.5 W	19.2 W	50.4 W	130 W
OverDrive™ Input Current	3.4 A	6.4 A	19 A	47 A
OverDrive™ Input Power	82 W	154 W	460 W	1130 W

RESOURCE CORNER

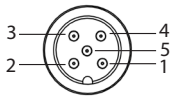
Additional resources, including CAD files, videos, and application examples, are available on our website.

OUTPUT CONFIGURATION

Using a Reverse-Key 5-pin M12 Connector

When connecting a four-wavelength light to a 4WMD using the 5-pin connector, a reverse-key 5-pin M12 cable is required.

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



Reverse-Key 5-pin M12 Connector
(female)

5-pin M12 Connectors (Female) Pin Layout

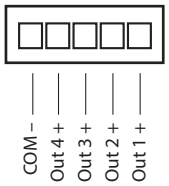
Pin	Channel	Color
1	Common	Brown
2	1	White
3	2	Blue
4	3	Black
5	4	Green/Yellow

NOTE:

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

Using Output Terminal Blocks

The terminal block may be used with a custom SVL light or a non-SVL light without a built-in driver. It may also be used when connecting a light without a reverse-key 5-pin M12 connector (with no external driver).



NOTE:

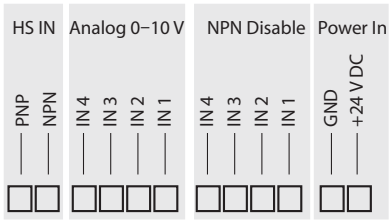
Smart Vision Lights recommends using either the terminal block or the reverse-key 5-pin M12. Using both may result in unexpected results.

WARNING:

When connecting a light to the 4WMD, **do no exceed** the maximum input LED current rating of the light.

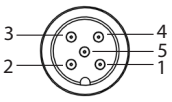
WIRING CONFIGURATION

Input Connectors
(top of 4WMD)

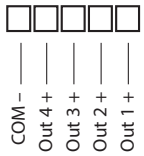


Input Channels
HS IN — High-speed PNP or NPN strobing/trigger
Power In — Power source
NPN Disable — Disable operation of a channel
Analog 0–10 V — Input for setting intensity for continuous mode (1–10VDC) or OverDrive™ strobe mode (0VDC)

Output Connectors
(bottom of 4WMD)



Reverse-key 5-pin M12 Connector
(female)



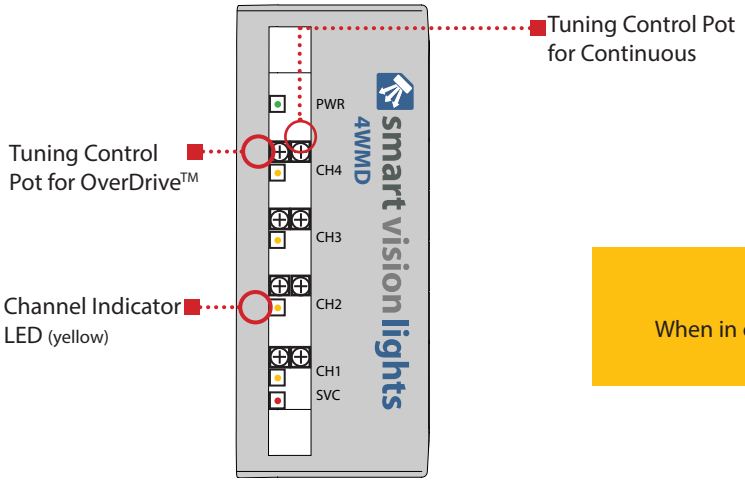
NOTE:

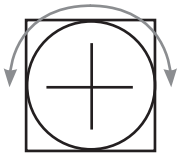
All channels are enabled by default. To disable a channel, connect that channel to ground (GND).

Example: To disable channel 4, connect NPN Disable IN4 to GND.

TUNING WAVELENGTHS

The 4WMD allows for the tuning of up to four individual wavelength intensities. Depending on its configuration, a channel can tune the output intensity of a given wavelength for either continuous operation or OverDrive™ strobe mode. Each channel can be tuned either in continuous operation or OverDrive™ strobe mode, but not both modes simultaneously. Each channel has a yellow indicator light that illuminates when the channel is active.





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

NOTE:

When in continuous mode, channels can be tuned individually using 1–10 V DC on the analog input.

PART NUMBER

4WMD – □□□□

CURRENT:

100 = 100 mA
250 = 250 mA
750 = 750 mA
2000 = 2 A

Part Number Examples:

4WMD-250 4WMD driver (maximum of 250 mA)

Determine the amount of current needed for the driver:
The current requirement is based on the maximum continuous LED current needed. Smart Vision Lights is able to set the current to a desired value upon request.

Any 4WMD above 750 mA is high current. High-current version is equipped with a cooling fan.
4WMD-2000 is the high current version.

