Wattstopper®

DLM - Digital Input/Output Interface

Catalog Number • Numéro de Catalogue • Número de Catálogo: LMIO-101

Country of Origin: Made in China • Pays d'origine: Fabriqué en Chine • País de origen: Hecho en China
LMIO-101-U is BAA and TAA compliant (Product produced in the U.S.)

This unit is pre-set for Plug n' Go™ operation, adjustment is optional.

For full operational details, adjustment and more features of the product, see the DLM System Installation Guide provided with Wattstopper room controllers, and also available at www.legrand.us/wattstopper.

Installation shall be in accordance with all applicable regulations, local and NEC codes. Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.
For Class 2 DLM devices and device wiring: To be connected to a Class 2 power source only. Do not reclassify and install as Class 1, or Power and Lighting Wiring.

SPECIFICATIONS

Voltage 24VDC
Current Consumption 20mA
Power Supply .... Wattstopper Room Controller
Connection to the DLM Local Network.................... 2 RJ-45 ports
Isolated Relay Ratings .... 1A 24VDC/VAC, SPDT
    normally open (N/O), normally closed(N/C), and common
    outputs
Environment .... For Indoor Use Only
    Operating Temperature ....32° to 104°F (0° to 40°C)
    Storage Temperature ....23° to 176°F (-5° to 80°C)
    Relative Humidity ....5 to 95% (non condensing)
RoHS compliant, UL2043 Plenum rated
Patent Pending

DESCRIPTION

The LMIO-101 Digital Input/Output Interface allows seamless integration of 3rd party devices to the Wattstopper Digital Lighting Management Local Network (DLM). The LMIO-101 connects to the DLM local network. It sends messages such as After Hours, Shed, or Force On to the DLM local network based on external inputs. It also activates the isolated relay upon any signal from any user defined DLM occupancy sensor so that a 3rd party's device can observe when occupancy is detected. It also has a 24VDC output and pilot light function.

OPERATION

The LMIO-101 operates on power from the DLM local network. It contains a 24VDC isolated relay [single-pole, double throw with normally open (N/O), normally closed (N/C), and common outputs for output to other systems. It also provides input terminal connections and options for converting input signals from 3rd party devices into load controlling messages for the DLM system.

Outputs: Isolated Relay, 24VDC, Pilot Light

The isolated relay can respond to any DLM occupancy sensor on the DLM local network to provide the DLM system's occupancy status from a specific sensor to a third party controlling device, such as HVAC or other controlling systems.

The LMIO-101 also provides 24VDC, 5mA current limited, output and a pilot light terminal.

Inputs

Four input terminals are provided for purposes including Force-ON/Force-OFF, load shedding and cleaning functions. Input terminals 1A, 1B, 2A and 2B are for connection of maintained or momentary switch closure inputs, or third party logic inputs. Input signals may come from a wide variety of devices including building automation systems, time clocks, and key switches.

Relay Normally Open (N.O.) — Pilot Light
Relay Common — Input 2B
Relay Normally Closed (N.C.) — Input 2A
Ground — Input 1B
+24VDC — Input 1A

DIP Switch Options

The LMIO-101 has DIP Switches to allow different messages to go out from third party switches to the DLM local network to control the loads bound to the LMIO-101.

With the default DIP Switch setting (all **OFF**), using Inputs 1A and 1B or 2A and 2B the LMIO-101 can take an input from any of three types of switches: Momentary **ON/ OFF**, Maintained or Momentary push button. When these inputs receive a 24VDC signal, the LMIO-101 issues a DLM command to turn **ON** the loads bound to the input.

When the DIP Switches are changed to a non-default setting, the LMIO-101 sends the appropriate digital command on the local network as determined by the DIP Switch settings when receiving a dry contact closure input to either 1A, 1B or 2A.

