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Kelly Walsh High School

Operation and Maintenance Manuals

Division 26 – Electrical – Volume III

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Digital Lighting Management

DLM System Installation Guide

This guide shows you how to install, configure and use a WattStopper Digital Lighting Management (DLM) system. It complements the instructions supplied with each DLM product. Carefully read all product instructions. This guide assumes a basic knowledge of good wiring practices. All wiring must comply with applicable electrical and safety codes. All electrical installation work should be carried out by an experienced electrician.

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WattStopper®

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DIGITAL LIGHTING MANAGEMENT

The DLM system integrates load control with occupancy sensors, daylight sensors, switches, and other devices to provide simple code compliant solutions for lighting. It is a powerful, flexible, scalable, easy to install lighting control system designed to provide maximum energy savings. It uses plug-in low voltage connections to create a DLM Local Network in any room, office, commercial space or restaurant. Room Controllers serve as the foundation of any DLM system. The room controllers manage communication between DLM devices, control line voltage outputs to lighting loads and provide low voltage power to all connected DLM devices.

WIRING

Control (Low Voltage Class 2) Wiring

All DLM devices are connected to the room controller(s) using WattStopper LMRJx cables through a free-topology DLM Local Network. Therefore, any DLM device can connect to any other DLM device that has an open RJ-45 receptacle. The illustrations in this guide show just a few examples of how the DLM devices can be connected to create the DLM Local Network.

The LMRJ cables are sold in various lengths. Review the distances between devices to ensure you have the proper cable lengths for your project. Avoid using splitters and couplers whenever possible. Most DLM devices have two or three RJ-45 receptacles. Daylighting and corner mount occupancy sensors have only a single RJ-45 plug, so a cable splitter or coupler (included) is required to connect them to the DLM Local Network.

The DLM Local Network can support up to 1,000 feet of LMRJ cable, up to 24 devices, including up to a total of four LMRC-10x room controllers and/or LMPL-101 plug load controllers. The maximum cable between devices on the DLM Local network is 300'. 150' of cable is allowed per device; a two device network is allowed 300', 3 devices 450' etc., up to 1,000' maximum.

Line and Load (High Voltage) Wiring

All line voltage flying leads on room and plug load controllers are #12 AWG. Wire connections shall be suitable for the wire gauge (lead and building wiring) employed. **Installation shall be in accordance with all applicable regulations, wiring practices, and NEC codes.**

SETUP AND CONFIGURATION

Plug n' Go™ (PnG): Default Operation

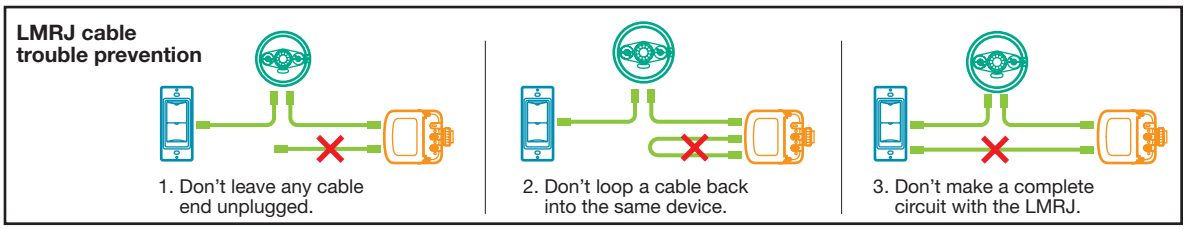
Upon initial power up, the DLM system automatically identifies the devices on the Local Network then enters the WattStopper patented Plug n' Go™ configuration to allow basic operation of all DLM devices. In most applications the relationship between quantity of loads, switches and occupancy sensors will not require any adjustments.

PnG sets up the most energy efficient control strategy. For example, if at least one switch and one occupancy sensor are on the DLM Local Network to control two loads, the system defaults to auto ON 50%. Load 1 turns ON automatically with occupancy and load 2 must be turned ON manually from the switch. Both loads turn OFF when the sensor time delay expires. If a two-button switch is used, PnG operation is the same except that the loads are independently controlled from separate buttons.

PnG operation depends on the types of devices installed. A description of system PnG operation for each device is included in the device section.

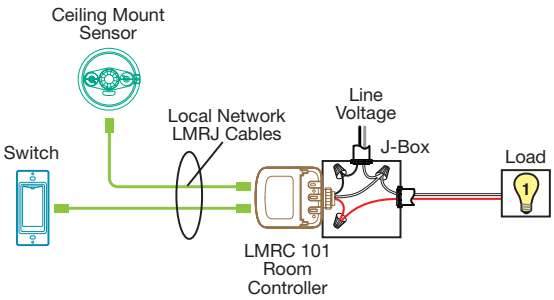
Push n' Learn™ (PnL): Custom Operation

A configuration (Config) button on most DLM devices allows easy access to the WattStopper patented Push n' Learn™ technology to modify system operation. Functionality of the Config button is standardized throughout the DLM product line, as is the operation of the Config LED indicators. In addition, the Configuration Tool provides remote infrared access to PnL and sensor adjustment parameters.



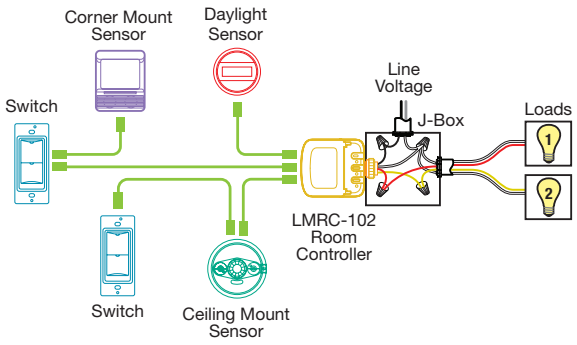
DIGITAL LIGHTING MANAGEMENT LOCAL NETWORK LAYOUT EXAMPLES

One load DLM Local Network configuration example



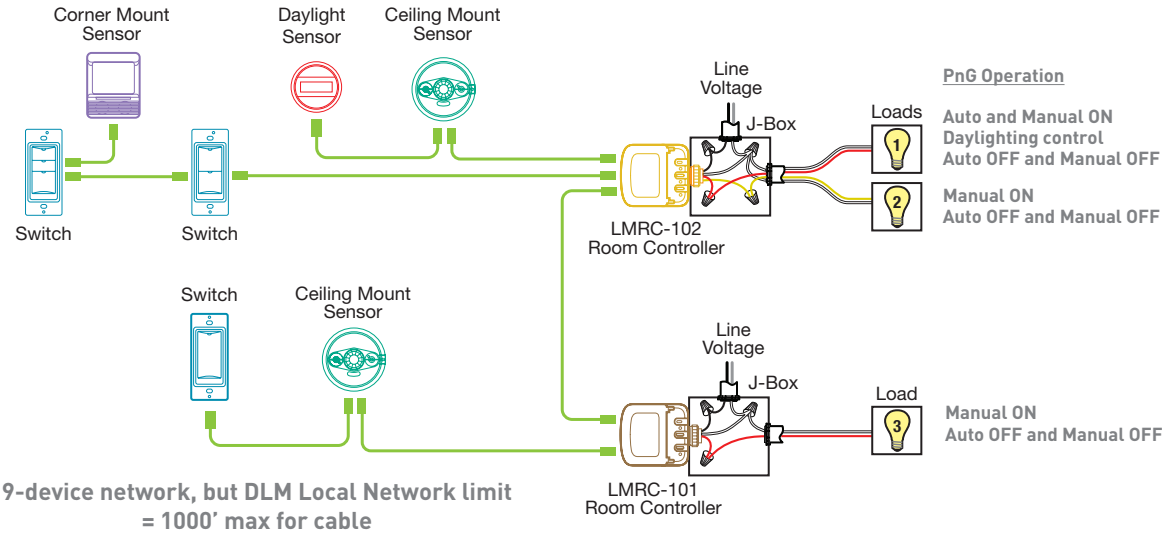
3-device network, 150' for each device
= 450' max for cable
Max cable between any two devices is 300'

Two load DLM Local Network configuration example



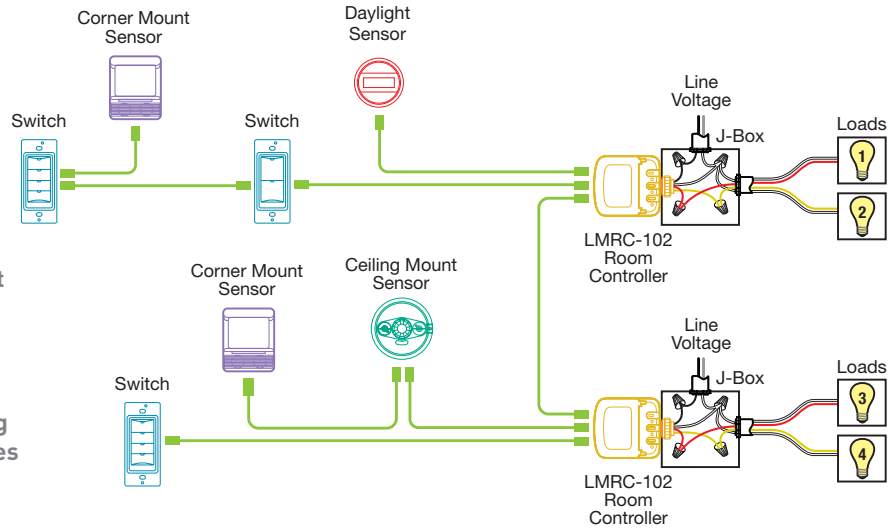
6-device network, 150' for each device
= 900' max for cable
Max cable between any two devices is 300'

Three load DLM Local Network configuration example



9-device network, but DLM Local Network limit
= 1000' max for cable
Max cable between any two devices is 300'

Four load DLM Local Network configuration example



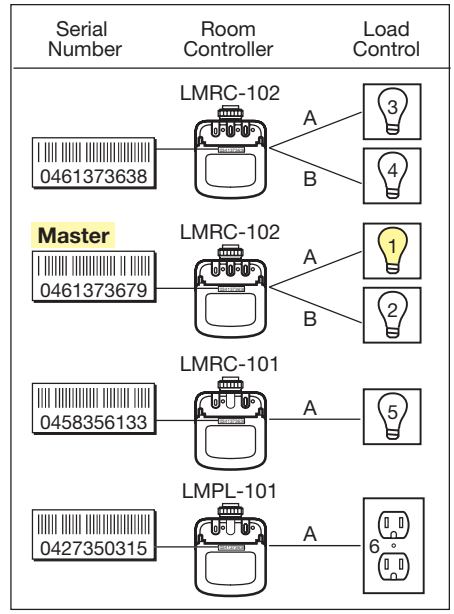
DLM Local Network limit
= 1000' max for cable
Max cable between any
two devices is 300'

Max 24 devices, including
up to four LMRC-100 series
controllers.

LMRC-101 AND LMRC-102 ROOM CONTROLLERS

LMRC-101/102 Connectivity

The LMRC-101 and LMRC-102 are powered by 120/230/277VAC, 50/60Hz. Up to four room controllers can be interconnected on the DLM Local Network. The LMRC-101 has one load controlling relay and the LMRC-102 has two load controlling relays (Load A and Load B). Connect only one 120VAC or one 277VAC circuit to a room controller. If there are mixed voltages in the room, install at least two room controllers.



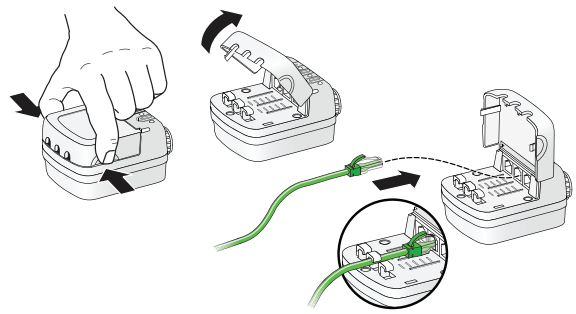
Load Control Arbitration

To take full advantage of automatic PnG configuration, review these simple rules about load control arbitration.

After the room controllers are connected to the DLM Local Network and powered up they automatically negotiate to determine which controller becomes the Master and to assign the load numbers for each relay on the DLM Local Network.

The **Master** is the controller with the most load relays and the highest serial number.

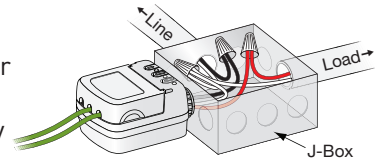
Controllers with more than one relay are labeled with sequential letters to identify loads. For example, the LMRC-102 has loads A and B, which, if it is the Master, would be Load 1 and Load 2 on the DLM Local Network. The LMRC-102 with the next highest serial number on the DLM Local Network would have Load 3 connected to its A load wire and Load 4 on its B load wire, and so forth.



Low Voltage Wiring

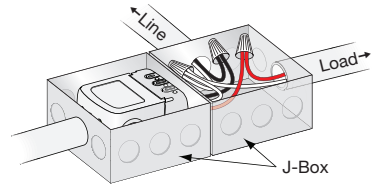
Each room controller provides up to 150mA @ 24VDC to class 2 devices (sensors, switches, etc.) on the DLM Local Network via LMRJ-x Cat 5e cables. The available current is cumulative, meaning that each room controller contributes to the power available on the DLM Local Network. A DLM Local Network, fully loaded with four room controllers carries 600mA.

To access the LMRJ receptacles, lift the "clamshell" cover on the controller. Plug the cables into the receptacles then secure them under the strain relief hooks. Cover any unused receptacle with the black rubber plug provided.



Mounting and Placement

Room controllers can mount external to a junction box in the plenum space, or they can mount inside a 4" x 4" junction box. Each room controller has a threaded nipple that fits into a ½" knockout.



Power Up Functionality

On power up, the DLM system automatically uses the PnG configuration appropriate to the number of loads and types of devices on the DLM Local Network. In common applications, the relationship between quantity of loads, switches and occupancy sensors won't require any adjustments.

To customize operation of the system see **PUSH n' LEARN**.

LMRC-101 AND LMRC-102 continued

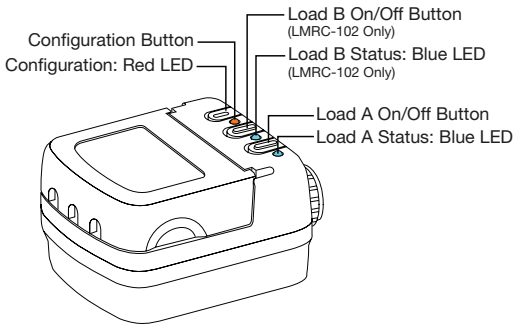
LED Indicators

The room controllers contain two different colored LEDs. Blue status LEDs indicate the relay status; they are solid ON when the relay is closed and OFF when the relay is open.

A red LED blinks about once every three seconds when the room controller is in standard operating mode. When the room controller enters Push n' Learn mode, the red LED blinks twice each second.

Load ON/OFF Button

Pressing the Load ON/OFF button toggles the state of the associated relay to turn the load ON or OFF. It temporarily overrides automatic control signals from an occupancy sensor or a daylight sensor. The Load ON/OFF button is used primarily during installation to verify proper operation of the relay.



Specifications.

Input Voltage:
- LMRC-101 & LMRC-102 . . . . . 120VAC or 230VAC or 277VAC, 50/60Hz
- LMPL-101 . . . . . 120VAC, 50/60Hz

Load Ratings:
- Incandescent. . . . . 20A @ 120VAC
- Ballast . . . . . 20A @ 120/277VAC
- Motor . . . . . 1Hp @ 120/240VAC

Output . . . . . 150mA @ 24VDC

Environment . . . . . For Indoor Use Only, Plenum Rated
- 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)

Each LMRC-100 series room controller (or LMPL-101) adds 150mA of power to the DLM Local Network: 1 LMRC-100 series = 150mA, 2 = 300mA, 3 = 450mA, 4 = 600mA (maximum 4).

When installing multiple controllers, it is best practice to spread them throughout the DLM Local Network with devices connected to each controller, rather than all the controllers at one end with LMRC cable connections only to other controllers.

LMPL-101 PLUG LOAD CONTROLLER

With the exception of the features described below, the LMPL-101 has the same mechanical form and features as the LMRC-101.

LMPL-101 Connectivity

The LMPL-101 is powered by 120VAC, 50/60Hz. The LMPL-101 counts as one of the four controllers that can be interconnected on the DLM Local Network. The LMPL-101 has one load controlling relay intended for connection to an electrical wall outlet circuit for plug load control.

Power Up Functionality

Upon initial power up, the plug load circuit connected to the LMPL-101 is automatically controlled by all occupancy sensors on the DLM Local Network; it is not bound to any switch button. After the last occupancy sensor's time delay expires, the LMPL-101 shuts OFF the plug load circuit.

LMSW-101, 102, 103, 104 & 108

Current Consumption 5mA

For Indoor Use Only

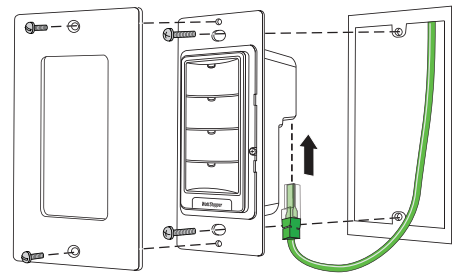
Unit Description

The LMSW-10x series are DLM low voltage momentary switches. They operate on 24VDC supplied by WattStopper Room Controllers. The switches communicate with other DLM devices over the DLM Local Network. Each switch has two RJ-45 ports for DLM Local Network connections.