PRODUCT VERSIONS

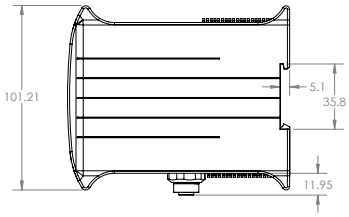
The 4WMD is available in two versions, depending on the maximum output current. The high-current version is equipped with a cooling fan. **Any 4WMD above 750 mA is high current.**

Standard

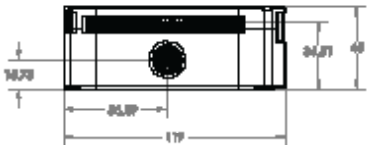
High-Current

PRODUCT DRAWING

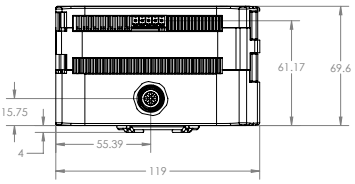
Dimensions are in mm.



Standard



High Current



ACCESSORIES

Jumper Cables

Lengths	Part Number
2000 mm	5PM12-J2000-KR

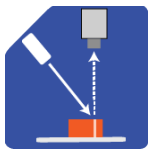
GLOSSARY

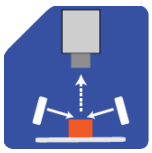
This glossary covers all Smart Vision Lights product families; some content in this section may not apply to this specific product.

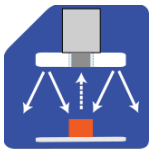
TERMINOLOGY

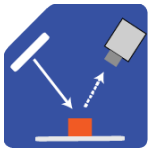
OverDrive™ Lights include an integrated high-pulse driver for complete LED light control.
Continuous Operation Light stays on continuously.
Multi-Drive™ Combines continuous operation and OverDrive™ strobe (high-pulse operation) mode into one easy-to-use light.
Built-In Driver The built-in driver allows 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.
Diffuser Used to widen the angle of light emission, reduce reflections, and increase uniformity.

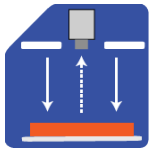
TYPES OF ILLUMINATION

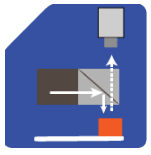

Projector

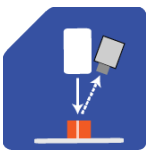

Dark Field

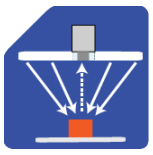

Radial

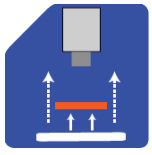

Bright Field


Direct


Axial

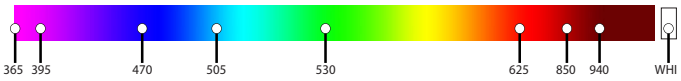

Line


Diffuse Panel


Backlight

COMMON COLOR/WAVELENGTHS LEGEND

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



SWIR SHORT WAVE INFRARED

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

smart vision lights

4ZMD Four-Zone DRIVER

EXTERNAL DRIVER

PRODUCT DATA SHEET

Warranty	Mount	Compliant	Zones	Connector
3 YEAR	DIN RAIL	CE RoHS	UP TO 4	5-PIN M12 (Reverse Key)

PRODUCT HIGHLIGHTS

- ✓ Four individual channels that can be controlled independently of one another
- ✓ Works with LED Light Manager (LLM)
- ✓ 5-pin M12 quick connect (reverse key)
- ✓ Built-in Multi-Drive™ allows light to work in continuous operation or OverDrive™ strobe mode
- ✓ Separate control for each channel to control intensity for either continuous operation or OverDrive™ strobe mode

PRODUCT DESCRIPTION

The 4ZMD is an external driver with four individual built-in channels, allowing control of up to four zones within a single light or four individual lights with no built-in drivers. Users can set different intensity levels for each zone channel because they act independently of each other. Also, depending on the channel's configuration, intensity controls can adjust the intensity for either continuous operation or OverDrive™ strobe mode.

When connected to the 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

PER CHANNEL	Standard	High Current
Electrical Input	24VDC +/- 5%	
Electrical Input Connector	2-position screw terminal block — 14 AWG max wire size	
Operating Current (No Load)	70 mA	110 mA (Includes fan)
Number of Input Channels	4	
Input Connector	8-position screw terminal block — 14 AWG max wire size (4 for PNP and 4 for analog)	
On/Off Trigger Input	PNP trigger: +4VDC or greater to activate (max 26VDC)	
Input Channel Current	PNP input: 4 mA @ 4VDC | 10 mA @ 12VDC | 20 mA @ 24VDC	
Analog Intensity Input	Continuous Operation: The output is adjustable from 10%–100% of intensity by applying 1–10VDC signal OverDrive™ Strobe Mode: Apply 0VDC	
Output Channels	4 channels for LED control	
Output Connectors	One 5-pin M12 reverse-key connector 5 position screw terminal block – 14 AWG max wire size	
Indicator Lights	Power on = Green light Individual channels = Yellow light Service = Red light	
Mounting	DIN rail	
Dimensions	H = 102 mm (4.0"), L = 119 mm (4.7"), W = 45 mm (1.8")	H = 102 mm (4.0"), L = 119 mm (4.7"), W = 70 mm (2.8")
Ambient Temperature	-18ºC–40ºC (0ºF–104ºF)	
Ambient Humidity	0%–95% noncondensing	
Weight	~233 g	~425 g
Compliances	CE, RoHS	
Terminal Block Plugs (Included with 4ZMD)	2-position terminal block plug 5-position terminal block plug 8-position terminal block plug	