See **Switch Settings** on page 4.
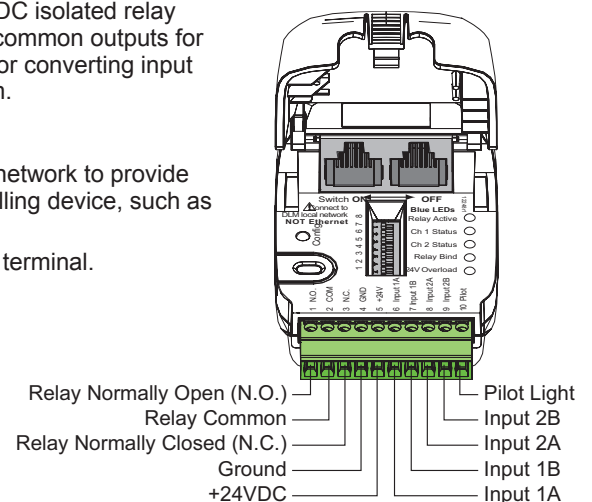
MOUNTING AND WIRING

> ⚠ **CAUTION:** TO CONNECT A COMPUTER TO THE DLM LOCAL NETWORK USE THE LMCI-100. **NEVER CONNECT THE DLM LOCAL NETWORK TO AN ETHERNET PORT** – IT MAY DAMAGE COMPUTERS AND OTHER CONNECTED EQUIPMENT.
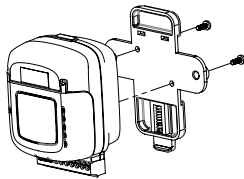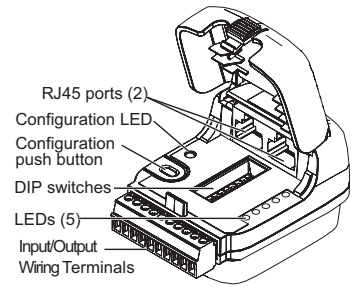
Installation shall be in accordance with all applicable regulations, wiring practices, and codes. Connect to a Class 2 power source only.

- Class 2 Device Wiring Only. – Do Not Reclassify and Install as Class 1, 3 or Power and Lighting Wiring.
- Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.
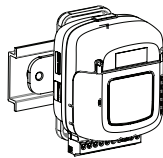
The LMIO-101 is UL2043 Plenum rated.

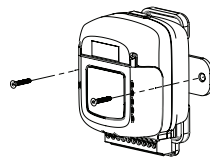All connections to the LMIO-101 are Class 2 low voltage.

If code requires that the LMIO-101 be mounted in an enclosure, it can be mounted inside a 4" x 4" junction box, inside a 21/8" deep (or deeper) 2-gang wall box, in a 3" or 4" octagonal box, or on a din rail inside a panel.
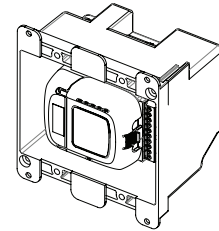
RJ45 ports (2)
Configuration LED
Configuration push button
DIP switches
LEDs (5)
Input/Output Wiring Terminals