Mounting the Switch

Pull the LMRJ Cat 5e cable(s) into the top of the wall box. Plug the RJ-45 connector(s) into the switch, looping at the rear bottom of the switch.

Mount the switch using the holes that align with a standard single gang electrical box.

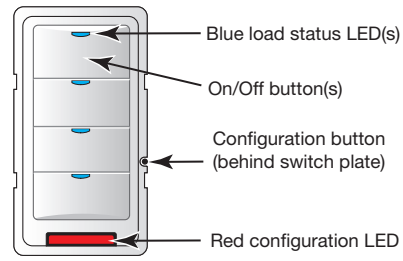


LED Indicator

The LMSW-10x contains two different types of LEDs.

Each button has a Blue load status LED. The LED is solid ON when the load bound to that button is turned ON, and OFF when the load is OFF.

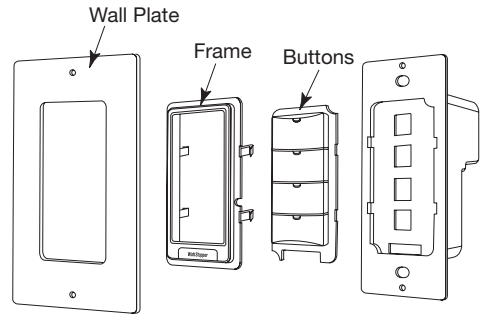
A red LED located at the bottom of the switch is the Configuration LED used for Push n' Learn. This red LED remains OFF in standard operating mode and blinks when the system is in PnL mode.



Optional Trim Color Change and Engraving Change

An optional trim color kit is available so that if the room color scheme changes, the switch color can also change.

1. Remove the wall plate.
2. Push in tabs on side of frame to remove.
3. Remove the buttons and replace with desired buttons.
4. Replace frame by lining up tabs and snapping on.



Power Up Functionality

Upon initial power up, the system automatically enters the default PnG configuration allowing immediate operation. In most common applications, the relationship between quantity of loads, switches and occupancy sensors does not require any adjustments.

Plug n' Go Operation

Each button is sequentially assigned to a load. (Plug loads are not bound to a button.)

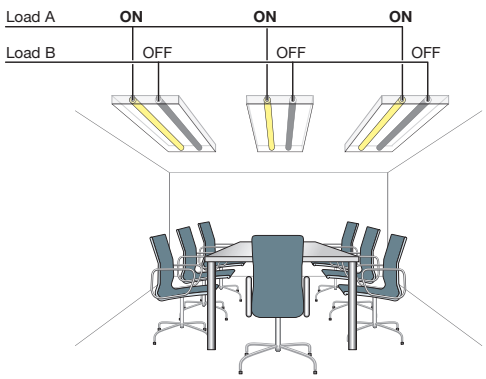
- If the number of buttons is greater than the number of loads, the extra button(s) do nothing and blink when pressed.
- If the number of buttons is less than the number of loads, the last button controls all remaining loads.

Pressing a switch button toggles the room controller relay, turning loads ON/OFF.

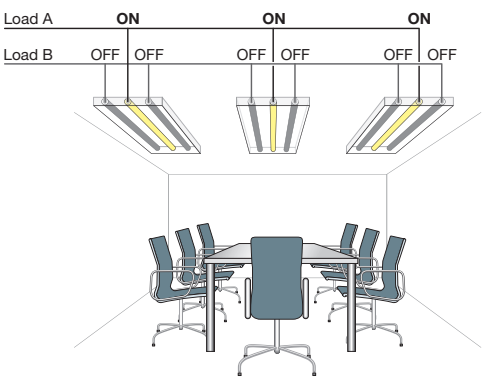
With the default PnG configuration, if an occupancy sensor is connected to the DLM Local Network with LMSW switches, Load 1 operates in Auto-ON mode and all other loads operate in Manual-ON mode. If there is only one load and it is connected to an LMRC-101, it defaults to Manual-ON. All loads turn OFF automatically when the sensor time delay expires.

The illustrations below show various load circuit examples that can optimize energy savings using PnG configuration while maintaining occupant satisfaction.

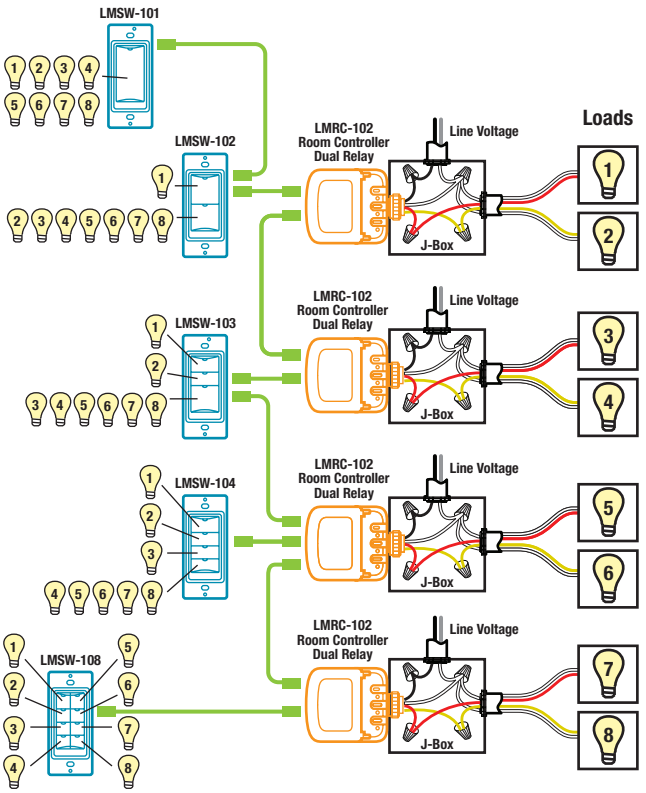
Bi-Level Auto-ON 50%



Bi-Level 33% ON



Plug n' Go Load Binding



Unit Adjustment - Push n' Learn (PnL)

To change the binding relationship between switch buttons and loads:

Step 1: Enter Push n' Learn

Using a pointed tool, press and hold the Configuration button for 3 seconds.

The Red LED on the LMSW switch begins to blink rapidly. Release the configuration buton. The Red LED on ALL other communicating devices begins to blink rapidly. After 1 second, load #1 turns ON. **All switch buttons that are bound to this load have their blue LED solid On.**

Step 2: Load selection

Press and release the Configuration button to step through the loads. As each load turns ON note which switch buttons are showing the blue LED.

To **unbind** a switch button from a load, press the switch button while its blue LED is ON. The blue LED turns OFF to indicate the button no longer controls the load that is currently ON.

To **bind** the switch button to the load that is currently ON, press the switch button. Its blue LED illuminates indicating that it controls the load that is currently ON.

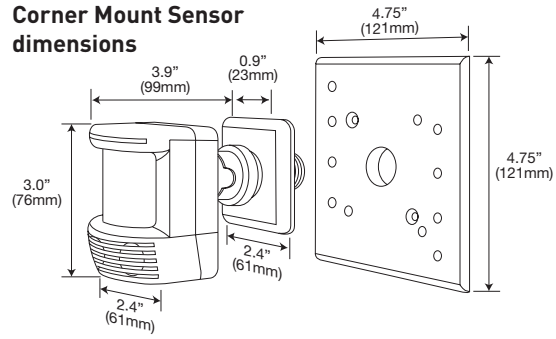
Step 3: Exit Push n' Learn

Press and hold the Configuration button until the red LED turns off, approximately 3 seconds.

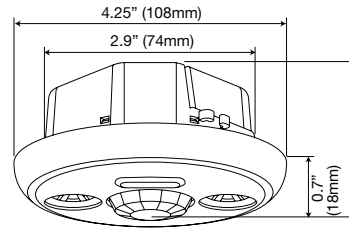
SENSOR OPERATION OVERVIEW

WattStopper DLM occupancy sensors operate on 24VDC supplied by WattStopper Room Controllers. Every sensor communicates with other DLM devices over the DLM Local Network. Sensors are available with passive infrared, ultrasonic and dual-technology detection methods. They are available in a low-profile ceiling mount style, and in a pivoting corner-mount design that is suitable for mounting on either a wall or ceiling. Each type of sensor offers numerous features that can be combined to create the ideal custom control system.

Corner Mount Sensor dimensions



Ceiling Mount Sensor dimensions



Power Up Functionality

There is a 30 second warm up period. Upon establishing communications, the sensors' red LEDs become active and each sensor displays its firmware version on its LCD screen. The detection LEDs start blinking with occupancy detection.

PnG Load Parameters

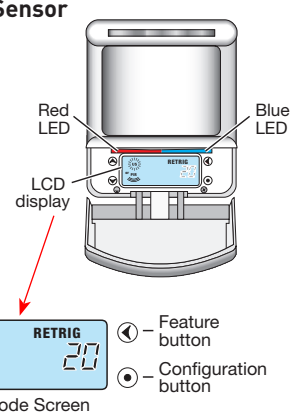
	Load 1	Loads 2-8 or more***	Plug Load
ON Mode Operation*	**AUTO-ON** **	**MANUAL-ON** if switch is connected. **AUTO-ON** if switch is not connected.	**AUTO-ON**
Blink Warning (B-W)	OFF	OFF	OFF
Daylighting (DL)	ON	OFF	OFF

* Auto-OFF is enabled according to the sensor Time delay when a sensor is bound to the load, regardless of whether the load was turned ON automatically with occupancy or manually using a switch.
** Manual-ON if sensor, switch and only one LMRC-101 on Local Network.
*** Max 8 loads using LMRC-100 series room controllers.

Plug n' Go Operation

Upon initial power up, the system automatically takes inventory of the devices on the DLM Local Network. It sets up a Plug n' Go™ (PnG) configuration allowing immediate operation of devices in the most energy efficient manner. In most common applications, the relationship between loads, switches and occupancy sensors does not require any adjustments.

Corner Mount Sensor User Interface

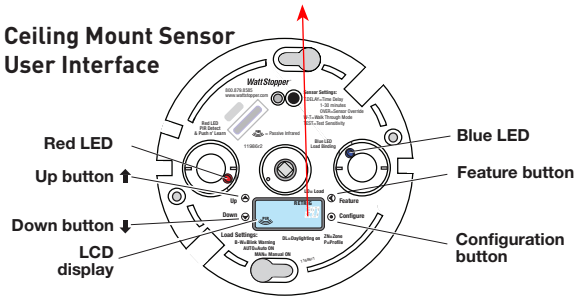


LCD Display and Control Buttons

The sensors share a common user interface consisting of an LCD screen and a set of control buttons. On corner mount sensors, the interface is located behind a hinged assembly that swings downward. On ceiling sensors the interface is located underneath a removable cover.

Sensor displays and adjustments are described in **Sensor Parameter Adjustments** in the **Sensor Programming Section.**

Ceiling Mount Sensor User Interface



Feature button - While the sensor is operating in run mode, press to enter sensor parameter programming and view customizable features.

Up ↑ and Down ↓ buttons - Press to view/change selections for sensor parameters. While in run mode turns ON/OFF the load(s) bound to sensor.

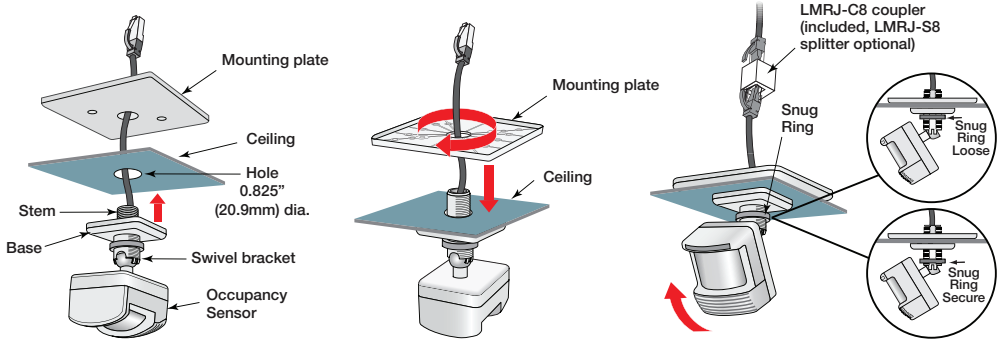
Config button - Press to enter Push n' Learn mode to re-configure load bindings and load control parameters.

OCCUPANCY SENSOR SPECIFICATIONS

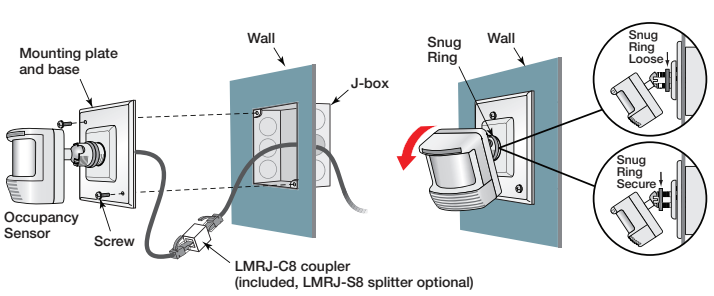
Voltage 24VDC
Current Consumption:
LMDX-100, LMDC-100, LMUC-100-2 . . . . . 20mA
LMPX-100 series, LMPC-100 series 7mA
Power Supply . . . . . WattStopper Class 2 Room Controllers
DLM Local Network connection:
Corner mount sensors. . . . . RJ-45 plug and 8-pin coupler (splitter optional), non-plenum rated
Ceiling mount sensors. . . . . two RJ-45 receptacles
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)

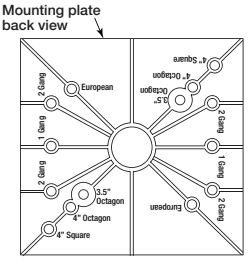
CORNER MOUNT SENSOR MOUNTING INSTRUCTIONS

Ceiling Mounted



Wall Mounted

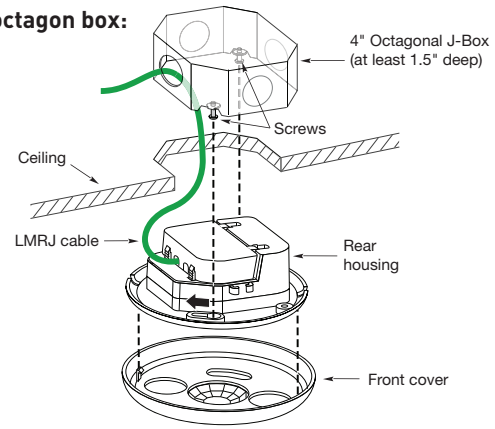




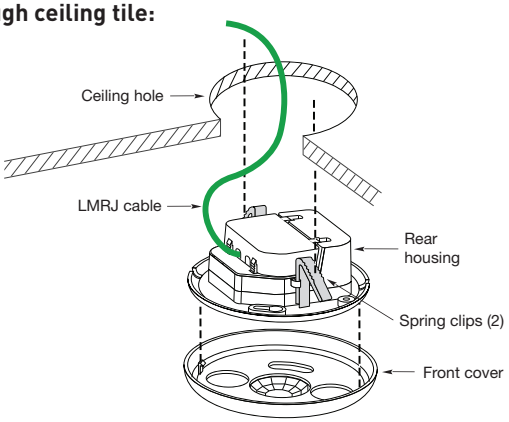
Using a screwdriver, punch out the holes for the corresponding junction box.

CEILING MOUNT SENSOR MOUNTING INSTRUCTIONS

To octagon box:



Through ceiling tile:



LMDX-100 DIGITAL DUAL TECHNOLOGY CORNER MOUNT SENSOR

Unit Description

LMDX-100 Digital Dual Technology Corner Mount Occupancy Sensors combine passive infrared (PIR) and ultrasonic technologies into one unit.

LED Indicators

The LMDX-100 contains two different LEDs.

- Blue LED indicates Ultrasonic detection and load binding.
- Red LED indicates PIR detection and Push n' Learn.

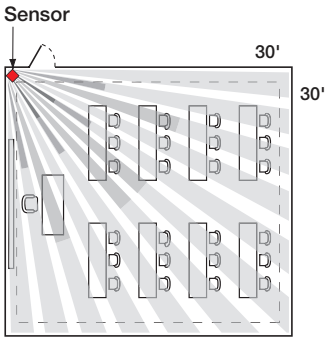
Sensor Parameter Defaults

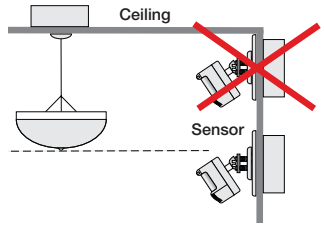
T-DELAY	**Time Delay**	20 minutes
PIR	Passive Infrared Sensitivity	90%
US	Ultrasonic Sensitivity	70%
W-T	Walk Through	OFF
TRIG	Initial Occupancy	PIR and Ultrasonic
RETRIG	Maintain Occupancy	PIR or Ultrasonic

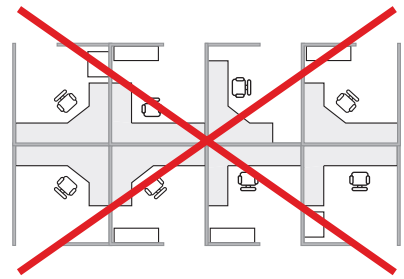
To view and change sensor parameter settings see **Sensor Parameter Adjustments** in the **Sensor Programming Section.**

Placement Guidelines

Depending upon obstacles such as furniture or partitions, the area of coverage may be less or more than the sensing distances shown in the coverage pattern. This must be considered when planning the number of sensors and their placement. It is also recommended to place the sensor 4 to 6 feet away from air supply ducts. The PIR must have clear line of sight to detect occupancy. Make sure the sensor is not blocked. The LMDX-100 is designed for a ceiling height of about 8-10 feet. Mounting above or below this range will significantly affect the coverage patterns.