OUTPUT PER CHANNEL (MAX)	4ZMD-100	4ZMD-250	4ZMD-750	4ZMD-2000
Maximum LED Continuous Current	100 mA	250 mA	750 mA	2 A
Maximum LED OverDrive™ Current	1 A	2 A	6 A	12 A

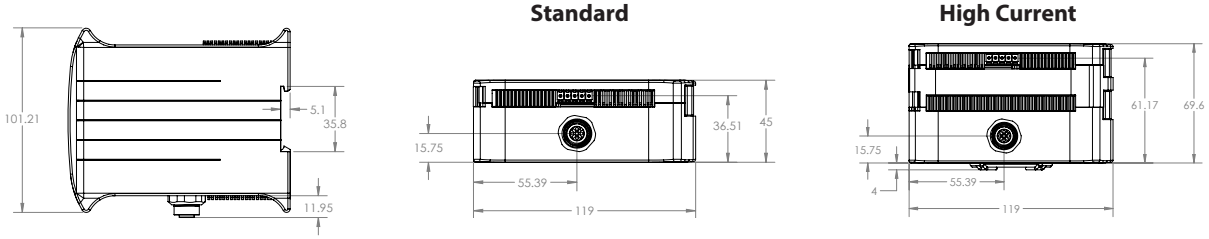
TOTAL INPUT PER UNIT (MAX)	4ZMD-100	4ZMD-250	4ZMD-750	4ZMD-2000
Continuous Input Current	440 mA	800 mA	2.1 A	5.4 A
Continuous Input Power	10.5 W	19.2 W	50.4 W	130 W
OverDrive™ Input Current	3.4 A	6.4 A	19 A	47 A
OverDrive™ Input Power	82 W	154 W	460 W	1130 W

RESOURCE CORNER

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

PRODUCT DRAWING

Dimensions are in mm.



OUTPUT CONFIGURATION

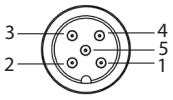
Using the Reverse-Key 5-pin M12 Connector

When connecting a Smart Vision Lights four-zone light to a 4ZMD using the 5-pin connector, 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.

NOTE:

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



Reverse-Key 5-pin M12 Connector
(female)

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

Using Output Terminal Blocks

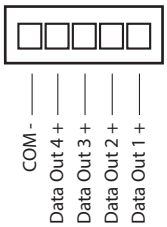
The terminal block may be used with a custom SVL light or a non-SVL light without a built in-driver. It may also be used when connecting a light without a reverse-key 5-pin M12 connector (with no external driver).

NOTE:

Smart Vision Lights recommends using either the terminal block or the reverse key 5-pin M12. Using both may cause unexpected results.

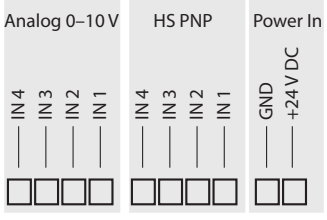
WARNING:

When connecting a light to the 4ZMD, **do no exceed** the maximum input LED current rating of the light.



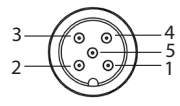
WIRING CONFIGURATION

Input Connectors
(top of 4ZMD)

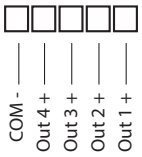


Input Channels for 4ZMD
Power In — Power source
HS PNP— High-speed PNP strobing/trigger
Analog 0—10 V — Input for setting intensity for continuous mode (1—10VDC) or OverDrive™ strobe mode (0VDC)

Output Connectors
(bottom of 4ZMD)



Reverse-Key 5-pin M12 Connector
(female)



INPUT CONFIGURATION

Using Input Terminal Block

Input terminal block is also used when connecting to the LED Light Manager (LLM).

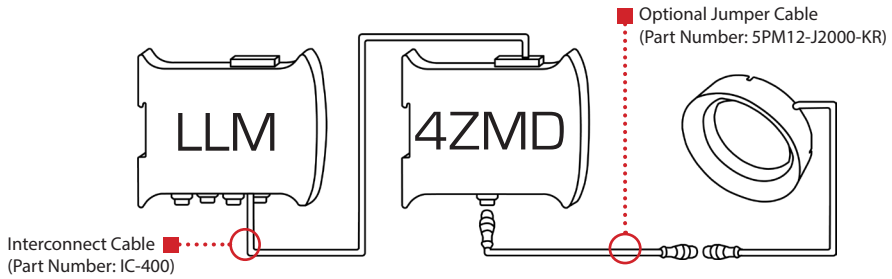
Smart Vision Lights recommends using the interconnect cable (part number: IC-400) to connect the 4ZMD driver to the LLM.

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

MANAGING ZONES

Connect the LED Light Manager (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, each with the ability to set its zone to continuous on, off, any intensity level in between, and even OverDrive™ strobe mode.

For more information about how to use the LED Light Manager (LLM), see the LED Light Manager data sheet.