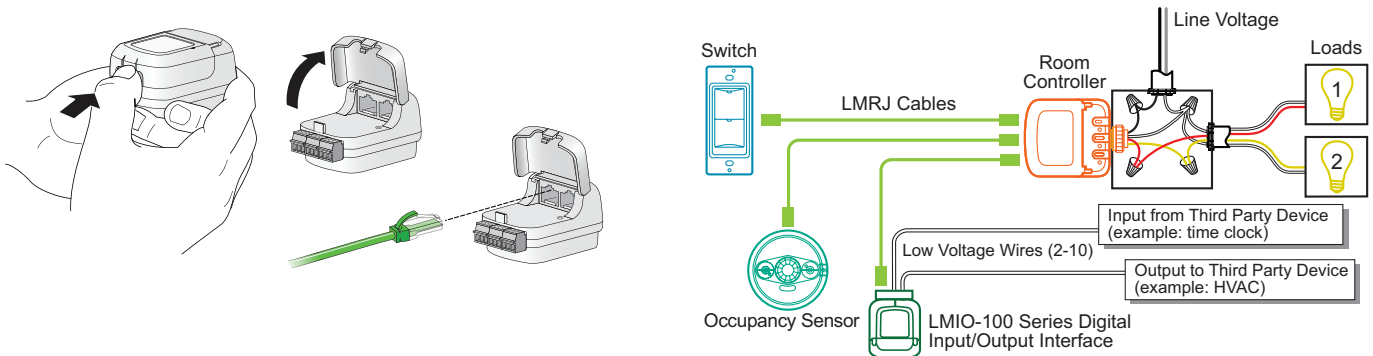**Attach din rail clip** **Option 1: Attach to din rail** **Option 2: Mount to wall** **Inside a 2-gang J-box**
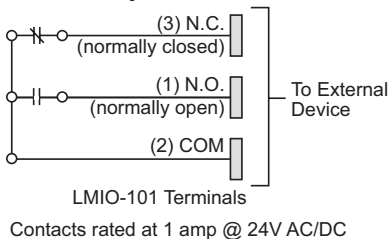
Attach the LMRJ Cable

The DLM local network uses free topology low voltage wiring. The LMIO-101 can connect anywhere on the DLM local network.

Switch
Line Voltage
Room Controller
Loads
1
2
LMRJ Cables
Input from Third Party Device (example: time clock)
Low Voltage Wires (2-10)
Output to Third Party Device (example: HVAC)
Occupancy Sensor
LMIO-100 Series Digital Input/Output Interface

TERMINAL CONNECTIONS

Isolated Relay

(3) N.C. (normally closed)
(1) N.O. (normally open)
(2) COM
To External Device
LMIO-101 Terminals
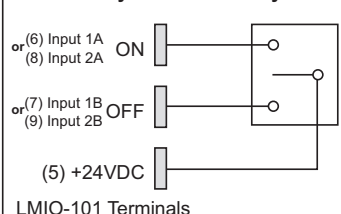Contacts rated at 1 amp @ 24V AC/DC

The isolated relay output is on terminals 1, 2 and 3. By default, the relay responds to a signal from any DLM sensor. See **Isolated Relay Binding** to change bound sensors.
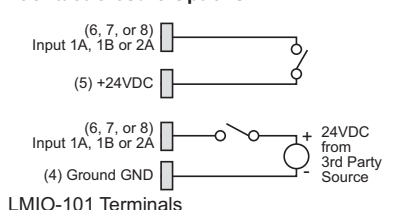
Momentary Push Button Switch

or (6) Input 1A / (8) Input 2A ON
or (7) Input 1B / (9) Input 2B OFF
(5) +24VDC
LMIO-101 Terminals
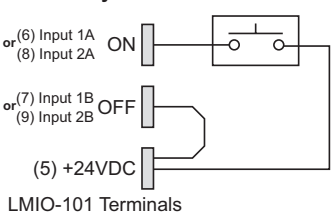
NOTE: This is a toggling input
Press once = signal sent, the Blue LED corresponding to the input will be lit on the LMIO-101
Press again = the relinquish command is sent, the Blue LED corresponding to the input will be OFF on the LMIO-101

Momentary On/Momentary Off Switch

or (6) Input 1A / (8) Input 2A ON
or (7) Input 1B / (9) Input 2B OFF
(5) +24VDC
LMIO-101 Terminals

Contact Closure Options

(6, 7, or 8) Input 1A, 1B or 2A
(5) +24VDC
(6, 7, or 8) Input 1A, 1B or 2A
(4) Ground GND
+ 24VDC from 3rd Party Source
LMIO-101 Terminals