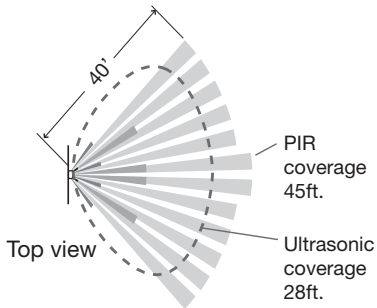


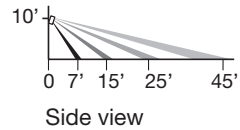




Coverage Patterns

Coverages shown are maximum and represent half-step walking motion. Under ideal conditions with no barriers or obstacles, coverage for half-step walking motion can reach up to 2000 square feet, while coverage for typical desktop activity can reach up to 1000 square feet.





LMPX-100 DIGITAL PIR CORNER MOUNT SENSOR

Unit Description

The LMPX-100 Digital PIR Corner Mount Occupancy Sensors feature passive infrared (PIR) detection technology. LMPX-100 series sensors come in 3 different lens styles for various applications.

LED Indicators

- Blue LED indicates load binding.
- Red LED indicates PIR detection and Push n' Learn

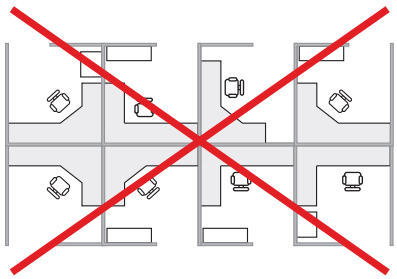
Sensor Parameter Defaults

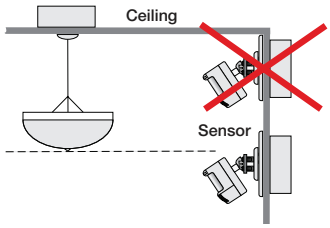
T-DELAY	**Time Delay**	20 minutes
PIR	Passive Infrared Sensitivity	90%
W-T	Walk Through	OFF

To view and change sensor parameter settings see **Sensor Parameter Adjustments** in the **Sensor Programming Section.**

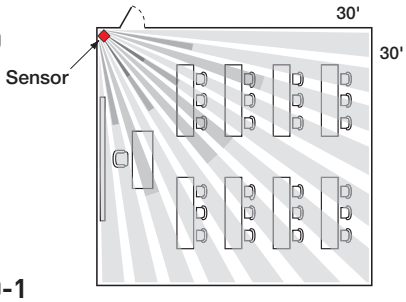
Placement Guidelines

Depending upon obstacles such as furniture or partitions, the area of coverage may be less or more than the sensing distances shown in the coverage pattern. This must be considered when planning the number of sensors and their placement. Be sure to place the sensor at least 4 to 6 feet away from air supply ducts. The LMPX-100 and LMPX-100-1 are designed for a ceiling height of about 8-10 feet. Mounting above or below this range will significantly affect the coverage patterns (see next page).

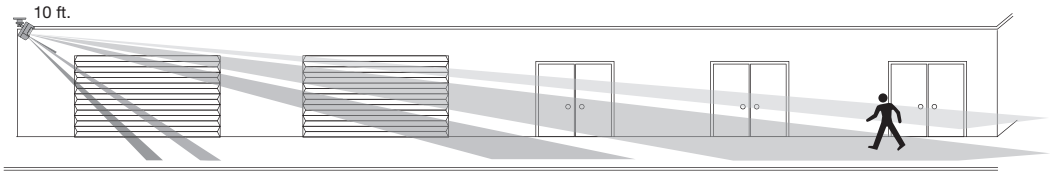




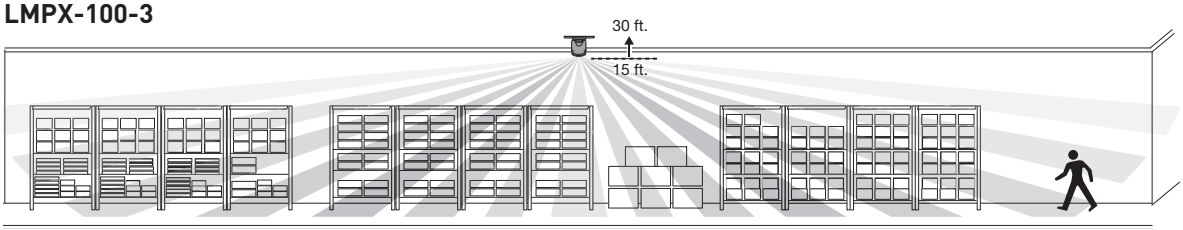
LMPX-100



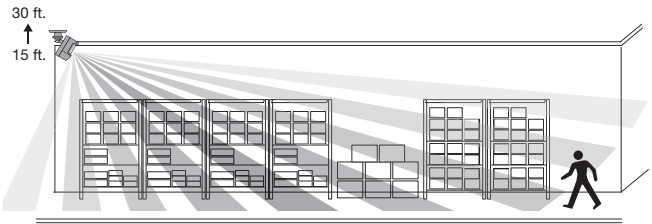
LMPX-100-1



LMPX-100-3



LMPX-100-4



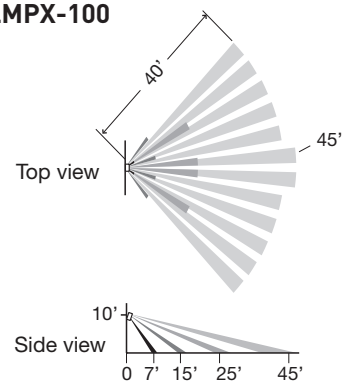
Mount LMPX-100-3 and LMPX-100-4 sensors at least 15' and not more than 30' above the floor. To suspend the sensor from a fixture or solid construction material, use the MB-1 Sensor Bracket.

LMPX-100 continued

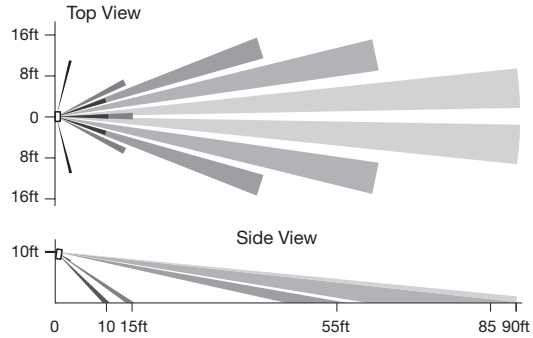
Coverage Patterns

Coverages shown are maximum and represent half-step walking motion. Under ideal conditions with no barriers or obstacles, coverage for half-step walking motion can reach up to 2000 square feet, while coverage for typical desktop activity can reach up to 1000 square feet.

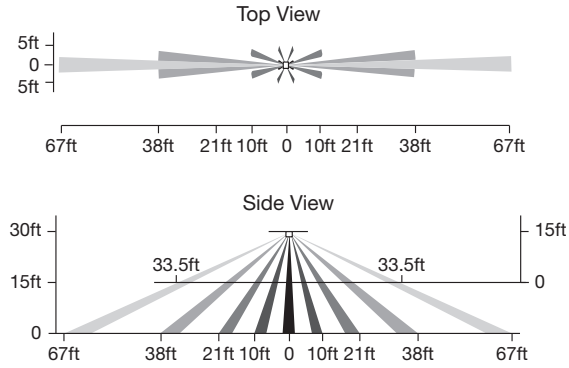
LMPX-100



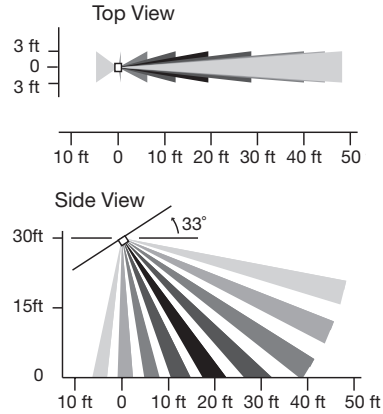
LMPX-100-1



LMPX-100-3



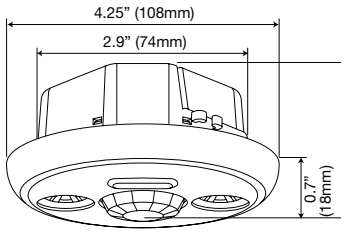
LMPX-100-4



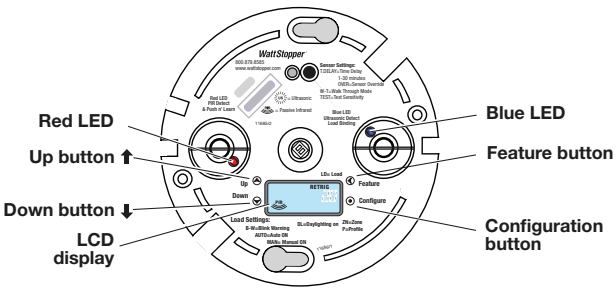
LMDC-100 DIGITAL DUAL TECHNOLOGY CEILING MOUNT SENSOR

Unit Description

The WattStopper LMDC-100 Digital Dual Technology Ceiling Mount Occupancy Sensor combine passive infrared (PIR) and ultrasonic technologies into one unit.



LED Indicators



The LMDC-100 contains two different LEDs:

- Blue LED indicates Ultrasonic detection and load binding.
- Red LED indicates PIR detection and Push n' Learn.

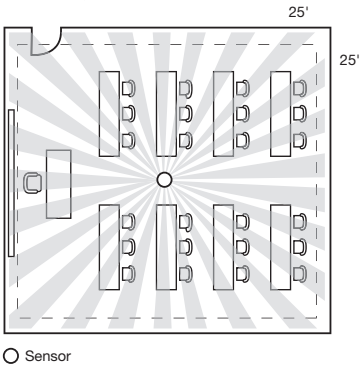
Sensor Parameter Defaults

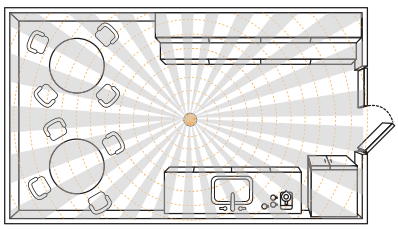
T-DELAY	Time Delay	20 minutes
PIR	Passive Infrared Sensitivity	90%
US	Ultrasonic Sensitivity	70%
W-T	Walk Through	OFF
TRIG	Initial Occupancy	PIR and Ultrasonic
RETRIG	Maintain Occupancy	PIR or Ultrasonic

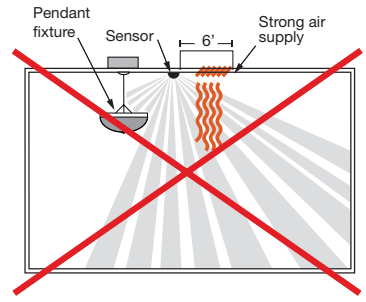
To view and change sensor parameter settings see **Sensor Parameter Adjustments** in the **Sensor Programming Section.**

Placement Guidelines

Depending upon obstacles such as furniture or partitions, the area of coverage may be less or more than the sensing distances shown in the coverage pattern. This must be considered when planning the number of sensors and their placement. It is also recommended to place the sensor 4 to 6 feet away from air supply ducts. The LMDC-100 is designed for a ceiling height of about 8-10 feet. Mounting above or below this range will significantly affect the coverage patterns.



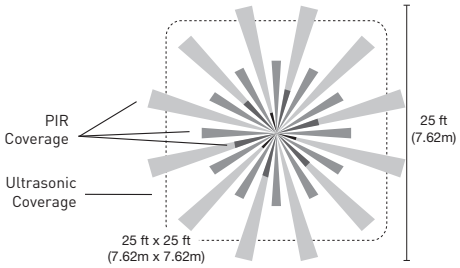




Mount sensor at least 6' away from hot air supply. Avoid obstacles that block sensor's line-of-sight.

Coverage Patterns

Coverages shown are maximum and represent half-step walking motion. Under ideal conditions with no barriers or obstacles, coverage for half-step walking motion can reach up to 2000 feet, while coverage for typical desktop activity can reach up to 1000 feet.



LMPC-100 SERIES DIGITAL PIR CEILING MOUNT SENSOR

Unit Description

The LMPC-100 series Digital PIR Ceiling Mount Occupancy Sensors feature passive infrared (PIR) detection technology. They are available in two different lens styles for various applications.

LED Indicators

The LMPC-100 contains two different LEDs;

- Blue LED indicates load binding.
- Red LED indicates PIR detection and Push n' Learn.

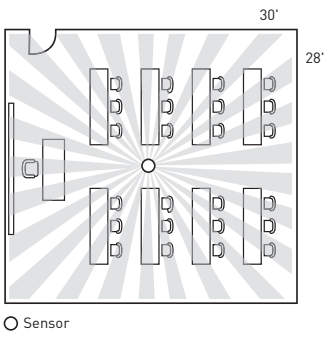
Sensor Parameter Defaults

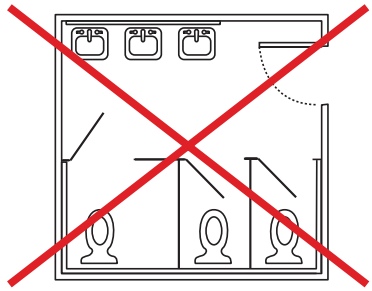
T-DELAY	**Time Delay**	20 minutes
PIR	Passive Infrared Sensitivity	90%
W-T	Walk Through	OFF

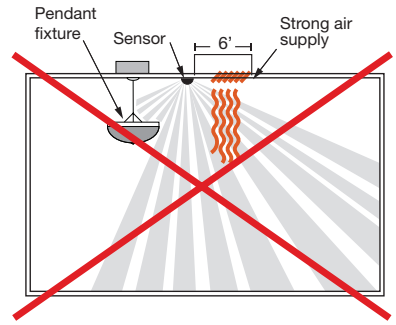
To view and change sensor parameter settings see **Sensor Parameter Adjustments** in the **Sensor Programming Section.**

Placement Guidelines

Depending upon obstacles such as furniture or partitions, the area of coverage may be less or more than the sensing distances shown in the coverage pattern. This must be considered when planning the number of sensors and their placement. It is also recommended to place the sensor 4 to 6 feet away from air supply ducts. The LMPC-100 and LMPC-100-1 are designed for a ceiling height of about 8-10 feet. Mounting above or below this range will significantly affect the coverage patterns.





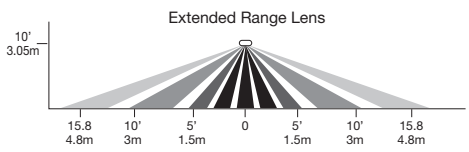


Mount sensor at least 6' away from hot air supply. Avoid obstacles that block sensor's line-of-sight.

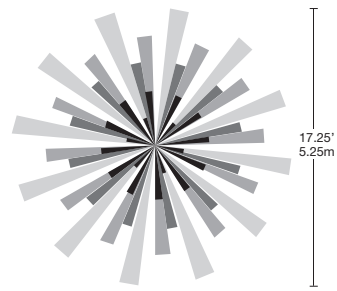
Coverage Patterns

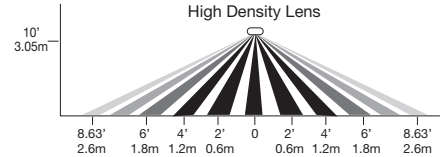
Coverages shown are maximum and represent half-step walking motion. Under ideal conditions with no barriers or obstacles, coverage for half-step walking motion can reach up to 2000 feet, while coverage for typical desktop activity can reach up to 1000 feet.

LMPC-100



LMPC-100-1



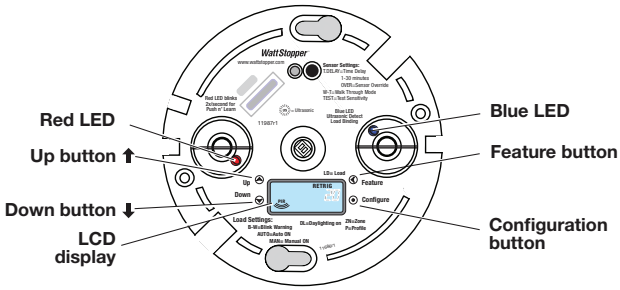


LMUC-100-2 DIGITAL ULTRASONIC CEILING MOUNT SENSOR

Unit Description

The LMUC-100-2 Digital Ultrasonic Corner Mount Occupancy Sensor features ultrasonic detection technology.

