

Warranty
3
YEAR

Mount
DIN
RAIL

Compliant
CE
RoHS

Quadrants
UP TO
4

Connector
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 or 1 four-quadrant 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 multilight 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 quadrants or channels within an integrated photometric or multispectral ring light solution. Each program can contain up to four sequences with up to four lights set to continuous on, off, any intensity level in between, and even OverDrive™ strobe mode.

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



PRODUCT SPECIFICATIONS

Electrical Input	24 V DC +/- 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	26 V
On / Off Trigger Input	PNP mode: +4 V DC or greater to activate (max 26 V DC) NPN mode: GND (<1 V DC) to activate
Input Channel Current	PNP line: 4 mA @ 4 V DC 10 mA @ 12 V DC 20 mA @ 24 V DC NPN line: 15 mA @ Ground (0 V DC)
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)
Output Current (Per Channel)	PNP (sourcing): 65 mA NPN (sinking): 65 mA
M12 Connector (Per Channel)	Continuous mode: 1.85 A (polyfuse protected) OverDrive™: 10 A – 10% duty cycle (polyfuse protected) Total Current: 8 A (polyfuse protected)
Analog Output (Per Channel)	Voltage: 1–10 V DC, 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
Terminal Blocks (Included with LLM)	2 connector terminal block 8 connector terminal block 10 connector terminal block

RESOURCE CORNER



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

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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 four sequences and quadrants 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.



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.

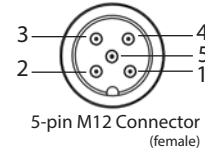


OUTPUT CONFIGURATION EXAMPLES

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 Connectors (Female) Pin Layout

Pin	Function	Signal
1	Power Out	+24 V DC
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.

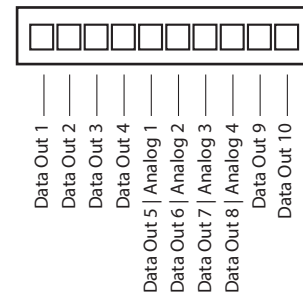
Using Output Terminal Blocks

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 strips (input/output).*



RECOMMEND LIGHTS

Smart Vision Lights recommends the following lighting kits for best results when using the LLM for multiple quadrant lighting. Kits includes 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)

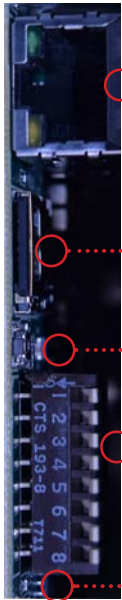
+



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	Not Used		Not Used
7	Not Used		Not Used
8	Not Used		Not Used

Example: Sliding dip switch 1 in the opposite direction of the number (1) will set the LLM into master mode.

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)

When dip switch 1 is set to master, the remaining dip switches will be ignored. Dip switch 1 set to master mode tells the LLM to use the settings configured during your last programming session using the web page interface.

Slave Mode (Dip Switch 1)

When dip switch 1 is set to slave mode, the remaining dip switches become active. Setting dip switch 1 to slave mode allows for the bypassing of 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 strips (input/output).*

Input Signal PNP/NPN (Dip Switch 2)

Allows you to select your input signal as either PNP (sourcing) or NPN (sinking).

Output Signal PNP/NPN (Dip Switch 3)

Allows you to select your output signal as either PNP (sourcing) or NPN (sinking).

NOTE:

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



PROGRAMMING

Quadrants LED Light Manager

MODE: RUN PROGRAM

INPUT: PNP NPN

	Q1	Q2	Q3	Q4
Sequence 1	Off ▼	Off ▼	Off ▼	Off ▼
Sequence 2	Off ▼	Off ▼	Off ▼	Off ▼
Sequence 3	Off ▼	Off ▼	Off ▼	Off ▼
Sequence 4	Off ▼	Off ▼	Off ▼	Off ▼

Save

Programming the LLM

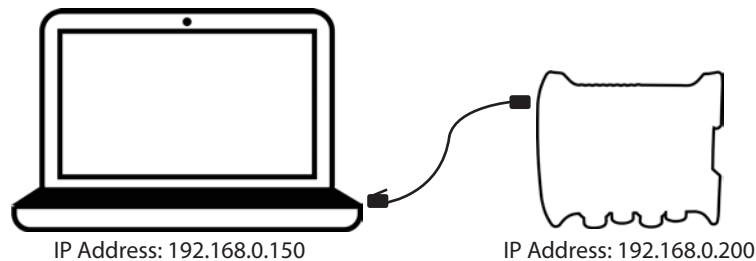
- Open web browser and enter IP address **192.168.0.200**
- The most recent event program will be displayed
- Select PROGRAM from MODE
- Click on SAVE to enter program mode
- Web page will refresh
- Select either PNP or NPN for INPUT
- Select the values for your sequences / quadrants
- Set MODE to RUN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

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.