Maintained Switch

or (6) Input 1A
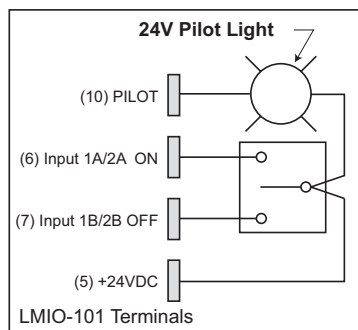or (8) Input 2A   ON

or (7) Input 1B
or (9) Input 2B   OFF

(5) +24VDC

LMIO-101 Terminals
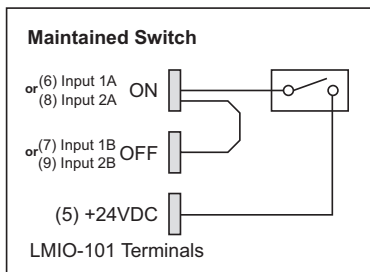
NOTE: If there is a break the switch will appear as if it is off.

24V Pilot Light

(10) PILOT

(6) Input 1A/2A ON

(7) Input 1B/2B OFF

(5) +24VDC

LMIO-101 Terminals

NOTE: 24VDC supply has a 5ma current supply. If the pilot light or any of the 3rd party devices draw more current the power supply will shut off 24VDC and the 24VDC overload LED (LED #5) will blink until the overload condition is corrected.

POWER UP FUNCTIONALITY

Upon initial power up, the LMIO-101 automatically listens for a DLM occupancy message from any occupancy sensor on the local network. The occupancy message activates the internal isolated relay output.

With the default DIP switch settings (all **OFF**), the LMIO-101 looks for only three types of switches on Input 1A, 1B, 2A and 2B: Maintained, Momentary **ON/OFF**, and Momentary push button. Any positive input results in a DLM message to turn **ON** the relay(s) bound to that input. In the default Plug 'n Go (PnG) mode, Input 1 turns load 1 **ON**, input 2 turns the rest of the loads **ON**.

If you change the DIP switches to use a dry contact input switch, then input 1A and 1B are assigned to load 1. Input 2A will be assigned to the rest of the loads.

LED INDICATORS

Relay Active: Isolated relay activation.

Ch 1 and Ch 2 Status:

Associated with Input 1 and Input 2 in contact closure mode. LEDs track load status. They also show bindings in PnL.

Ch 1 Status will be lit when either 1A or 1B is activated.

Ch 2 Status will be lit when either 2A or 2B is activated.

Relay Active
Ch 1 Status
Ch 2 Status
Relay Bind
24V Overload

Relay Bind: Binding status for sensor to LMIO-101 isolated relay.

24V Overload: Indicates 24VDC current overload.
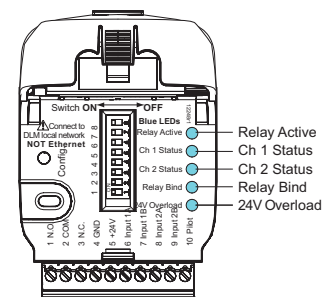
ADJUSTMENTS

Load Binding to Inputs:

1. **Enter Push n' Learn (PnL)**

   Using a pointed tool, press and hold the Configuration button on the LMIO-101 for 3 seconds. The Red LED begins to blink rapidly. Release the configuration button. The Red LED on ALL other communicating devices begins to blink rapidly. After 1 second, load #1 turns **ON**. All devices that are bound to this load have their blue LED solid **ON**.

2. **Load selection**

   Press and release the Configuration button to step through the loads. As each load turns **ON** note which blue LEDs are lit. On the LMIO-101 the Channel 1 status LED indicates binding for Input 1A or 1B and Channel 2 status LED indicates binding for Input 2A or 2B.

   • To unbind an input from a load, activate the desired input by using the third party switch or dry contact closure. The blue LED turns **OFF** to indicate the input is no longer bound to the load that is currently **ON**.

   • To bind the input to the load that is currently **ON**, activate the input using the third party switch or dry contact closure. The input's blue LED lights indicating that it controls the load that is currently **ON**.