LED Indicators



Sensor Parameter Defaults

T-DELAY	Time Delay	20 minutes
US	Ultrasonic Sensitivity	70%
W-T	Walk Through	OFF

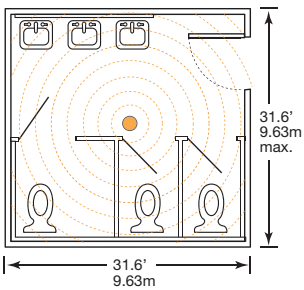
To view and change sensor parameter settings see **Sensor Parameter Adjustments** in the **Sensor Programming Section.**

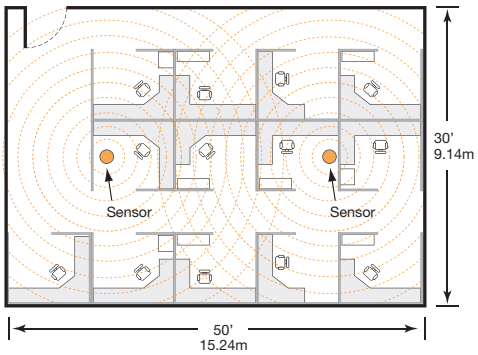
The LMUC-100 has two different LEDs:

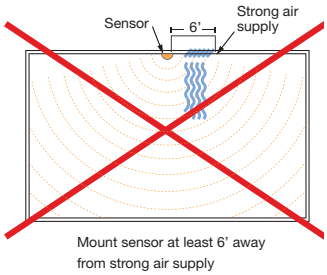
- Blue LED indicates Ultrasonic detection and load binding.
- Red LED indicates Push n' Learn.

Placement Guidelines

Depending upon obstacles such as furniture or partitions, the area of coverage may be less or more than the sensing distances shown in the coverage pattern. This must be considered when planning the number of sensors and their placement. It is also recommended to place the sensor 4 to 6 feet away from air supply ducts. The LMUC-100-2 is designed for a ceiling height of about 8-10 feet. Mounting above or below this range will significantly affect the coverage patterns.

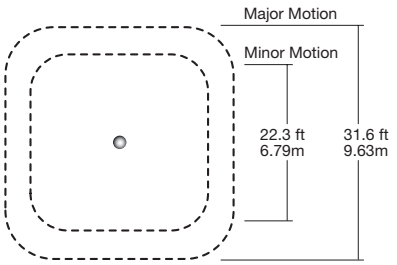






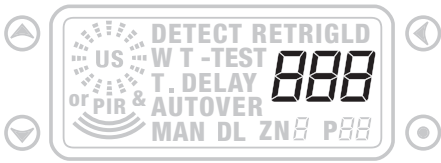
Coverage Patterns

Coverages shown are maximum and represent half-step walking motion. Under ideal conditions with no barriers or obstacles, coverage for half-step walking motion can reach up to 1000 square feet, while coverage for typical desktop activity can reach up to 500 square feet.

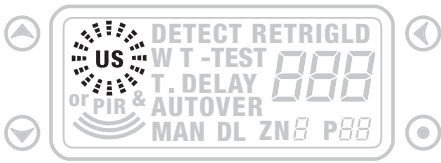


LCD DISPLAY OVERVIEW - ABBREVIATIONS

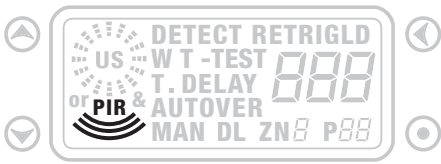
Digital Readout: Time delay minutes and seconds, load number, status



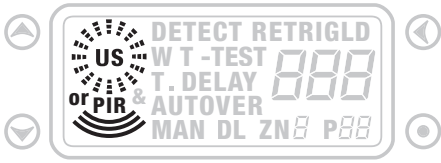
Ultrasonic



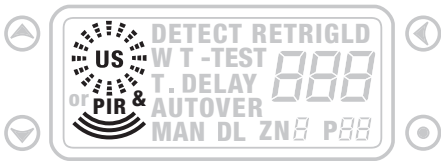
Passive Infrared



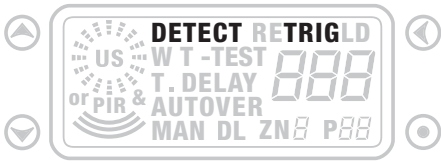
Ultrasonic or Passive Infrared



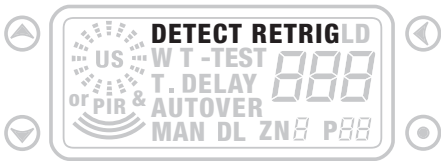
Ultrasonic and Passive Infrared



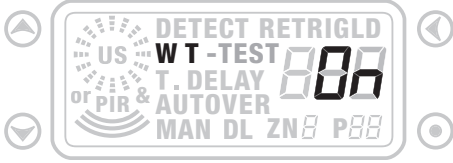
Detect Trigger - Initial Occupancy



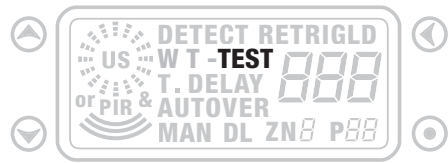
Detect Retrigger- Maintain Occupancy



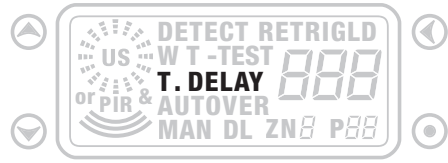
Walk-Through Enabled



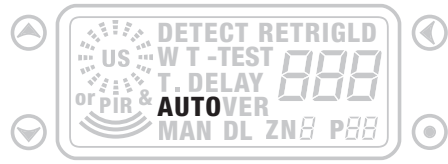
Test Mode



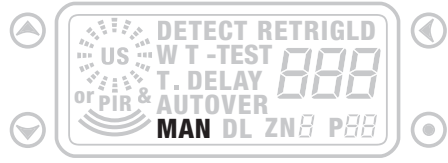
Time Delay



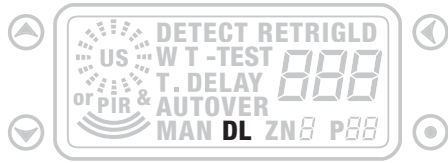
Auto ON Enabled



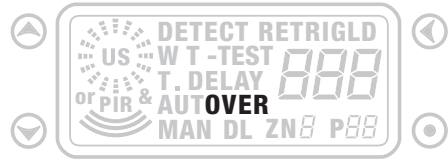
Manual ON Enabled



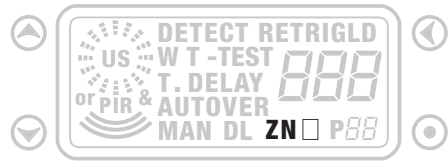
Daylighting Enabled



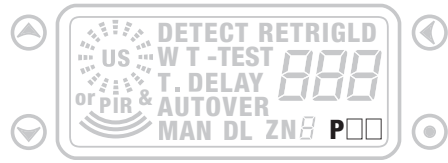
Override



Zone



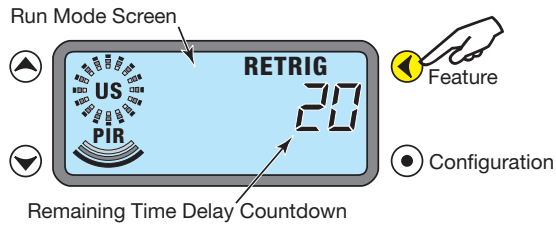
Profile



SENSOR PARAMETERS ADJUSTMENT

View Sensor Settings

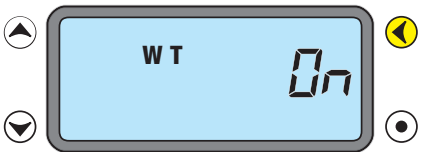
To view the sensor settings, press quickly on the "Feature" button to cycle through each sensor parameter setting. Pressing and holding the Feature button for 3 seconds at any parameter brings you back to the Run Screen. In Run Screen the "up" button turns ON all loads bound to the sensor. The "down" button turns OFF all loads bound to the sensor.



Sensor Parameters Adjustment

Step 1: Cycle to the sensor settings. Press quickly on the "Feature" button to cycle to the sensor settings you wish to modify.

Step 2: Modify current sensor parameter settings. Once a parameter is selected, use the up/down buttons to adjust its value.



Step 3: Lock in setting. Once its value is modified, a quick press on the "Feature" button displays the next available parameter.

Time Delay (T.DELAY)

The sensor holds the lights ON as long as occupancy is detected. (If the user uses a switch to turn the lights OFF the sensor holds the lights OFF until there is no motion and the time delay expires.) The time delay countdown starts when no motion is detected. After no motion is detected for the length of the time delay, the sensor turns the lights OFF. The following selections are available:

- **Fixed time delay:** The LCD display shows a numeric value that ranges from 1 to 30 minutes.
- **Override (OVER):** The LCD display shows "OVER". This setting overrides all sensor functions and bypasses the occupancy control function of the sensor, but still allows the lights to be manually controlled with a DLM switch, if one is installed.

  Note: If in override, to leave the light ON you must use ▲ arrow.

Walk-Through (WT)

Walk-through mode turns the lights OFF three minutes after the area is initially occupied, if no motion is detected after the first 30 seconds. If motion continues beyond the first 30 seconds, the selected time delay applies.

Passive Infrared Sensitivity (PIR)

The LCD display shows PIR and a numeric value ranging from 0 to 100%. You can adjust this value in 10% increments. As soon as a sensor sensitivity parameter is adjusted using the up/down buttons, you can check for detection sensitivity by watching the LEDs. The sensor does not turn loads ON or OFF; instead, it blinks the appropriate LED(s) to indicate detection.

SENSOR PARAMETERS ADJUSTMENT continued

Ultrasonic Sensitivity (US)

The LCD display shows US and a numeric value ranging from 0 to 100%. You can adjust this value in 10% increments. If the sensitivity is 0%, the sensor will not transmit any Ultrasound. As soon as a sensor sensitivity parameter is adjusted using the up/down buttons, you can check for detection sensitivity by watching the LEDs. The sensor does not turn loads ON or OFF; instead, it blinks the appropriate LED(s) to indicate detection.

Test Mode (TEST)

In this mode, the sensor turns the load OFF after 5 seconds and begins a 10 minute test period. During this test period, the time delay is 5 seconds. This short time delay allows performing a sensor walk test to define the optimum sensitivity settings and product orientation. After the 10 minute period is over, the sensor begins operating with the selected time delay.

To activate the test mode: While TEST is in the sensor display, press and hold the Feature button for 3 seconds.

Detection Scheme (Dual Technology sensors only)

Dual technology sensors have 16 logic configurations set by selecting one of four Trigger and one of four Retrigger combinations.

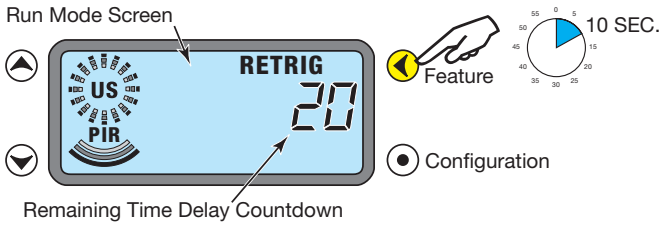
- **Trigger (DETECT TRIG):** The LCD display shows "DETECT TRIG" and options of technologies (see below for details). This is the method that activates a change from "standby" (area unoccupied and time delay has expired) to "occupied" (sensor detects motion).
- **Retrigger (DETECT RETRIG):** The LCD display shows "DETECT RETRIG" and options of technologies. This is the method indicating that the area is still occupied.

For each of these functions, you can select between the following options:

- PIR: requires detection only by PIR
- US: requires detection only by Ultrasonic
- PIR **or** US: requires detection by only one of the technologies
- PIR **&** US: requires detection by both technologies

Sensor Parameter Settings Reset

If the user is not satisfied with the changes made to the sensor parameters, you can reset all sensor parameters to the factory default (time delay, sensitivity, detection scheme and walk-through).



Press and hold the "Feature" button for 10 seconds. The LCD display shows "CLr" to confirm the sensor has been reset.

CODES IN THE DISPLAY

E06 means that the sensor is not bound to any load. **Resolution:** Bind the sensor to a load.

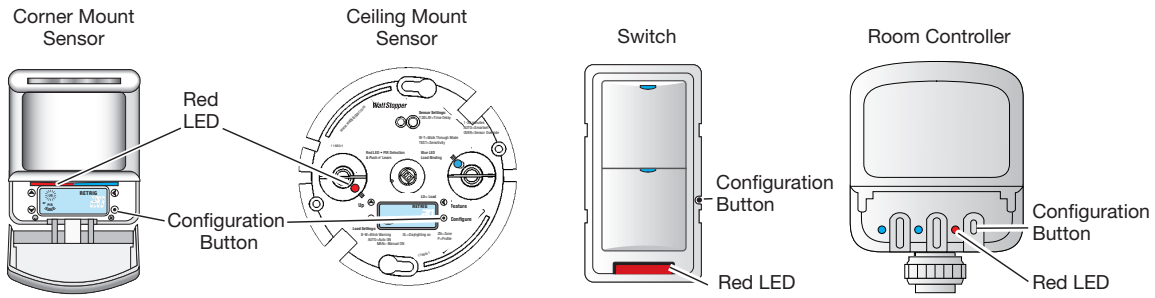
E07 means the Local Network can't be found. **Resolution:** Check LMRJ cable connections.

E08 means that the Local Network current is below 24VDC. **Resolution:** Make sure that the maximum number of devices on the Local Network is within specs for the room controller type(s). Review the Wiring instructions on pages 2 & 3 then check to be sure cable lengths and device spacing recommendations are followed.

Call technical support if you can not clear the code, or have a code that is not listed.

Enter Push n' Learn Mode (PnL)

A Configuration button on DLM communicating devices allows easy access to WattStopper's patented Push n' Learn™ technology to modify the system load bindings.



To enter PnL press and hold the Configuration Button on any DLM device. Release the button when the device's Red LED begins blinking (about 3 seconds).

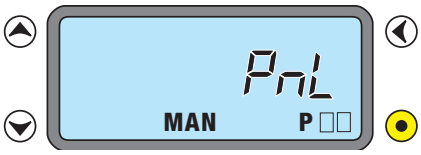
The Red LED begins blinking rapidly (2x/second) on all DLM Local Network Devices. Make adjustments per instructions.

To exit PnL press and hold the Configuration Button until the red LED on the device stops blinking (about 3 seconds).

Making PnL Changes from a Sensor

While any DLM communicating device can initiate PnL, with a sensor installed on the DLM Local Network additional load behaviors can be configured using the sensor's display.

Entering PnL from a sensor:

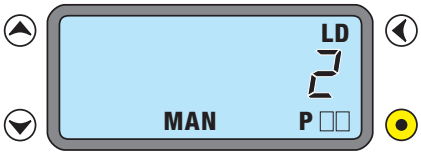


Press and hold on the Configuration button for 3 seconds. The sensor's Red LED begins blinking rapidly (2x/second) on ALL communicating devices connected to the DLM Local Network. These Red LEDs continue to blink until the user exits Push n' Learn mode.

- All loads in the room except load #1 turn OFF immediately after entering Push n' Learn.
- The blue status LED is solid ON at every device bound to the load when the load is ON.

Note: In Push n' Learn, only one load is ON at a time.

Load Selection



A quick press on the Configuration button steps through the loads connected to the DLM Local Network. The LCD display shows the selected load "LD #" and its associated parameters. At this point, one load is ON, and all switch buttons and sensors that are bound to this load have their blue LED solid ON.

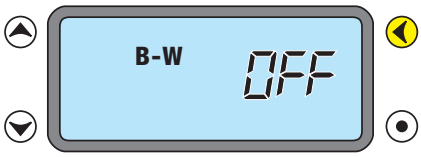
To unbind a sensor from a load, press the Up or Down button, and the blue LED turns OFF to indicate the sensor no longer controls this specific load. To unbind a switch button from a load press the switch button and the blue LED turns OFF.

A quick press on the Configuration button activates the next load.

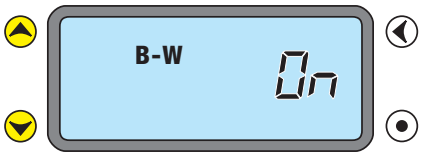
Be sure to EXIT PnL when you are finished making load changes. If you leave the network in PnL, undesired bindings and load parameter setting changes may occur.

PUSH n' LEARN™ continued

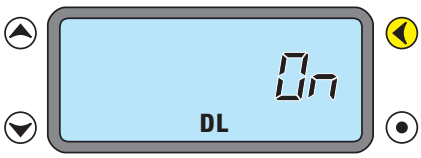
View and Modify Load Parameters



Once a load is selected, use the "Feature" button to cycle through the load parameters. (B-W is Blink Warning.)



Once a parameter is selected, use the "Up/Down" buttons to adjust its value.



Once a parameter value is modified, a quick press on the "Feature" button displays the next available parameter. (DL is DayLighting.)

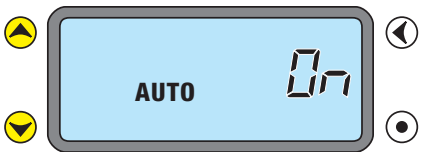
A quick press on the Configuration button displays the next available load and its parameters.

Pressing and holding the Configuration button for three seconds **exits** Push n' Learn.

Load Parameter Options

Operating Mode (AUTO or MAN): For each load, you can select the operating mode and choose between Automatic-ON and Manual-ON. Press the "Up or Down" button to cycle through these two options. When the Automatic-ON mode is selected, the LCD display shows "AUTO". When the Manual-ON mode is selected, the LCD shows "MAN".