UNDERSTANDING ZONES

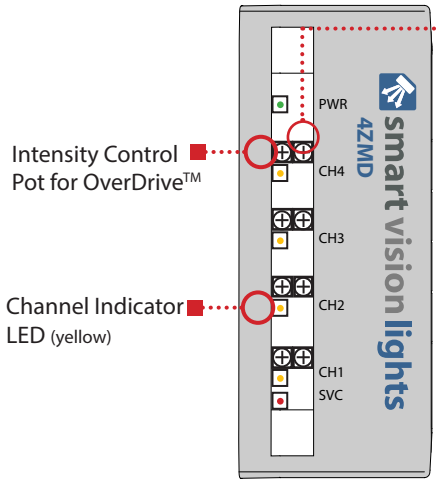
Smart Vision Lights offers lights with four individual built-in zones, allowing each zone to act independently of one another. Each zone can be set to continuous on, off, or any intensity level in between, and even OverDrive™ strobe mode. Intensity levels can be set by programming the LLM to control the zones or by using the intensity controls on the front of the 4ZMD (see Managing Zones and Adjusting Intensity).

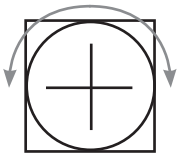
These four-zone lights enable any combination of the zones to be turned on at the same time, including adjacent and opposing zones.

One Zone | Two Zones | Three Zones | Four Zones | Opposing Zones

ADJUSTING INTENSITY

The 4ZMD allows for the control of up to four individual channel intensity levels. Depending on how the 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
Counterclockwise = Decrease intensity

NOTE:

When in continuous mode, channel intensity can be adjusted using 1—10 V DC on the analog input.

NOTE:

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

PART NUMBER

4ZMD – □□□□

CURRENT:

100 = 100 mA
250 = 250 mA
750 = 750 mA
2000 = 2 A

Part Number Examples:

4ZMD-250 4ZMD driver (maximum of 250 mA)

Determine the amount of current needed for the driver: The current requirement is based on the maximum continuous LED current needed. Smart Vision Lights is able to set the current to a desired value upon request.

Any 4ZMD above 750 mA is high-current. High-current version is equipped with a cooling fan. 4ZMD-2000 is the high-current version.

PRODUCT VERSIONS

The 4ZMD is available in two versions, depending on the maximum continuous LED current. The high-current version is equipped with a cooling fan. **Any 4ZMD above 750 mA is high-current.**

Standard

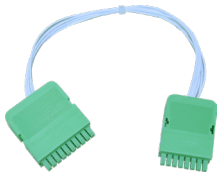
High-Current

ACCESSORIES

Jumper Cables

Lengths	Part Number
2000 mm	5PM12-J2000-KR

Interconnect Cable



Lengths	Part Number
400 mm	IC-400

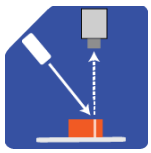
GLOSSARY

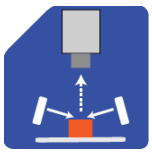
This glossary covers all Smart Vision Lights product families; some content in this section may not apply to this specific product.

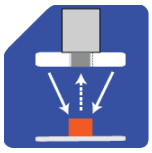
TERMINOLOGY

OverDrive™ Lights include an integrated high-pulse driver for complete LED light control.
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.
Diffuser Used to widen the angle of light emission, reduce reflections, and increase uniformity.