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 four sequences. For example, if you only need three sequences, you can leave all the quadrants off in the fourth sequence.

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

1. The first sequence (sequence 1) of lights (quadrants) 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 event.

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

To drive the exposure complete input:

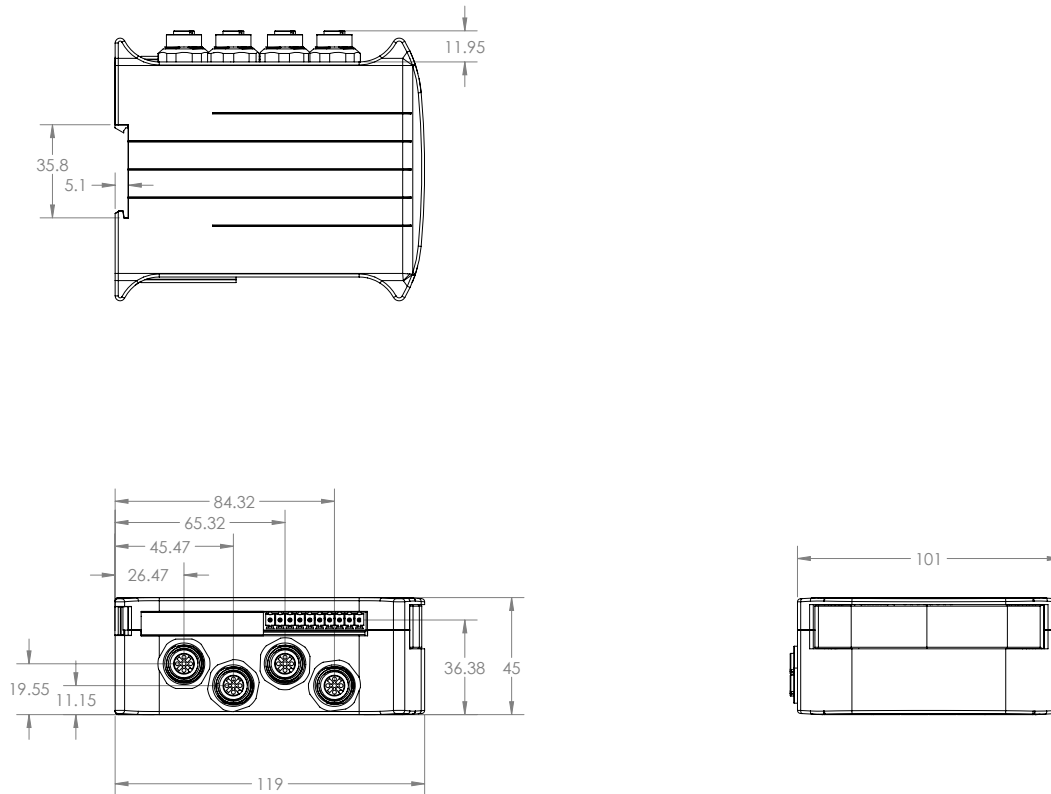
If the PNP is selected for the input, connect a pulse signal of +4 V DC or greater (max 26 V DC).

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



PRODUCT DRAWING

Dimensions are in mm.





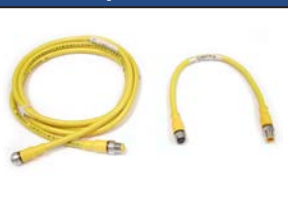
ACCESSORIES

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.

Continuous Operation Lights stay on continuously.

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

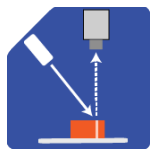
Built-in Driver The built-in driver allows full function without the need of an external controller.

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

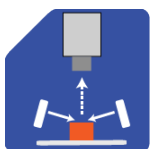
Polarizers Filters that reduce reflections on specular surfaces.

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

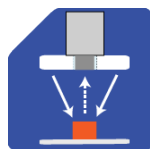
TYPES OF ILLUMINATION



Projector



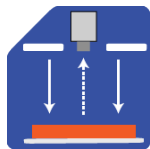
Dark Field



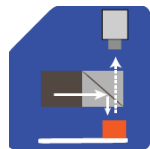
Radial



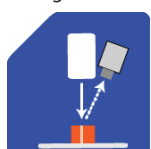
Bright Field



Direct



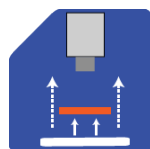
Axial



Line



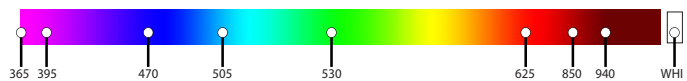
Diffuse Panel



Backlight

COMMON COLOR/WAVELENGTHS LEGEND

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



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