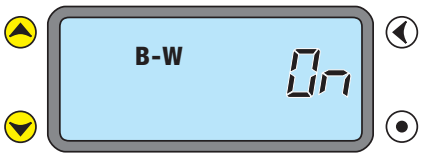
Manual-ON: in this mode, a DLM switch is required to turn ON the load. The sensor is then used to keep the load ON, based on occupancy activity. After the time delays elapses, the switch must be used to turn the load ON, if no movement is detected within the 10 second retrigger period.



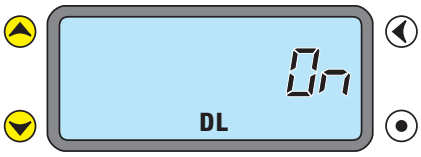
Auto-ON: in this mode, either a DLM occupancy sensor or switch can turn ON the load. A switch provides the following additional functionality:

a) The load can be turned ON by the switch and it stays ON according to the occupancy settings, including time delay. When the load turns OFF due to lack of occupancy detection, the load can be turned ON again by occupancy detection, or by switch activation.

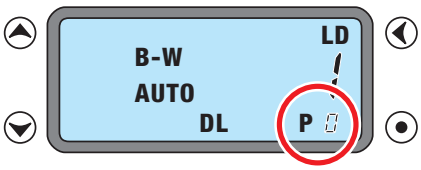
b) When the load is turned OFF manually, the load stays OFF until the sensor time delay expires. Each occupancy detection occurring during the time delay restarts the time delay, keeping the load OFF. After the time delay expires, the sensor reverts to Auto-ON mode and the load turns ON with the next occupancy detection.



Blink Warning (B-W): When enabled "B-W" shows in the display. This function can be either enabled or disabled. When 1 minute is left on the time delay, the load controlled by the sensor turns OFF for 1 second then turns back on. This provides a visual warning before the load(s) are turned OFF by the sensor. By default Blink Warning is disabled (OFF).



Daylighting (DL): When this function is enabled "DL" displays. This function allows specific load(s) to be bound to a DLM daylight sensor, LMLS-10x series. By default Daylighting is enabled for load 1 and disabled for all other loads.



Profile (P): This function can be viewed only and cannot be modified. It is currently not used.

» Reset Options

DEVICE & SYSTEM RESETS

Under some conditions you may want to reset devices, loads, or the entire DLM Local Network to a known state. (To return sensor parameters to default settings - see page 18.)

•Clear Single Device Bindings

From the device you want to clear, press and hold the Configuration button for 10 seconds.
When the LED turns on solid, release the button. At this point, the device is no longer bound to any load.

•Reset Single Device to Plug n' Go Configuration

From the device you want to reset, press and hold the Configuration button for 20 seconds.
The LED turns on solid after 10 seconds; when the LED begins blinking again, release the button. At this point, the device is bound to load(s) according to its PnG default.

•Clear ALL Bindings for ALL Devices on the DLM Local Network

Enter PnL mode.
From any device, press and hold the Configuration button for 3 seconds. When the red LED on the device begins blinking rapidly, release the button. The red LED on every device on the DLM Local Network starts blinking rapidly.

Press and hold the Configuration button for 10 seconds.
When the Red LED turns solid, release the Configuration button. At this point, none of the devices connected to the DLM Local Network are bound to a load.

Reconfigure the system as desired, then exit PnL.

•Reset ALL Devices on the DLM Local Network to Plug n' Go Configuration

Enter PnL mode.
From any device, press and hold the Configuration button for 3 seconds. When the red LED on the device begins blinking rapidly, release the button. The red LED on every device on the DLM Local Network starts blinking rapidly.

Press and hold the Configuration button for 20 seconds.
The red LED turns on solid after 10 seconds; when the LED begins blinking again, release the button. At this point, all devices connected to the DLM Local Network are restored to their Plug n' Go functionality.

Be sure to EXIT PnL. If you leave the network in PnL, undesired bindings and load parameter setting changes may occur. To exit PnL press and hold the Config button until the red light stops blinking, approximately 3 seconds.

MY NOTES

IR-Capable Devices

DLM handheld devices use an infrared (IR) transmitter and receiver to communicate wirelessly with a Digital Lighting Management (DLM) network. A DLM handheld device is battery operated and communicates wirelessly by sending an IR signal to a DLM IR enabled device within its range and line of sight.

Handheld IR devices include controls such as the LMRH-101, LMRH-102 and LMRH-105, as well as the LMCT-100 Digital IR Configuration Tool.

LMRH-101

LMRH-102

LMRH-105

LMCT-100

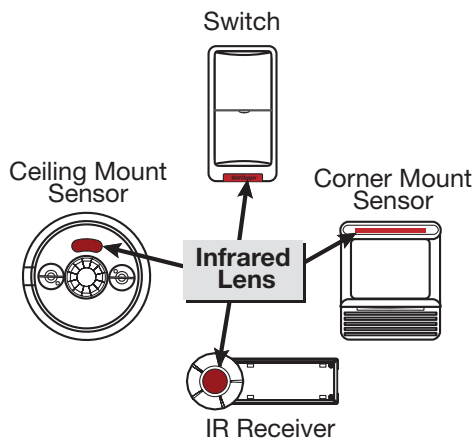
To send signals to the DLM network, the user simply points the handheld remote at any IR enabled DLM device within its range and presses a button. To identify an IR enabled device, look for a dark translucent lens on the face of the device.

Helpful Communication Tips

Infrared signalling can be affected by high ambient light such as direct sunlight, floodlights, and some halogen or fluorescent lamps, as well as plasma screens.

Be sure to point the remote at a DLM IR enabled device that is within range. To test, see if you can put the local network into PnL using the remote from your current position.

- If not successful, move closer to the IR enabled local network device and more directly in front of it, or try pointing toward a different IR enabled device.
- If still not successful, turn OFF bright lights, close blinds and try again.
- If still not successful, the IR lenses on the DLM devices may be dirty. Clean the lenses with a soft material such as an eyeglass lens cleaning cloth.



LMCT-100 DIGITAL IR CONFIGURATION TOOL

The LMCT-100 Digital Configuration Tool is a handheld tool for setup and testing of WattStopper Digital Lighting Management (DLM) devices. It provides wireless access to occupancy and daylighting sensors for setup and parameter changes, WattStopper Push n' Learn™ (PnL) technology for load configuration, switch and dimmer assignment and operating parameter changes.

The LMCT-100's display shows menus and prompts to lead you through each process. The navigation pad provides an intuitive interface to navigate through the customization fields. The LMCT-100 allows modification of the system without requiring ladders or tools; simply with a touch of a few buttons.

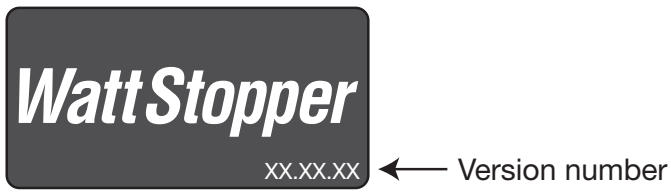
The LMCT-100's IR transceiver allows bi-directional communication between DLM devices and the LMCT-100. Simple menu screens let you see the current status of the system and make sensor and load changes. You can use it to change any of the DLM occupancy sensor parameters such as sensitivity, time delay and more. With the LMCT-100 you can also change load configurations, without any new wiring. For systems including daylighting sensors the LMCT-100 can set or change the daylight level parameters. The LMCT-100 can change dimming system options such as scene assignments, fade rates, scene and load button characteristics, and other options not available through the standard user interface.

The instructions for using the LMCT-100 are provided with the unit. They are also available at www.wattstopper.com. To download the complete user guide, go to: Resources->Downloads->Installation Instructions->Digital Lighting Management.

Depending on the firmware version in the LMCT-100, the Home Menu items may be different than what is shown in the examples below. For example, to access the advanced configuration options for dimming systems, the LMCT-100 must be equipped with version 21 or higher firmware.

The version of firmware in the LMCT-100 displays on the start-up screen when you turn ON the unit.

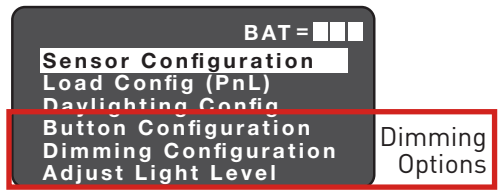
Start-up Screen



Home Menu

Version 03.02.20 or 04.02.20

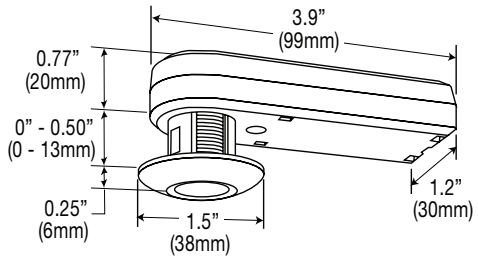
Version 03.02.21 or 04.02.21



LMIR-100 DIGITAL INFRARED RECEIVER

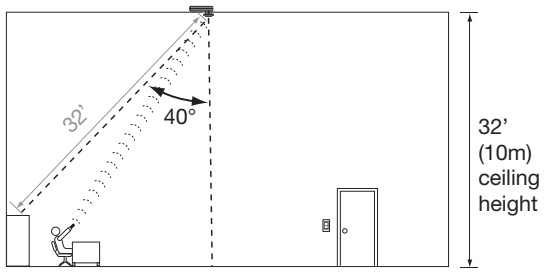
Unit Description

The LMIR -100 Digital IR ceiling mount interface provides even greater flexibility and functionality to the DLM system. The LMIR-100 provides a simple remote IR portal for access by any of the LMRH IR remotes to control loads connected to the DLM system.



Placement Guidelines

The LMIR-100 provides an IR remote interface for DLM devices that are not within line of sight of the user. It accepts commands from DLM IR devices such as hand-held remote controls and forwards them to the DLM system. Choose a place for the LMIR that it is in direct view of the user. Avoid obstruction by objects such as furniture or partitions. It has a 360˚ 30-35 foot (10m) line of sight receiving range.

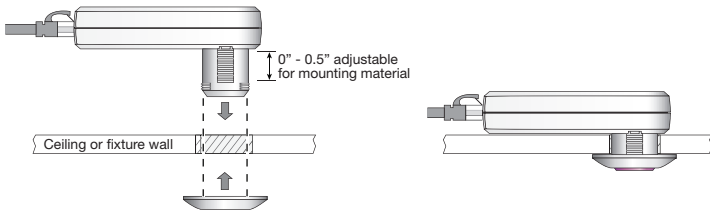


Operation

The LMIR-100 communicates to all other DLM devices connected to the DLM Local Network. Mount the device and connect it to the DLM Local Network. For use with DLM IR handheld remotes.

Mounting Instructions

The device has an adjustable head to accommodate multiple mounting methods and building materials or fixture walls up to 5/8" thickness.



Unit Adjustment

There are no adjustments on the LMIR-100.

Power up functionality

Upon power up the device is ready to receive signals from any of the DLM IR handheld remotes.

Specifications

Input Voltage	24VDC
Current Consumption	5mA
Power Supply	WattStopper Room Controllers
Environment	For Indoor Use Only
Operating Temperature	32° to 131°F (0° to 55°C)
Storage Temperature	23° to 140°F (-5° to 60°C)
Relative Humidity	5 to 95% (non condensing)

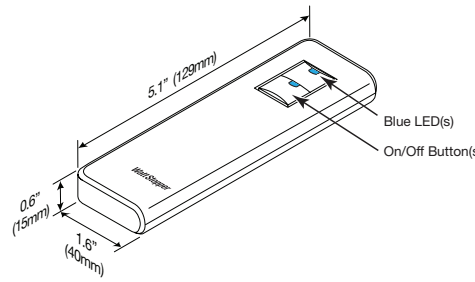
WARNING: DO NOT USE THE DLM SYSTEM TO CONTROL LOADS OTHER THAN LIGHTING IF THE LOAD IS NOT IN VIEW OF A PERSON AT ALL CONTROL LOCATIONS. DO NOT USE DLM TO CONTROL ANY LOAD THAT MIGHT BE DANGEROUS OR CAUSE A HAZARDOUS SITUATION IF ACCIDENTALLY ACTIVATED.

LMRH-102 DIGITAL IR HANDHELD REMOTE

Unit Description

The WattStopper LMRH-102 Digital IR Handheld Remote uses an infrared transmitter to send commands to a DLM IR enabled device. It allows the user to turn lights ON/OFF, to mimic functionality of other DLM switch and user interface buttons.

The LMRH-102 operates on three AAA alkaline or NiMH rechargeable batteries. It communicates with other DLM devices by sending an IR signal to any DLM IR enabled device in its line of sight, for remote personal control.



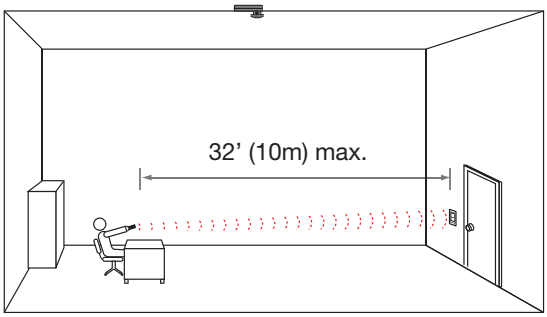
Operation

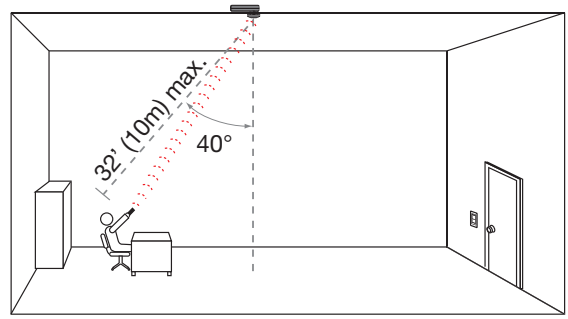
The LMRH-102 uses IR technology to control multiple zones of the DLM system. By pointing the handheld remote at any IR enabled DLM device a user can turn load(s) or zone(s) ON/OFF. Press the button on the handheld remote to turn ON a load. The LED on the LMRH-102 button turns ON.

Default Functionality

When first powered up, the top button on the LMRH-102 controls Load 1 and the second button controls Load 2. If the LMRH-102 has more buttons than there are loads or zones to control (i.e., a LMRH-102, 2 button remote is being used with only one DLM load) the second button does not control anything. If there are more than two loads on the DLM Local Network that you want to control, or you want to change the loads that are controlled by the LMRH-102 see Unit Adjustment.

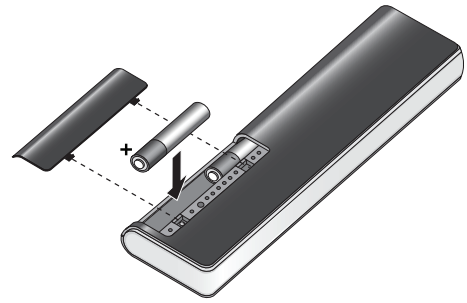
Transmitting Range





Battery Installation

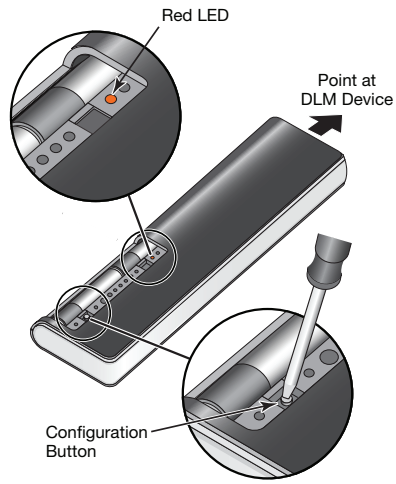
The battery compartment holds 3 standard AAA Alkaline or NiMH rechargeable batteries. Use only one type of battery; do not mix battery types in the same LMRH-102.



Specifications

Power Supply
. . . . . 3 AAA batteries, 1.5V alkaline or NiMH rechargeable
Environment:
Operating Temperature. . . . . 32˚ to 95°F (0˚ to 35°C)
Storage Temperature . . . . . 23 to 176°F (-5° to 80°C)
Relative Humidity . . . . . 5 to 95% (non condensing)

LMRH-102 continued



Unit Adjustment (optional)

The Configuration button allows the user to easily access, without tools, our patented Push n' Learn™ (PnL) technology and simply modify the default operation of the handheld remote. In order to communicate with the DLM Local Network, the LMRH-102 must be pointed at a DLM IR enabled device.

Step 1: Enter Push n' Learn (PnL)

Open the battery compartment and locate the Configuration button as shown in the illustration.

Point the LMRH-102 at an IR enabled DLM device as you press and hold the Configuration button for 3 seconds.

- The Red LED on the LMRH-102 and ALL other communicating DLM devices begins to blink rapidly (2x/second). The Red LED will continue to blink until you exit PnL mode.
- All loads in the room turn OFF immediately after entering PnL. After 1 second, Load 1 as assigned by the Plug n' Go feature (or the last PnL binding) turns ON.

Step 2: Load Selection

A quick press on the Configuration button while pointing the LMRH-102 at an IR enabled DLM device steps through all the loads connected to the DLM Local Network. All switches and sensors that are bound to the load that is currently ON will have their blue LED solid ON.

- To bind the load that is ON to one of the buttons on the handheld remote, press the desired button on the remote making sure that the blue LED turns ON.
- To unbind the load that is currently ON press the button with the blue LED ON, and the LED turns OFF to indicate that the button on the handheld remote no longer controls this load.