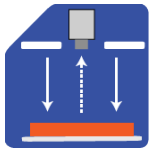
TYPES OF ILLUMINATION

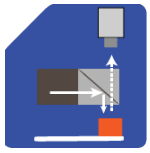

Projector

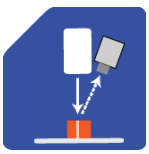

Dark Field

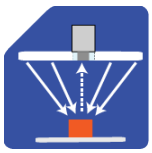

Radial

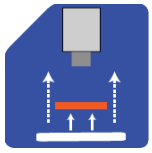
Bright Field


Direct


Axial

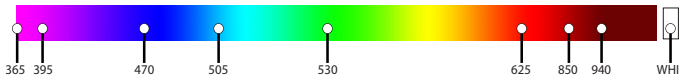

Line


Diffuse Panel


Backlight

COMMON COLOR/WAVELENGTHS LEGEND

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



SWIR SHORT WAVE INFRARED

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

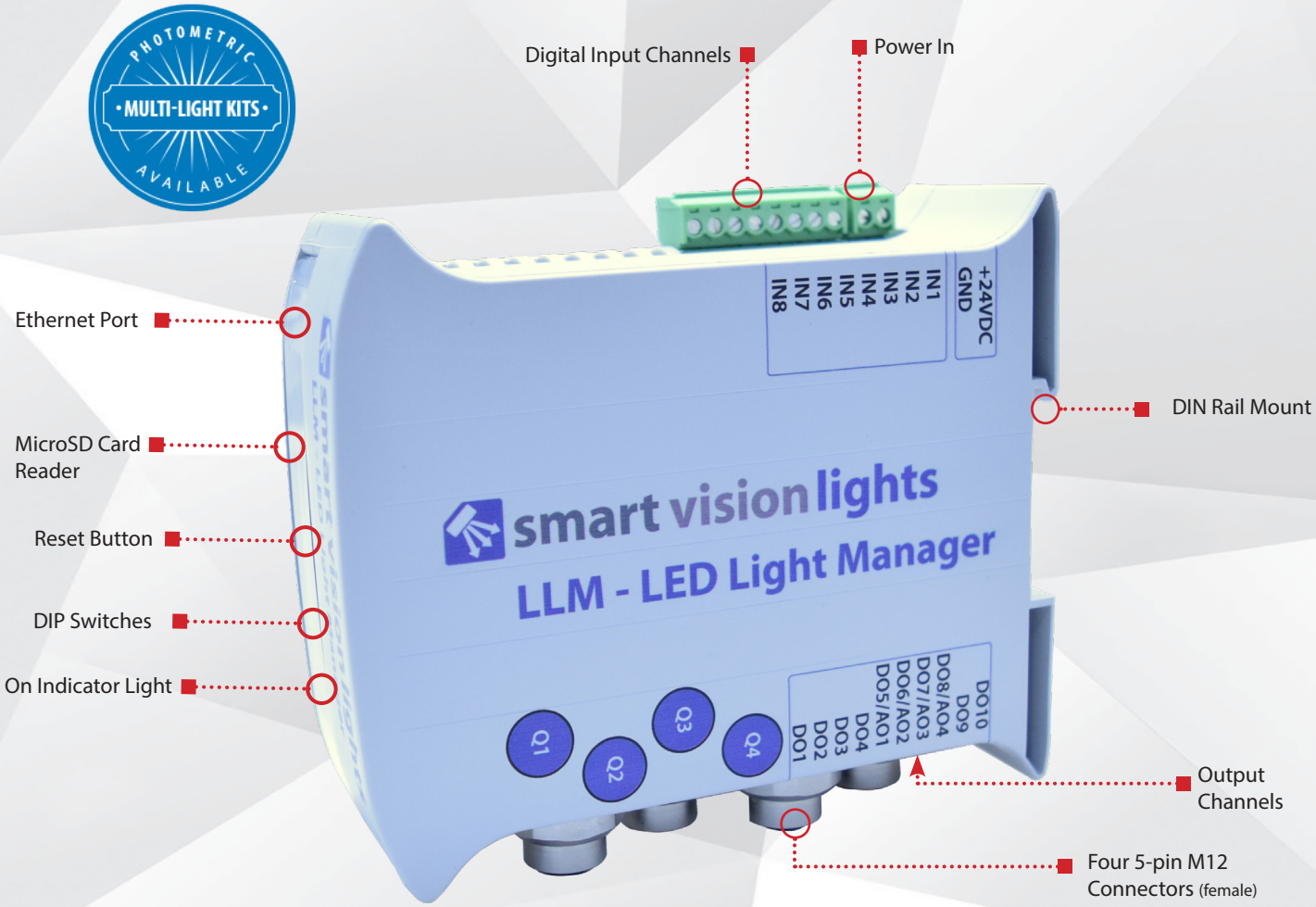
smart vision lights

LLM LED LIGHT MANAGER

MULTI-ZONE LIGHTING MANAGER

PRODUCT DATA SHEET

PHOTOMETRIC • MULTI-LIGHT KITS • AVAILABLE



Warranty	Mount	Compliant	Zones	Connector
3 YEAR	DIN RAIL	CE RoHS	UP TO 4	5-PIN M12

PRODUCT HIGHLIGHTS

- Manage multiple lights operating in continuous, Multi-Drive™, or OverDrive™ modes
- Program operational mode, sequence, intensity, and more through an intuitive browser interface
- Connect up to four separate lights or 1 four-zone light
- Easily program the LLM using the web page interface
- PNP and NPN input and output channels

PRODUCT DESCRIPTION

The programmable LED Light Manager (LLM) addresses the lighting control needs of multi-light machine vision solutions, including photometric 3D, multispectral and other multi-light systems.

The LLM can drive up to four separate lights of virtually any type or up to four individual zones or channels within an integrated photometric or multispectral ring light solution. Each program can contain up to six sequences with up to four lights set to continuous on, off, or any intensity level in between, and even OverDrive™ strobe mode.

Additional information about the LED Light Manager (LLM) can be found at: **smartvisionlights.com/products/llm**.

PRODUCT SPECIFICATIONS

Electrical Input	24VDC +/- 5%
Electrical Input Connector	2 position screw terminal block – 14 AWG max wire size
Operating Current (No Load)	70 mA
Number of Input Channels	8 (including 1 input channel with interrupt capability)
Input Connector	8 position screw terminal block – 14 AWG max wire size
Max Input Channel Voltage	Not to exceed electrical input voltage
On / Off Trigger Input	PNP mode: +4VDC or greater to activate (max 26VDC) NPN mode: GND (<1VDC) to activate
Input Channel Current	PNP line: 4 mA @ 4VDC | 10 mA @ 12VDC | 20 mA @ 24VDC NPN line: 15 mA @ Ground (0VDC)
Output Channels	4 channels for lights plus 2 additional outputs, such as a camera trigger
Output Connectors	4 5-pin M12 connectors 10 position screw terminal block – 14 AWG max wire size (configurable for NPN or PNP)
Total Output Current (M12 Connectors)	**Total Average Output Current:** 8 A - sum of all 4 channels (polyfuse protected) Maximum average output current per any 1 channel 2.8 A
Trigger Output Current (Per Channel)	PNP (sourcing): 65 mA NPN (sinking): 65 mA
Analog Output (Per Channel)	Voltage: 1–10VDC, continuous mode intensity control Current: 0.5 mA max (with fault protection)
Slave Mode	Selectable and configurable with DIP switches
Indicator Lights	Power on = green light Ethernet = 2 indicator lights
Protection Circuitry	Polyfuse protection
Programming Connector	Ethernet port
SD Card	microSD card
Reset Button	Hold down for 3 seconds
Mounting	DIN rail
Dimensions	H = 120 mm (4.7"), L = 107 mm (4.2"), W = 45 mm (1.8")
Ambient Temperature	-18°–40° C (0°–104° F)
Ambient Humidity	0–95% non-condensing
Weight	~233g
Compliances	CE, RoHS
Warning	The user must ensure that the potential difference between any combination of applied signals does not exceed the supply voltage. The LED Light Manager (LLM) must not be used in an application where its failure could cause a danger to personal health or damage to other equipment.
Terminal Blocks (Included with LLM)	2 position terminal block plug 8 position terminal block plug 10 position terminal block plug