   NOTE: If you can not activate the third party switch or the dry contact closure, you can still bind Input 1 and Input 2 to a load. Enter PnL as before and when the desired load is active toggle DIP Switch **#7** (for Input 1) or **#8** (for Input 2) to bind the input to this load.

3. **Exit Push n' Learn.**

Isolated Relay Binding

By default, the LMIO-101's isolated relay responds to any occupancy sensor on the DLM local network. The isolated relay binding process associates the relay activation based on input from specific DLM sensors. Once this process has been performed for one sensor, all other sensors are unbound from the isolated relay. For custom binding, a total of 10 occupancy sensors can be bound to a single LMIO-101 isolated relay.

Isolated Relay: Binding/Unbinding an Occupancy Sensor

The sensor must broadcast its serial number over the DLM local network and the LMIO-101 must capture the sensor's serial number within 30 seconds. You must have access to both the sensor and the LMIO-101 and be able to perform steps 1-3 below within the 30 second capture window.

1. To initiate the sensor's serial number broadcast message, go to the desired sensor and momentarily press the Configuration Button.

2. Look at the LMIO-101.

   • If the broadcasting sensor is not bound to the isolated relay, the blue Relay Bind LED on the LMIO-101 **blinks**.

   • If the broadcasting sensor is bound to the relay the Relay Bind LED on the LMIO-101 is **ON solid**.

3. To bind or unbind the broadcasting sensor to the LMIO-101's isolated relay, flip DIP Switch **#8 ON** then back **OFF**.

   • If you unbind all sensors from the LMIO-101 it goes back to its default functionality, meaning that it responds to an occupancy signal from any occupancy sensor.

4. The capture window ends automatically, 30 seconds after pressing the Configuration Button. If you want to bind/unbind more sensors, repeat steps 1-3.

Using the LMIO with LMCS

LMIO-101 inputs may also be used to drive Scene behaviors as well as network group actions in conjunction with a Segment Manager. Access with LMCS-100 is required for both. Discover the LMIO-101 using LMCS and access the button input properties table to make these changes.

Button Type can be set to "Load", "Network", or "Scene1" through "Scene16". Button mode can be set to "Toggle non tracking" in order to drive network group behavior using Segment Manager programming.

SWITCH SETTINGS

When using dry contact closure inputs they may also be configured to send out DLM commands rather than just turn loads **ON** (0) and **OFF** (X). This is accomplished by setting the DIP switches in various ways.

DIP Switch				INPUT TERMINAL FUNCTIONS			
#1	#2	#3	#4	Input 1A	Input 1B	Input 2A	Input 2B
Off	Off	Off	Off	On		On	
On	Off	Off	Off	After Hours	Key-Switch	Shed	N/A
Off	On	Off	Off	After Hours	Key-Switch	Clean	N/A
On	On	Off	Off	After Hours	Key-Switch	Force-On	N/A
Off	Off	On	Off	After Hours	Key-Switch	Force-Off	N/A
On	Off	On	Off	Shed	Key-Switch	Force-On	N/A
Off	On	On	Off	Shed	Key-Switch	Clean	N/A
On	On	On	Off	Shed	Key-Switch	Shed	N/A
Off	Off	Off	On	Clean	Key-Switch	Force-On	N/A
On	Off	Off	On	Clean	Key-Switch	Force-Off	N/A
Off	On	Off	On	Force-On	Key-Switch	Force-Off	N/A
#5				#5 On inverts the input from 0-24VDC to 24VDC-0 (On) for input 1A.			
#6				#6 On inverts the input from 0-24VDCto 24VDC-0 (On) for input 2A.			
#7				#7 See "Load Binding to Inputs"			
#8				#8 See "Load Binding to Inputs" and "Isolated Relay Binding"			

Input Configuration
#1, #2, #3, #4

Default: All OFF

ON (0) OFF (X)

Special Usage
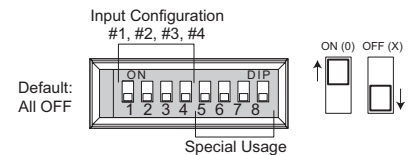
Command Prioritization Heirarchy and Description

The commands sent out are basic **ON/OFF** commands with different priorities. The higher priority command overrides lower priority commands given by the system. Below is the list of priorities for these commands. For example: a Force-On (highest priority) command overrides any **OFF** command given by any device in the system making sure that the lights remain on. When the Force-**ON** command is released, the next highest priority command is followed.