A quick press on the Configuration button activates the next load. Repeat the process until all the loads are assigned to the buttons you desire. Note that more than one load can be assigned to a button and a load can be assigned to multiple buttons.

Step 3: Exit Push n' Learn

Press and hold the Configuration button for 3 seconds, until the red LEDs stop blinking.

Reset Process

Point the LMRH-102 at an IR enabled DLM device as you perform each of these functions.

Load binding reset - To clear the unit so that it is not bound to any load:

1. Make sure the DLM local network is in Normal operating mode.
2. Press and hold the Configuration button in the battery compartment until LMRH device red LEDs go solid ON (approximately 10 seconds).

Device reset - To get the unit back to its default Plug n' Go state:

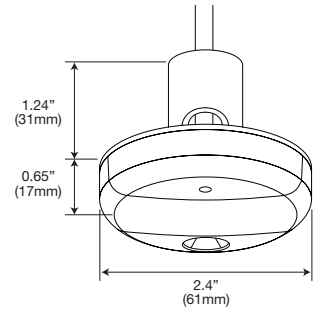
1. Make sure the system is in Normal operating mode.
2. Press and hold the Configuration button in the battery compartment for 20 seconds.

System Reset - To return all devices on the DLM local network to PnG:

1. Put the DLM local network into PnL.
2. Press and hold the Configuration button for approximately 20 seconds, until DLM device red LEDs resume blinking rapidly (approximately 2x/second).

LMLS-105 DAYLIGHT SENSOR - CLOSED LOOP ON/OFF

Unit Description



The WattStopper LMLS-105 is an interior photosensor that turns OFF or holds OFF electric lights if there is enough daylight. It is a low voltage device designed for Plug n' Go integration with the WattStopper Digital Lighting Management (DLM) product family.

The LMLS-105 is designed to require minimal adjustment at startup. For more advanced applications, an onboard display and two push buttons allow for adjustments, if needed. The display is hidden under a removable cover. To assist with adjustment, the LMLS-105 displays the current light level reading.

The LMLS-105 is designed to be either ceiling- or wall-mounted. It has a wide range light sensor capable of measuring from 1 to 1400 footcandles.

Placement Guidelines

The LMLS-105 controls lights in areas that receive enough daylight that the electric lights can be reduced or switched OFF. It is important to select a location for the LMLS-105 where the daylight is representative of the daylight throughout the controlled zone. Note the path of shadows. Daylighting control will be problematic if part of a controlled zone is in shadows while another part has plentiful daylight.

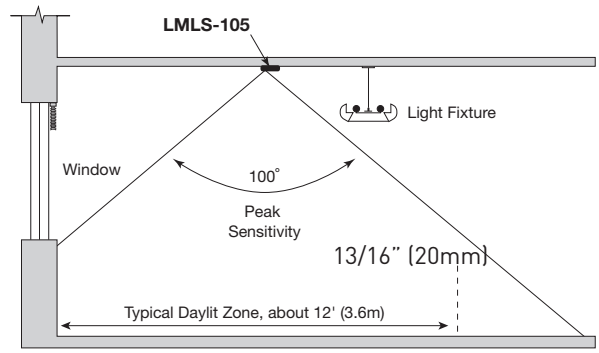


Figure A

When the primary source of daylight is a window (sidelighting), the LMLS-105 is typically ceiling mounted within the daylit zone which extends 12 feet or less in from the window. A good location is often between the window and the first row of fixtures. Figure A shows a typical mounting location for a sidelit application.

When the primary source of daylight is a skylight (toplighting), there are several options for mounting the LMLS-105. The recommended mounting locations are shown in Figure B.

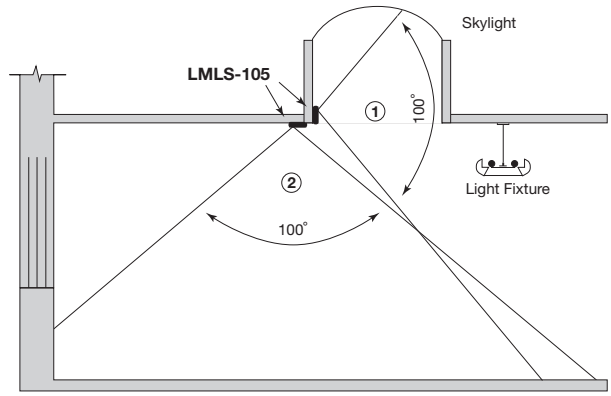
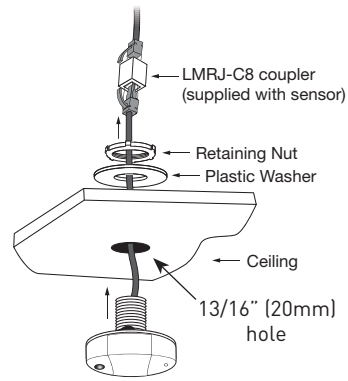


Figure B

① Ideally, the sensor is mounted on the South sidewall looking North across the light well.

② It could also be mounted on the ceiling next to the skylight, looking down at the floor.

A skylight may produce 5000 footcandles or more. If the sensor is mounted so that it looks up into the skylight, the daylight will exceed the maximum OFF setpoint of 1275fc which is too low for this orientation.

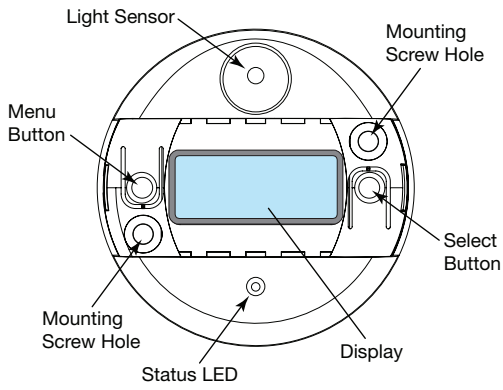


Mounting Instructions

The LMLS-105 is designed to be mounted in either of two ways.
For suspended ceiling tile, a threaded nipple with a lock nut is attached to the LMLS-105.

Controls and Indicators

All adjustments are made using the display and two buttons. Access the display by removing the cover. Set it safely aside. The display is oriented so that the letters are right side up when the light sensor is at the top.



Buttons

There are two buttons, one on each side of the display, labeled Menu and Select. The Menu button moves the display forward through the menus. The Select button has two functions:

1. Press and release Select to step through the adjustment choices.
2. Press and hold Select until MEM appears in the display. This locks the selection shown in the display into the sensor's memory.

Automatic Calibration (auto cal)

Auto Cal is an automatic calibration procedure for selecting an appropriate value for the ON setpoint. As part of this process, the controlled load is first turned ON for a period of two minutes to warm up the lamps. Then it is switched OFF and back ON eight times, terminating in an OFF state. To indicate to the user that AUTO CAL is active, the LED status indicator flashes in a unique manner. At the completion of the calibration, a new value for the ON setpoint will have been selected. The results can be viewed in the ON menu.

Default Daylight Sensor Settings

ON Setpoint ..... 7.5 fc	OFF Setpoint ..... 11 fc
ON Time Delay ..... 20 seconds	OFF Time Delay ..... 3 minutes

Load Binding

The daylight sensor is automatically enabled for Load 1 using the default PnG configuration. To enable/disable daylighting for any load, you can use an occupancy sensor display (see Push n' Learn) or the LMCT-100 configuration tool (see LMCT-100 instructions).

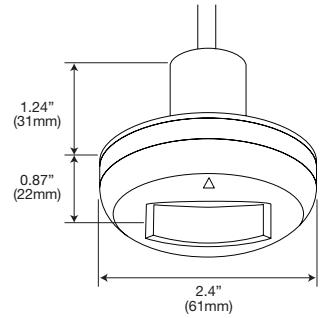
Specifications

Voltage 24VDC
Current Consumption 10mA
Total power requirements are determined by the controlled device.
Power Supply . . . . . WattStopper Room Controllers
Light Sensor range . . . . . 1 to 1400 footcandles
ON Setpoint range . . . . . 1 to 850 footcandles
Automatic Deadband . . . . . 25%, 50%, 75%, 100% (above the ON setpoint)
Status Indicator . . . . . Multi-function green LED
Output signal . . . . . 12/24 VDC, max 120 mA
Dimensions . . . . . 2.4" diameter x 0.7" depth (61mm x 17mm)
Environment . . . . . For Indoor Use Only
Operating Temperature . . . . . 50° to 104° F (10° to 40° C)
Storage Temperature . . . . . 23° to 176°F (-5° to 80°C)
Relative Humidity . . . . . less than 90% rh

LMLS-305 DAYLIGHT SENSOR - CLOSED LOOP DIMMING

Unit Description

The LMLS-305 is a low voltage, indoor dimming photosensor. It provides a continuous dimming signal to 0-10VDC dimming ballasts. The LM-305 is a "closed loop" system; it considers both daylight and artificial light when adjusting light levels. It uses a sliding setpoint control algorithm to maintain the desired illuminance levels for separate night and day target setpoints. The LMLS-305 slowly raises or lowers the electric lights to avoid sudden changes that can annoy occupants.



After the LMLS-305 is installed, all adjustments are made using the LMCT-100 Digital IR Configuration Tool or the LSR-301-S. The optional remote control (LSR-301-P) allows the occupant to adjust light levels.

Placement Guidelines

Placement of the LMLS-305 is critical to its overall performance. The photosensor must be aimed to view the area illuminated by the lights that it controls.

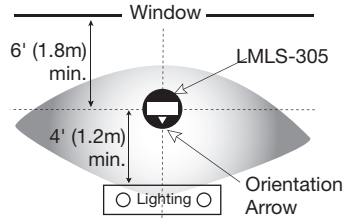


Fig. 1: Coverage pattern and typical placement

- Position the photosensor in a location with a light level that is representative of the entire controlled area or the least illuminated work space in the controlled area.
- Avoid installing multiple sensors in adjoining areas where the light from one controlled fixture spills over into the view of the next photosensor.
- When the primary source of daylight is a window, mount the photosensor no closer than 6 feet (1.8m) to the window and no farther away than 15 feet (4.5m). The arrow on the photosensor should point away from the window, it indicates the direction of the photosensor's broadest view.
- In applications with direct/indirect pendant fixtures, do not mount the photosensor on the ceiling within 4 feet (1.2m) of the pendant fixtures.
- Avoid mounting the photosensor above extremely reflective surfaces such as highly polished floors or tables, if possible.

Alternate Placement

When direct/indirect pendant lighting fixtures are installed less than 10 feet (3m) from the window it may be necessary to mount the LMLS-305 so that its view is away from the nearest fixture, as shown in Figure 2.

Follow the Placement Guidelines previously described.

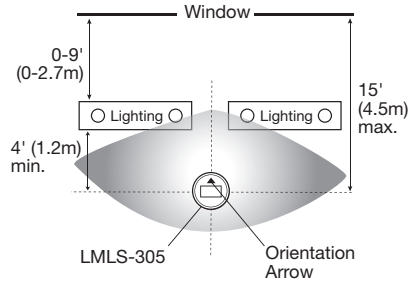
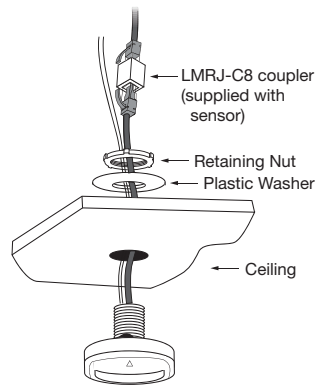


Fig. 2: Placement in applications where lighting fixtures are within 10 feet (3m) of daylight source

Mounting Instructions

The LMLS-305 can be mounted to a junction box in areas where low voltage connections are required to be enclosed.

1. Drill or cut a 13/16" (20mm) hole in the ceiling tile where the photosensor is to be mounted.
2. Guide the wires and threaded tube of the photosensor through the hole.
3. Slide the plastic washer around the tube.
4. Make sure the photosensor's view is set according to the proper placement guidelines described earlier in these instructions.
5. Tighten the retaining nut to prevent the photosensor from rotating.



Photosensor Adjustment

The photosensor must be adjusted under two conditions, **Night** and **Day**. The photosensor begins automatic dimming control after both adjustments have been completed.

Initial adjustments to the LMLS-305 are done using the LSR-301-S remote control or the LMCT-100 configuration tool (see the LMCT-100 User Guide). The LSR-301-S has 5 buttons. The LED on the remote control should light every time you press a button. The red LED on the LMLS-305 photosensor also flickers for the duration of the press.

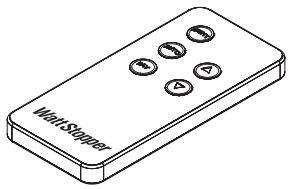
▲ **(up arrow):** Press to raise the intensity of the lights.

▼ **(down arrow):** Press to lower the intensity of the lights.

Night: Press to begin and end the Night adjustment.

Auto: Press to begin automatically dimming the lights.

Day: Press to begin and end the Day adjustment process.



LSR-301-S

Conditions for Setup

Adjust the LMLS-305 after the controlled zone is furnished and ready for move-in. Placement of furniture affects the way light reflects from various surfaces.

- Furniture, floor and wall coverings must be clean.
- Window coverings must be clean and operable.
- Remove unnecessary objects such as tools and installation materials from the view of the photosensor.
- Do not block primary sources of electric light or daylight from reaching the photosensor's view.

Default Daylight Sensor Settings

The photosensor provides full output until it is commissioned using the adjustment procedure.

Load Binding

The daylight sensor is automatically enabled for Load 1 using the default PnG configuration. To enable/disable daylighting for any load, you can use an occupancy sensor display (see Push n' Learn) or the LMCT-100 configuration tool (see LMCT-100 instructions).

Burn-In

Follow the lamp manufacturer's recommendation on lamp burn-in for new lamps prior to dimming the lamps with the LMLS-305. Typical recommendations are for 100 hours of operation at 100% light output. If the lamp manufacturer's guidelines are not followed, premature lamp failure may occur.

When it is first installed and connected to the fixtures, the LMLS-305 drives the lamps at full output until the Night adjustment has been completed. The amber LED under the photosensor's lens flashes continuously until the Night and Day adjustments have been properly completed.

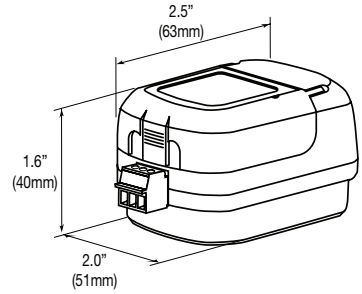
Specifications

Voltage	24VDC
Current Consumption	30mA@24VDC
Power Supply	WattStopper Room Controllers
Ballasts	0-10VDC standard dimming
Max Ballasts Controlled	50 Ballasts
Minimum Signal to ballast	0.2VDC
Max Signal to ballast	10VDC
Dimensions	2.4" diameter x 2.11" depth (61mm x 54mm)
Environment	For Indoor Use Only
Operating Temperature	50° to 104° F
Storage Temperature	23° to 176°F (-5° to 80°C)
Relative Humidity	less than 90% rh

INTERFACE MODULES TO 3RD PARTY SYSTEMS

General Description

There are several optional modules for the WattStopper DLM system (DLM system) that allow integration with third-party devices or systems. These interface modules have similar form factors as described below. See individual device sections for operational information.



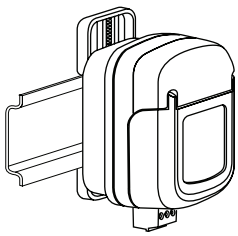
Mounting and Wiring

Installation shall be in accordance with all applicable regulations, wiring practices, and codes.

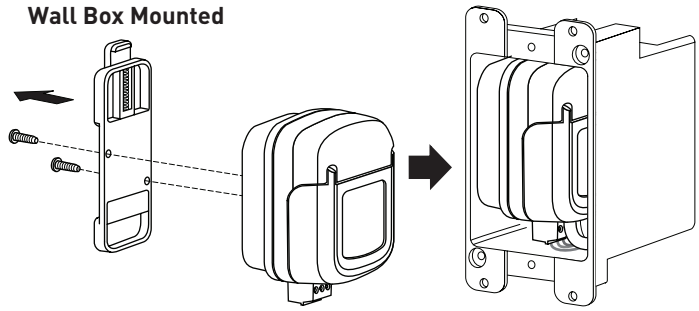
Interface modules are UL2043 Plenum rated. All connections are Class 2 low voltage.

If code requires that the interface module be mounted in an enclosure, it can be mounted inside a 4" x 4" junction box, inside a 2 1/8" deep (or deeper) 1-gang back box, or in a 3" or 4" octagonal box.