RESOURCE CORNER

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

MODE OPTIONS

Master Mode (Default Mode)

Master mode allows you to use the full function of the LLM. This mode allows you to control up to six sequences and zones using the built-in web browser based interface. **DIP switch 1 needs to be set to master mode.**

Slave Mode

Slave mode allows you to bypass the controls set using the web page interface. When the LLM is set to slave mode, the output signal follows the input signal and allows for the output signal to be set to the same or opposite polarity as the input signal.
DIP switch 1 needs to be set to slave mode.

INPUT TRIGGERING

The LLM uses the following convention for setting up the input triggering.

NPN triggering: The triggering device provides a sinking signal that is at ground potential (typically less than 1VDC)
PNP triggering: The triggering device provides a sourcing signal that is between 4VDC and 24VDC

WIRING CONFIGURATION

Master Mode

When connecting a camera to the LLM:

Action	Pin
Sequence Start	Input 6
Exposure Complete	Input 7
Camera Trigger	Data Output 9

Slave Mode

Data outputs 1–8 are slaves to the data input. They can be set to be the same or opposite polarity as the input signal.

NOTE:

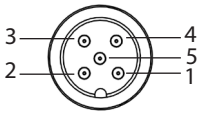
The four 5-pin M12 connectors on the LLM will not function if DIP switch 1 is set to slave mode.

OUTPUT CONFIGURATION EXAMPLES

Using 5-pin M12 Connector

Lights can be connected using a standard 5-pin M12 connector. Up to four lights can be connected to a single LLM.

Using daisy-chainable and direct connect lights is possible as long as you do not exceed the 5-pin M12 connector max value (see Product Specifications for value).



5-pin M12 Connector
(female)

5-pin M12 Connectors (Female) Pin Layout

Pin	Function	Signal
1	Power Out	+24VDC
2	NPN	Sinking Signal
3	GND	Ground
4	PNP	Sourcing Signal
5	*Varies by Light**	*Varies by Light**

*See Note

NOTE:

Smart Vision Lights recommends referencing the data sheet for each individual light for wiring configuration to determine exact wiring option and pin 5 function/signal.

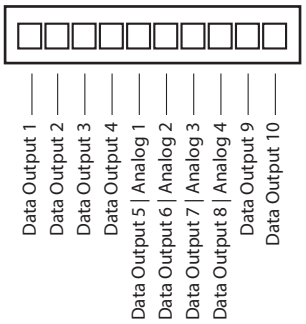
Using Output Terminal Blocks

Master Mode

If using a light with an external driver or non-Smart Vision Lights' light with an internal driver, use data output (1–4) to trigger PNP input.

Analog output is used when managing intensity control.

Data output (9) can be used for controlling additional output devices, such as a camera trigger.



Slave Mode

Data outputs 1–8 are slaves to the data input and are configured using the DIP switches. The output signal follows the input signal and allows for the output signal to be set to the same or opposite polarity as the input signal. *Slave mode can only use terminal block (input/output).*

NOTE:

If lights are using a separate power source, number of lights per channel are limited only by data output (1–4) or analog output (1–4). See Output Current per channel for data output values or Analog Output per channel for analog output values in Product Specifications.

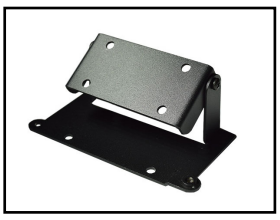
RECOMMEND LIGHTS

Smart Vision Lights recommends the following lighting kits for best results when using the LLM for multi-zone lighting. Kits includes the LLM, lights, cables, and mounting equipment. See our LLM Photometric Multi-Light Kits guide for more information.

- LM45 Kit
- LM75 Kit
- LXE300 Kit
- S75 Kit
- DFL12 Kit
- DFL24 Kit
- DFL460 Kit

Light(s)

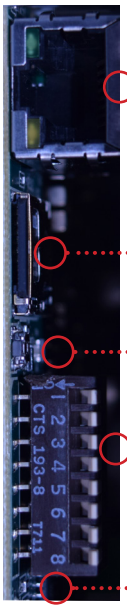
+


Mount(s) / Adapter(s)

+

Cable(s)

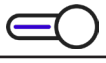
LLM FRONT PANEL



Ethernet Port	Allows you to connect an Ethernet cable to the LLM.
MicroSD Card Reader	MicroSD Card used to store the program file. Required when using web page interface as well as when running LLM in master mode.
Reset Button	Smart Vision Lights recommends holding the reset button down for three seconds.
DIP Switches	DIP switches allow you to set the configuration of the LLM. See DIP switches section for more information.
On Indicator Light	Indicator light to show that the LLM has power.