⬆ **Highest Priority**

Force-On action = Load(s) **ON**

Force-Off action = Load(s) **OFF**

Clean action = Load(s) **ON**

NOTE: Clean will turn bound loads **ON** regardless of the occupancy.

After Hours action = Puts the load into After Hours mode where individual load parameters switch to the assigned After Hours parameters of that load. These parameters can be different than the normal hours mode parameters. For example, Blink warning may be active in After Hours for the load but not active in normal hours. After Hours parameters are programmed via the LMCS-100 application or through network systems where a Segment Manager or BACnet BAS is used to set After Hours schedules for a load or device.

Key-Switch action = Does not allow control from any of the wall switches in the DLM local network.

⬇ **Lowest Priority**

The exception is the Key-switch command that puts the entire system into Key-switch mode where no DLM wall switches can control any loads. When the command is released, the system returns to normal operation so that DLM switches again control loads. Individual switch stations can be set to ignore this message using LMCS, enabling a subset of switches in a room to stay active. A typical use for this is to keep switches in secure locations active while disabling other publicly accessible switches.

Shed

The Shed command is broadcast to all loads in a room, causing them to reduce their level to the value specified by each load's "Shed Level" parameter. By default, the "Shed Level" is set to 65% because for most driver/ballast combinations this will result in at least a 15% power reduction. Using a "Shed" input configured for the 1A terminal will allow you to override (exceed) the Shed level while Shed is active. Using the 2A terminal will initiate Shed but will not allow you to exceed the Shed Level. When the contact input opens, lights will return to their values prior to the Shed command.

TROUBLESHOOTING

Relay does not close when the room is occupied:

1. Check that the circuit breaker is **ON**.
2. Make sure that there is an occupancy sensor detecting occupancy.
3. Check all wiring connections.
4. Check for 24VDC input to the LMIO-101: Plug in a different DLM device at the LMIO-101 location. If the device does not power up, 24VDC is not present.
   - Check the high voltage connections to the room controller.
   - If high voltage connections are good, recheck local network connections between the LMIO-101 and the room controller.
5. Check device and input/output bindings.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1)This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Any changes or modifications not expressly approved by The Watt Stopper Inc. could void the user's authority to operate the equipment.

Ce dispositif est conforme à la section 15 des règlements de la FCC. On peut s'en servir sous réserve des deux conditiond suivantes. 1) Ce dispositif ne provoque pas d'interférences nuisibles; 2) Il doit être en mesure d'accepter toute interférence reçue, y compris les interférences qui peuvent causer un fonctionnement indésirable.

REMARQUE: Ce matériel a été mis à l'essai et a été jugé conforme aux limites d'un dispositif numérique de classe A, conformément à la section 15 des règlements de la FCC. Ces limites visent à offrir une protection raisonnable contre les interférences nuisibles dans un environnement commercial. Ce matériel génère, utilise et peut émettre des radiofréquences et, s'il n'est pas installé ou utilisé conformément aux directives, peut causer des interférences nuisibles aux communications radio. L'utilisation de cet équipement dans une zone résidentielle est susceptible de provoquer des interférences nuisibles, dans un tel cas l'utilisateur devra corriger les interférences à ses frais.

Tout changement ou modification non expressément approuvé par The Watt Stopper Inc. pourrait annuler le droit de l'utilisateur de faire fonctionner l'équipement.

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