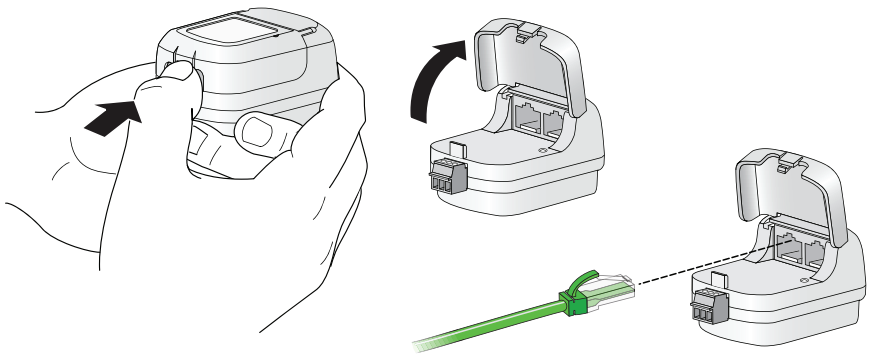
Din Rail Mounted



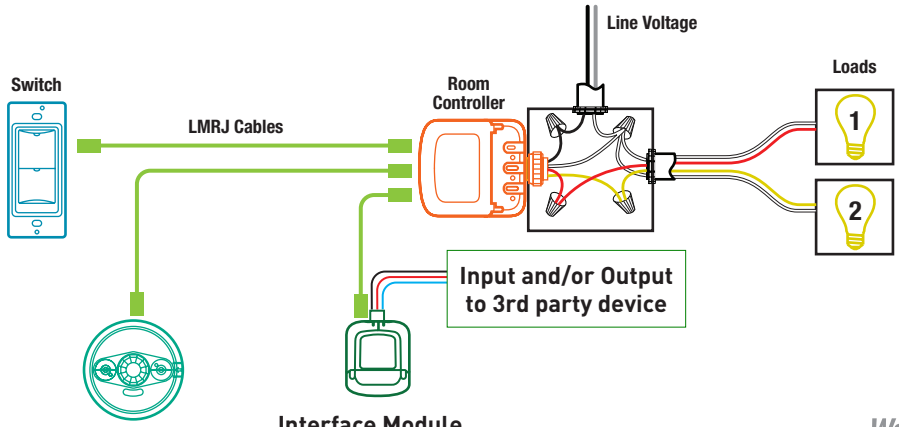
Wall Box Mounted



Attach the LMRJ Cable



The DLM Local Network uses free topology low voltage wiring. Interface modules can connect anywhere on the DLM Local Network.



LMRL-100 ISOLATED RELAY INTERFACE

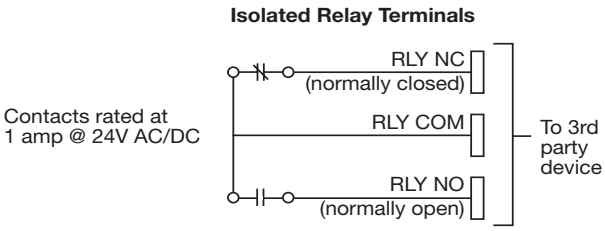
Description

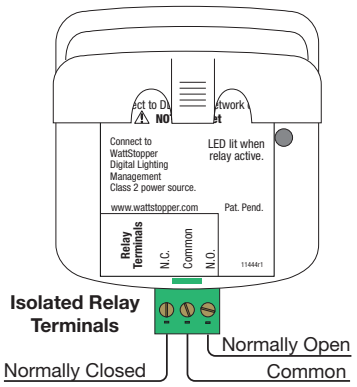
The LMRL-100 connects to the DLM Local Network and activates its isolated relay upon any occupancy signal. Connecting a third-party's device to the LMRL-100 relay output allows the third-party device to observe when occupancy is detected.

Operation

The LMLR-100 connects to the DLM Local Network. When occupancy is detected by any sensor on the DLM Local Network the LMRL-100 automatically closes its relay. The output from the LMRL-100 terminal can signal a third party device that there is occupancy.

Terminal Connections





Power Up Functionality

Upon initial power up the LMRL-100 automatically "listens" for an occupancy message from any occupancy sensor on the DLM Local Network. No setup is needed.

LED indicator

The LMRL-100 contains one blue LED that illuminates when the isolated relay closes.

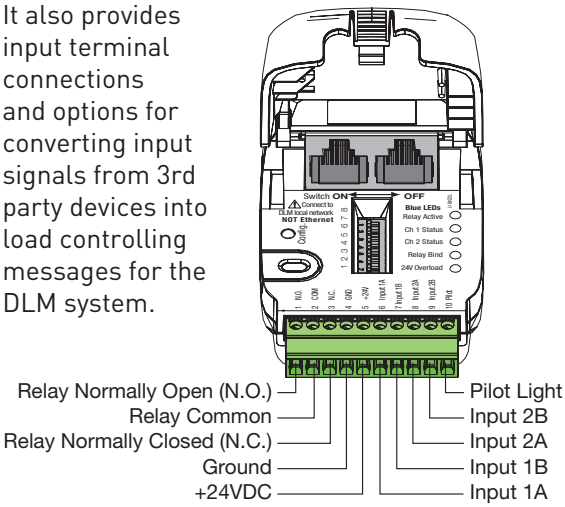
Specifications

Voltage 24VDC
Current Consumption 7mA
Power Supply . . . . . WattStopper Room Controllers
DLM Local Network connection . . . . . 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)

LMIO-101 DIGITAL INPUT/OUTPUT INTERFACE

The LMIO-101 Digital Input/Output Interface allows integration of 3rd party devices to the WattStopper DLM Local Network. It sends messages such as After Hours, Shed or Force On to the DLM local network based on external inputs. It activates the isolated relay upon any signal from any user defined DLM occupancy sensor so that a 3rd party's device can observe occupancy detection.

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

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 a **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.

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.

Power up functionality

Upon power up, the LMIO-101 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 mode, Input 1 turns ON load 1, input 2 turns ON the rest of the loads.

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.

Adjustments

Load Binding to Inputs:

1. **Enter Push n' Learn (PnL)**
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 1 and Channel 2 status LED indicates binding for Input 2.

   - 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 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 any occupancy sensor.
4. The capture window automatically ends 30 seconds after step 1 is complete. To bind/unbind more sensors, repeat steps 1-3.

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 0-24VDC to 24VDC-0 (On) for input 2A.
#7	#7 See "Load Binding to Inputs"
#8	#8 See "Load Binding to Inputs" and "Isolated Relay Binding"

Command Prioritization Heirarchy

Outgoing commands are basic ON/OFF commands with different priorities. The higher priority command overrides lower priority commands given by the system. Following is the command priority. For example: a Force-On overrides any OFF command given by any device in the system, to make 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
Shed action = Load(s) OFF
Clean action = Load(s) ON
After Hours action = Puts the load into after hours mode where individual load parameters switch to the assigned After Hours parameters that may be different than the normal hours parameters. 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.

LMRJ CABLE SPECIFICATION

WattStopper LMRJ cables are Cat 5e B-to-B pre-terminated and are available in lengths from 3 feet to 100 feet in both plenum and non-plenum rating. A 6 inch non-plenum rated jumper is available for use in multi-gang switch applications. The DLM local network does NOT use ethernet, therefore ethernet cable bend radius restrictions do NOT apply to cables in the DLM local network. WattStopper can not assure proper performance of the DLM system using any other cable. LMRJ cables are not recommended for general data use in other than DLM network applications.

150' of cable is allowed per device; a two device network is allowed 300', 3 devices 450', 4 devices 600', 5 devices 750', 6 devices 900', 7 or more devices up to 1,000' maximum.

When installing multiple controllers, it is best practice to spread them throughout the DLM Local Network with devices connected to each controller, rather than all the controllers at one end with LMRC cable connections only to other controllers.

WARNING

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.

Notice: For Class 2 DLM Devices

- Connect only to a Class 2 power source.
- Do Not Reclassify and Install as Class 1, or with Power and Lighting Wiring.

WARNING: Do Not install to cover a Junction Box Having Class 1, 3 or Power and Lighting Circuits.

SAFETY

WARNING: Do not use the DLM system to control loads other than lighting if the load is not in view of a person at all control locations. Do not use DLM to control any load that might be dangerous or cause a hazardous situation if accidentally activated.

CAUTION: Turn the power OFF at the circuit breaker or remove the fuse before working on any electrical wiring.

PATENTS

The system and products described in this guide may be covered by one or more of the following United States patents: 5,189,393 • 5,640,113 • 6,885,300 • 7,277,012 • Other Patents Pending.

legrand
A Group brand

WARRANTY INFORMATION

WattStopper warranties its products to be free of defects in materials and workmanship for a period of five (5) years. There are no obligations or liabilities on the part of WattStopper for consequential damages arising out of, or in connection with, the use or performance of this product or other indirect damages with respect to loss of property, revenue or profit, or cost of removal, installation or reinstallation.

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10743r3 10/2010

LMCT-100

Digital Configuration Tool

User Guide

The LMCT-100 Wireless IR Configuration Tool is a handheld tool for setup and testing of WattStopper Digital Lighting Management (DLM) devices. It provides wireless access to occupancy and daylighting sensors for setup and parameter changes, WattStopper Push n' Learn™ (PnL) technology for load configuration, switch and dimmer assignment and operating parameter changes. The LMCT-100's display shows menus and prompts to lead you through each process. The navigation pad provides a familiar way to navigate through the customization fields. The LMCT-100 allows modification of the system without requiring ladders or tools; simply with a touch of a few buttons.

CONTENTS

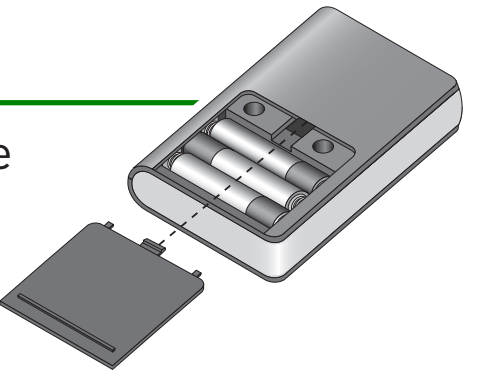
WattStopper®

Patents Pending

OPERATION

The LMCT-100's IR transceiver allows bidirectional communication between DLM devices and the LMCT-100. Simple menu screens let you see the current status of the system and make changes. It can change any of the DLM occupancy sensor parameters such as sensitivity, time delay and more. With the LMCT-100 you can also change load configurations, without any new wiring. For systems including the LMLS-305 daylighting sensor the LMCT-100 can also set or change the daylight level parameters. The LMCT-100 can change dimming system options such as scene assignments, fade rates and other options not available through the standard user interface.

BATTERIES



The LMCT-100 operates on three standard 1.5V AAA Alkaline batteries or three rechargeable AAA NiMH batteries.

The battery status displays in the upper right corner of the display. Three bars next to **BAT=** indicates a full battery charge. A warning appears on the display when the battery level falls below a minimum acceptable level.

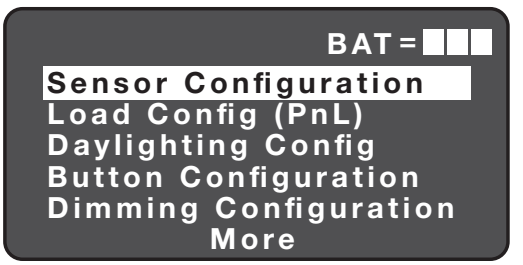
To conserve battery power, the LMCT-100 automatically shuts off 10 minutes after the last key press.

NAVIGATION

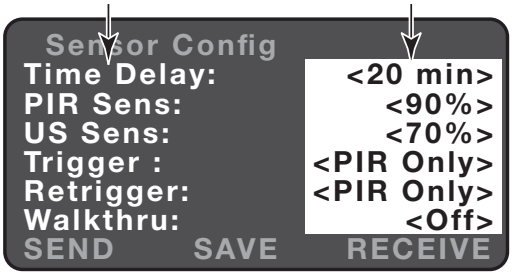
You navigate from one field to another using ▲ (up) or ▼ (down) arrow keys. The active field is indicated by flashing (alternates between yellow text on black background and black text on yellow background).

Once active, use the **Select button** to move to a menu or function within the active field.

Function Fields (on Home Menu)



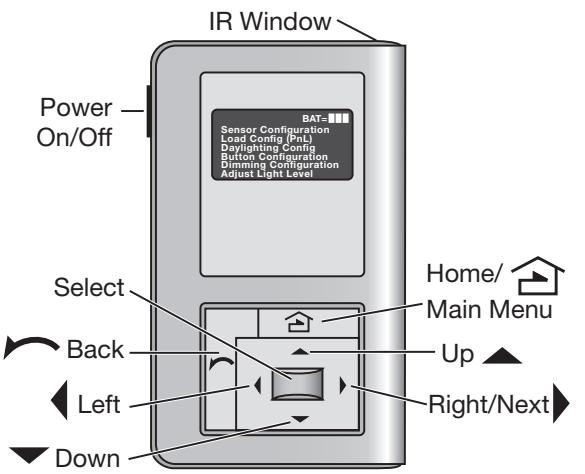
Parameters Value Fields



Value fields are used to adjust parameter settings. They are shown in "less-than/greater-than" symbols: <value>. Once active, change them using ◀ (left) and ▶ (right) arrow keys. In general the ▶ key increments and the ◀ key decrements a value. Selections wrap-around if you continue to press the key beyond maximum or minimum values. Moving away from the value field (using ▲/▼ keys) overwrites the original value.

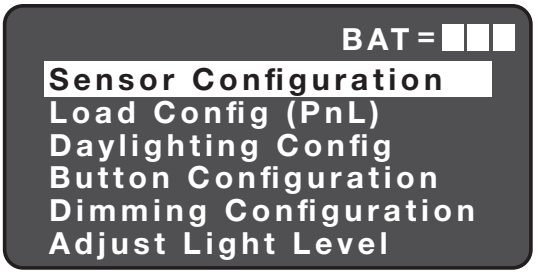
The  button takes you to the main menu.

The  button can be thought of as an un-do function. It takes you back one screen. Changes that were in process prior to pressing the  key are lost.



Home Menu

The Home (or Main) menu displays after the power-up process completes. It contains information on the battery status and six menu choices.

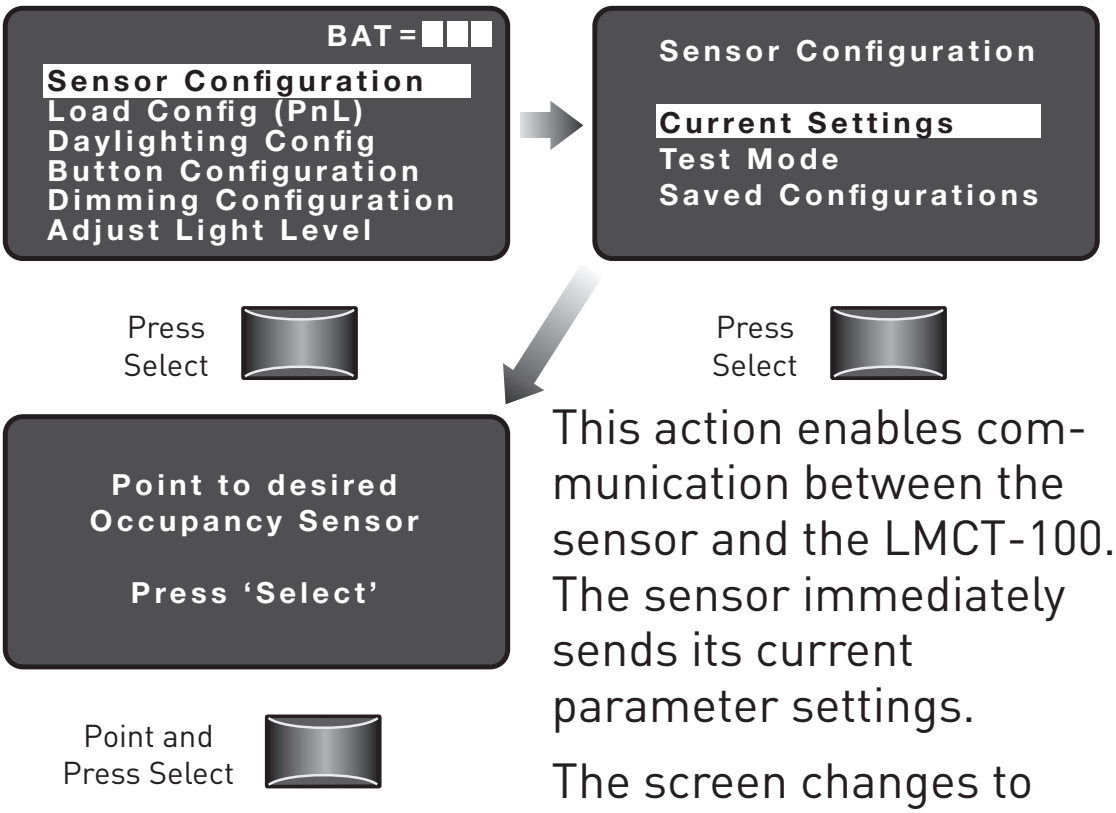


Up or Down Button

Select Button

Press ▲/▼ to locate the desired function then press **Select**.

SENSOR CONFIGURATION - CURRENT SETTINGS



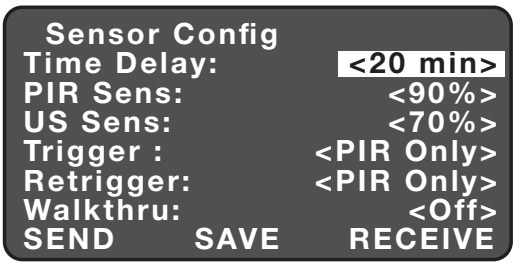
This action enables communication between the sensor and the LMCT-100. The sensor immediately sends its current parameter settings.

The screen changes to show the current sensor settings where you can adjust sensor parameters. "AH" next to Sensor Config indicates that the sensor is currently in After Hours mode. Changes made while AH is displayed only affect After Hours operation.

ADJUSTING SENSOR PARAMETERS

Using Current Settings, you can view all parameters applicable to the type of sensor that is currently communicating with the LMCT-100. You can modify settings, send them to the sensor, and/or store them in the LMCT-100.