DIP SWITCHES

← ON

1	Slave		Master
2	Input NPN		Input PNP
3	Output NPN		Output PNP
4	Not Used		Not Used
5	Not Used		Not Used
6	Trigger Delay On		Trigger Delay Off
7	Restart Sequence On		Restart Sequence Off
8	Test Mode On		Test Mode Off

Example: Toggling DIP switch 1 in the opposite direction of the number (1) will set the LLM into Master mode.

NOTE:

In order to use the setting you program using the web page interface, you need to have **DIP switch 1 set to master**.

The DIP switches located on the front of the LLM are used to configure the LLM for master or slave mode as follows:

Master Mode (DIP switch 1)

DIP switch 1 set the LLM to master mode. Master mode uses the settings configured during your last programming session.

Set Trigger Delay (DIP switch 6 - Active in Master mode)
Set camera trigger delay to 50 µs.

Restart Sequence Event (DIP switch 7 - active in Master mode)
Restart sequence event with each sequence start signal. *(See Restart Sequence Event for more information)*

Test Mode (DIP switch 8 - active in Master mode)
Allows you to select if you want to run the LLM in test mode. Available on version 1.7 or greater. *(See Test Mode for more information)*

Slave Mode (DIP switch 1)

When DIP switch 1 is set to slave mode, DIP switches 2 and 3 become active. Setting DIP switch 1 to slave mode bypasses the program created when accessing the web page interface. The output signal follows the input signal and allows the output signal to be set to the same or opposite polarity as the input signal. *Slave mode can only use terminal block (input/output).*

Input Signal PNP/NPN (DIP switch 2 - active in Slave mode)
Allows you to select your input signal as either PNP (sourcing) or NPN (sinking).

Output Signal PNP/NPN (DIP switch 3 - active in Slave mode)
Allows you to select your output signal as either PNP (sourcing) or NPN (sinking).

PROGRAMMING

Smart Vision Lights
LED Light Manager

MODE: (•) RUN ( ) PROGRAM

INPUT: (•) PNP ( ) NPN

	Q1	Q2	Q3	Q4
Sequence 1	100%	100%	Off	100%
Sequence 2	100%	Off	Off	Off
Sequence 3	Off	100%	Off	Off
Sequence 4	Off	Off	100%	Off
Sequence 5	Off	Off	Off	100%
Sequence 6	100%	100%	100%	100%

Save

Ver. 1.7

Programming the LLM

- Open web browser and enter IP address **192.168.0.200**
- The most recent event program will be displayed
- Select PROGRAM from MODE
- Click on SAVE to enter program mode
- Web page will refresh
- Select either PNP or NPN for INPUT
- Select the values for your sequences / zones
- Set MODE to RUN
- Review your sequences / zones
- Click on SAVE to save your program

NOTE:

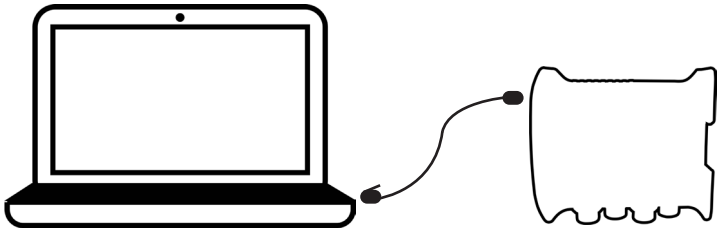
Review **Input Triggering** section for using PNP or NPN.

NOTE:

The LLM is set to use IP address: **192.168.0.200**

If your network is not set up to use 192.168.0.xxx, you will need to connect a computer to the LLM using a standard Ethernet cable (such as a Cat5e cable). Set your computer's IP address manually to 192.168.0.150. Set the subnet to 255.255.255.0. You will now be able to communicate with the LLM via your web browser.

Note: Make sure you set your computer back to the network settings prior to making the above changes to ensure your computer works properly on your network.



IP Address: 192.168.0.150 IP Address: 192.168.0.200

Managing Multiple LLMs on the Same Network

Smart Vision Lights recommends not programming multiple LLMs on the same network at the same time. When needing to program multiple LLMs, it is best to connect each LLM separately to a computer, program it, and move to the next one to do the same.

MANAGING SEQUENCES

A sequence event consists of the total number of sequences selected. You can select from one to six sequences. For example, if you only need five sequences, you can leave all the zones off in the sixth sequence.

Once the event is activated ("Sequence Start" signal on input 6), two things happen:

1. The first sequence (sequence 1) of lights (zones) is triggered.
2. The camera is triggered via data output 9.

(This is repeated for all the sequences selected, as described below.)

The LLM waits for the camera exposure to be completed before triggering the next sequence (such as sequence 2). The "Exposure Complete" signal is monitored on input 7. If the "Exposure Complete" signal is not detected within two seconds, the system times out, triggers the next sequence, and waits again for the "Exposure Complete" signal. This occurs for all the sequences chosen for the sequence event.

Once the sequences are complete, the LLM waits for the next "Sequence Start" signal (event start).

To drive the exposure complete input:

If the PNP is selected for the input, connect a pulse signal of 4VDC or greater (max 26VDC).

If the NPN is selected for the input, connect a pulse signal less than 1VDC (above ground).

RESTART SEQUENCE EVENT

Sometimes there is a need to interrupt the sequence event and start the event from the beginning. (A sequence event consists of the total number of sequences selected.)

Setting DIP switch 7 to the ON position while in Master mode, the sequence event will restart each time the sequence is triggered. When DIP switch 7 is in the ON position, applying a signal to the sequence start input (IN 6) will result in a restart of the sequence event.

For example, if the LLM is currently in second sequence of a four-sequence event and the LLM receives a sequence start trigger (on IN 6), the LLM will skip the last two sequences in the sequence event and restart from the first sequence.

Note: The current sequence will be completed before the sequence event is restarted.

This feature is available on version 1.7 or above.

TEST MODE

The LLM can be put in a test mode, which will allow the LLM to operate without any control lines connected.

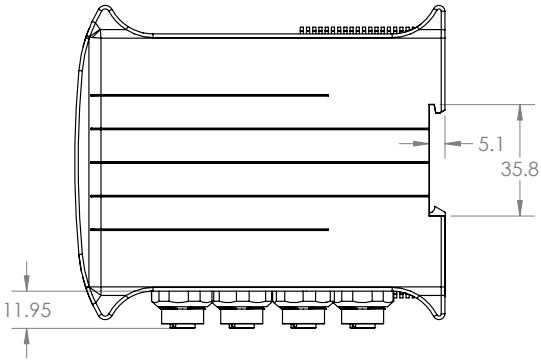
- In the test mode, the LLM will continuously run through the sequences. Each sequence will be displayed for two seconds.
- To enter into the test mode, set DIP switch 8 to the ON position and then press the reset button (the DIP switches are read at power up or after the Reset button is pressed).
- The sequences can be changed while in the test mode. The changes are updated automatically in the LLM once the changes are saved on the web page.
- While in the "Program" mode, the lights will turn off. After the changes are saved, there is a six-second delay. Following the delay, the lights will display the new changes.
- To exit the test mode, set DIP switch 8 to the OFF position and press the Reset button.

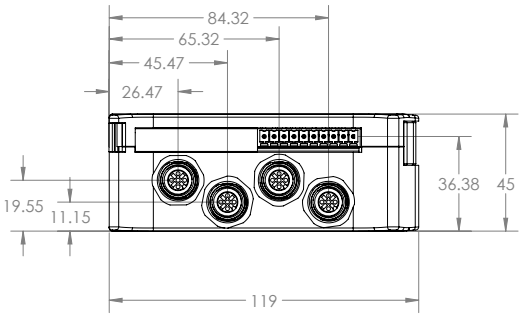
One application for the test mode is for setup. The lights in a particular sequence can appear to be on continuously by setting all sequences identically. This way, the lights in the repeating sequences will appear to be always on (there will be a very brief off period between sequences).

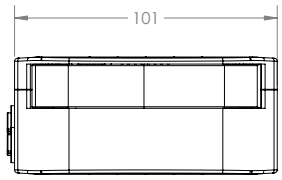
This feature is available on version 1.7 or above.

PRODUCT DRAWING

Dimensions are in mm.







ACCESSORIES

Power Cables

Lengths	Part Number
5 m	5PM12-5
10 m	5PM12-10
15 m	5PM12-15

Jumper Cables

Lengths	Part Number
300 mm	5PM12-J300
1000 mm	5PM12-J1000
2000 mm	5PM12-J2000

Jumper Cables

Lengths	Part Number
2000 mm	5PM12-J2000-BLK

GLOSSARY

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

TERMINOLOGY

OverDrive™ Lights include an integrated high-pulse driver for complete LED light control.
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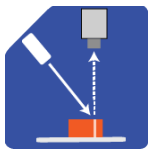
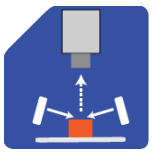
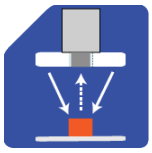
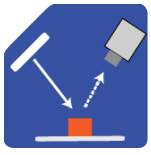
Built-in Driver The built-in driver allows full function without the need of an external controller.
Camera to Light Connecting the light directly to the camera, without the need for additional controllers or equipment.
Polarizers Filters that reduce reflections on specular surfaces.
Diffuser Used to widen the angle of light emission, reduce reflections, and increase uniformity.

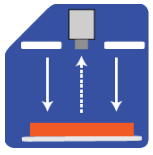
TYPES OF ILLUMINATION

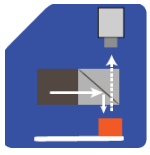

Projector

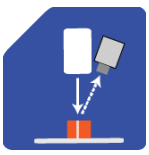

Dark Field

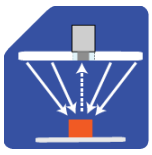

Radial

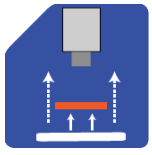

Bright Field


Direct


Axial

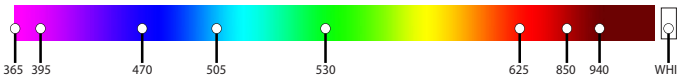

Line


Diffuse Panel


Backlight

COMMON COLOR/WAVELENGTHS LEGEND

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



SWIR SHORT WAVE INFRARED

Shortwave Infrared LEDs are available in 1050 nm, 1200 nm, 1300 nm, 1450 nm, and 1550 nm.