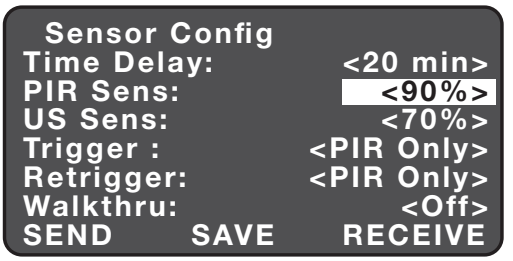
Time Delay



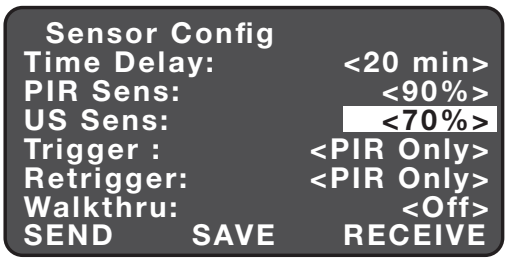
Adjust Time Delay Minutes

Step 1: push ◀ or ▶ to adjust the value.
Options: <1 to 30 minutes>, and <Override> to disable the sensor.
Step 2: push ▼ to activate the next field.

Detection Sensitivity



Adjust PIR Sensitivity



Press the Down Arrow for Ultrasonic

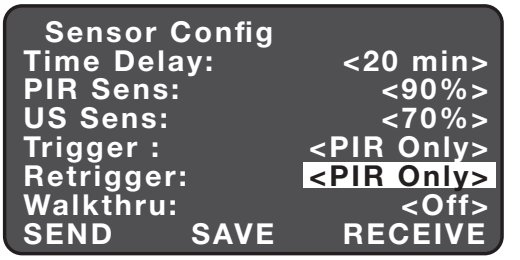
Adjust Ultrasonic Sensitivity

Step 1: push ◀ or ▶ to adjust the value. PIR and Ultrasonic sensitivities vary from 0% to 100% in 10% increments.

Note: Only sensitivity of technology that is present can be changed.

Step 2: push ▼ to activate the next field.

Trigger/Retrigger Mode (Dual Tech Sensors only)



Adjust Trigger Mode ◀ ▶

Press the Down Arrow for Retrigger ▼

Adjust Retrigger Mode ◀ ▶

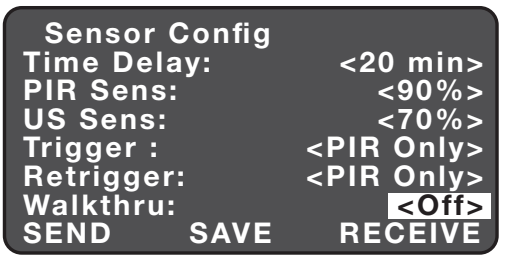
Step 1: push ◀ or ▶ to cycle through selections of technology(ies) for the initial occupancy trigger:

PIR Only ▶ US (ultrasonic) Only ▶ PIR or US ▶ PIR & US ▶

Step 2: push ▼ to activate the next field.

Step 3: push ◀ or ▶ to cycle through technology activations required to keep the load ON after the initial occupancy is triggered.

Walk Through Mode

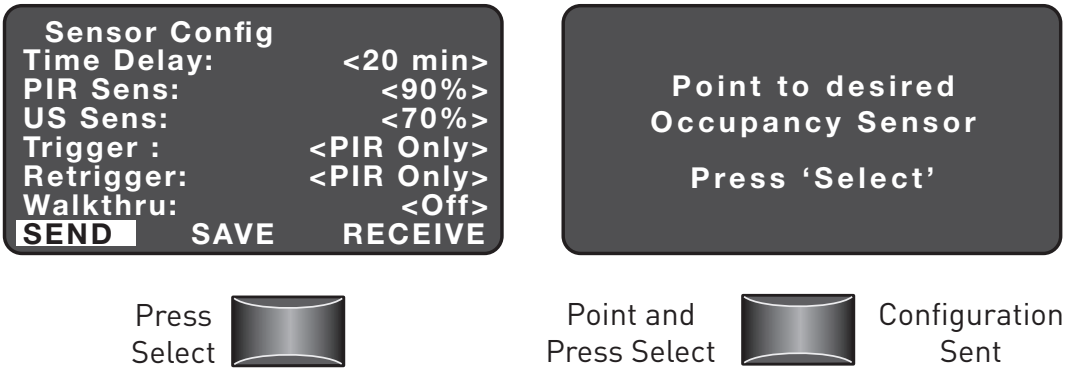


Walk Through Mode On or Off ◀ ▶

Press the down arrow to choose Send, Save or Receive ▼

Walk-through mode turns the load off three minutes after the area is initially occupied if no motion is detected after the first 30 seconds. If motion continues beyond the first 30 seconds, the selected time delay applies.

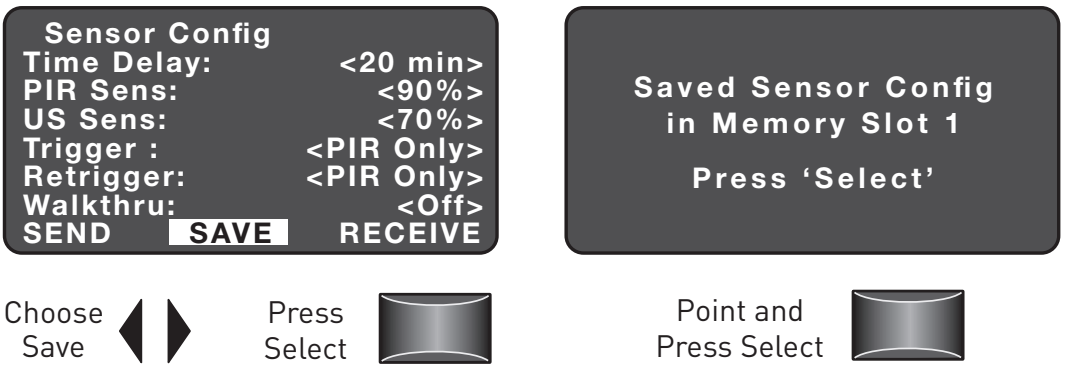
Send



This sends the settings to the sensor.

The LEDs on the sensor blink to confirm the message has been sent. To double-check that the new settings were sent to the sensor, see "Receive."

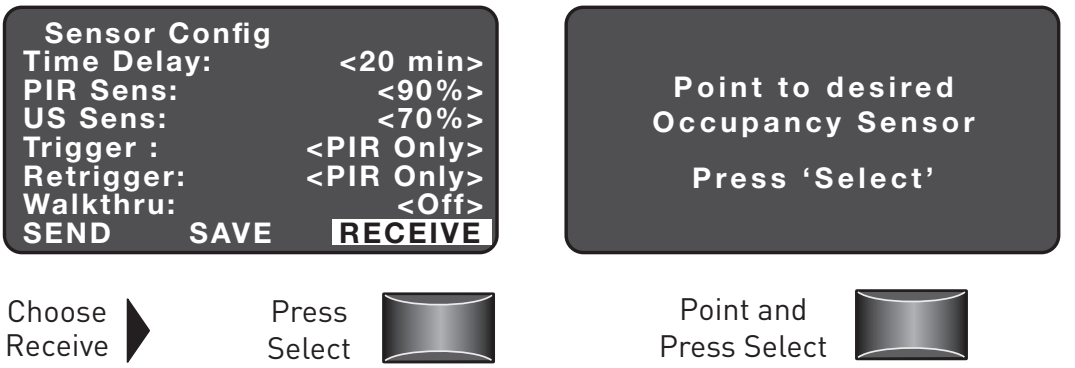
Save



This saves the settings in the LMCT-100 "Saved Configurations" menu function for future use. Each time you save a configuration the "Memory Slot" number increases. You can save up to 9 configurations. Saved configurations are listed in the LMCT-100's "Saved Configurations" function in the Sensor Configuration menu (for more details, see page 12).

Receive

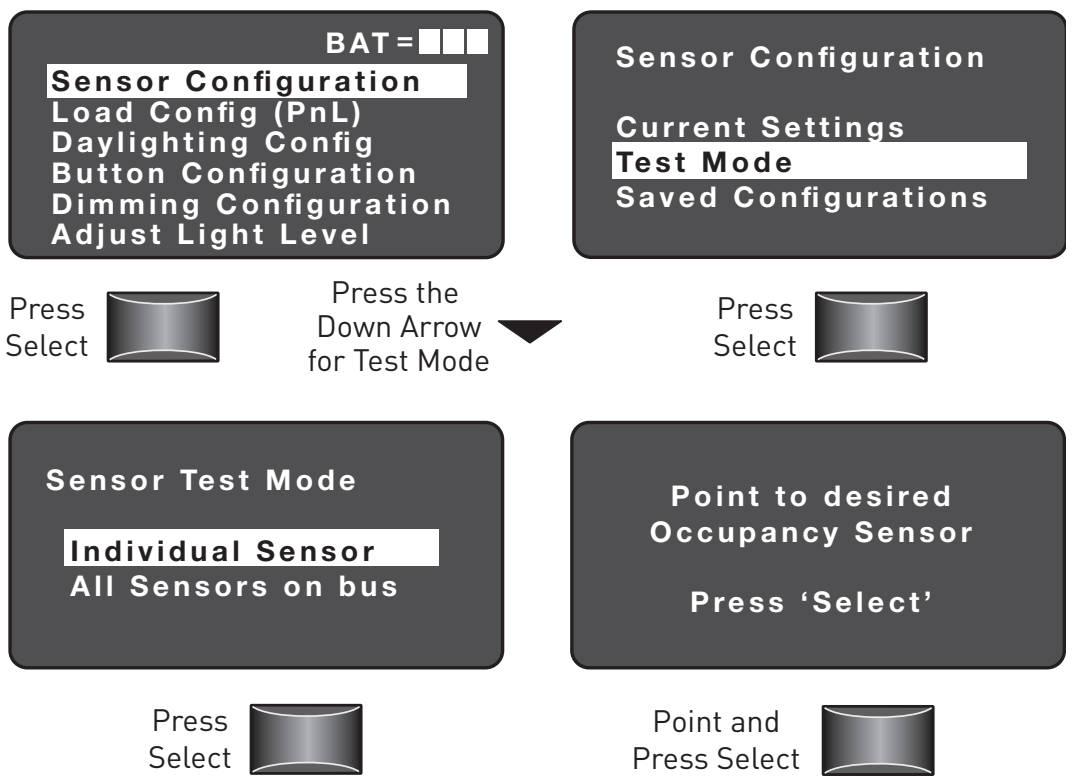
Important: Selecting Receive before sending new settings to the sensor or saving them to LMCT-100 memory clears any value changes that you made.



This retrieves the current settings from the sensor.

SENSOR CONFIGURATION - TEST MODE

Sensor Testing - Individual Sensor

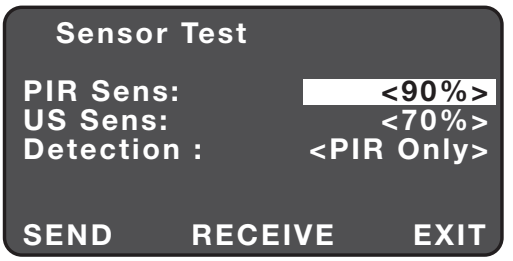


The individual sensor goes into test mode.

Adjusting Sensitivity during Test

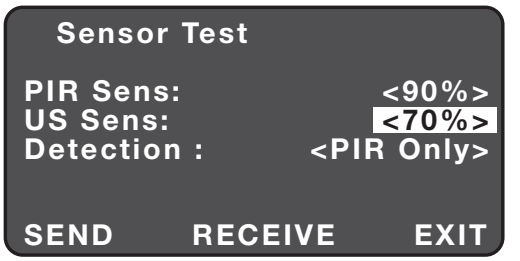
For dual technology sensors, both technologies appear on the screen, otherwise the screen only presents the applicable technology.

PIR Sens = passive infrared sensitivity
US Sens = ultrasonic sensitivity



Adjust PIR Sensitivity

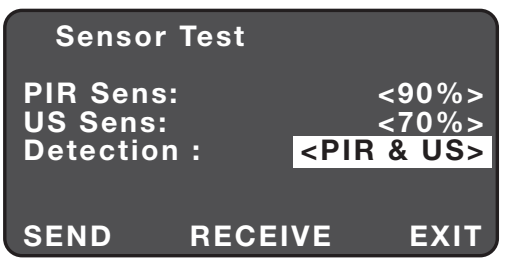
Press down arrow for Ultrasonic



Adjust Ultrasonic Sensitivity

You can adjust sensitivity values while inside the Test Mode. Values are 0 to 100%, in 10% increments.

Detection Criteria (Dual Technology Sensors only)



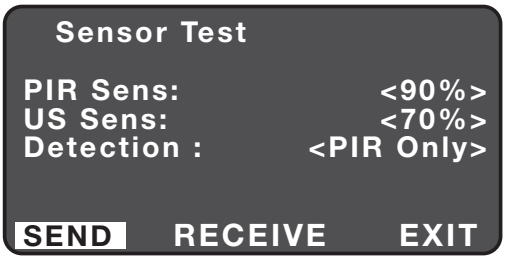
Press down arrow for Detection

Select Detection technology

You can select to test one or the other technology, or both technologies together. Selections cycle through:

PIR ▸ US ▸ PIR **or** US ▸ PIR **&** US

Send

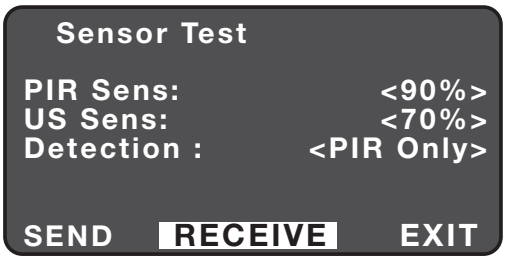


Press Select

Point and Press Select

Test Mode starts using the settings you sent.

Receive



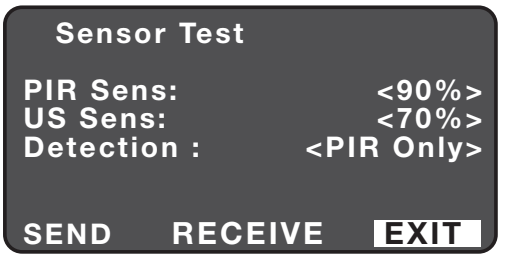
Choose Receive

Press Select

Point and Press Select

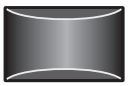
Retrieves settings from the sensor so you can view or modify them for further testing.

Exit Test Mode

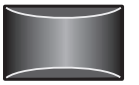


Choose Exit

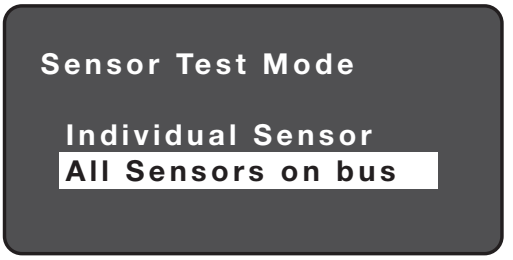
Press Select



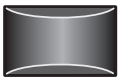
Point and Press Select



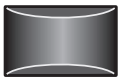
Sensor Testing - All Sensors on Bus



Press Select



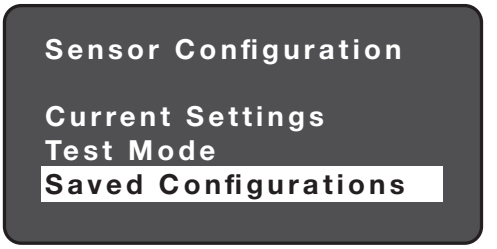
Point and Press Select



When you select "All Sensors on bus", you can test the selected sensor along with other sensors on the DLM Local Network (bus) to understand the coverage in the entire room.

SAVED CONFIGURATIONS

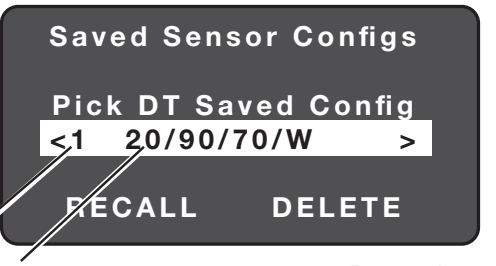
Press Select



Press the Down Arrow for Saved Configurations

Press Select

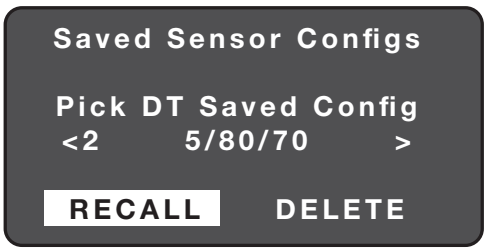
Press Select

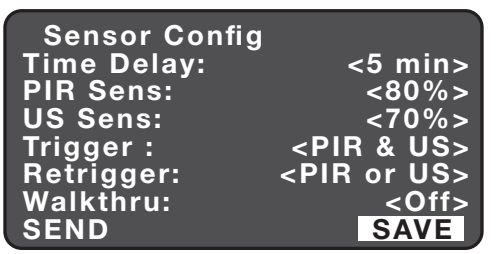


Memory Slot Number (up to 9 per sensor type)

Up to 4 enabled settings, e.g.:
20....Time Delay minutes
90....% PIR Sensitivity
70....% US Sensitivity
W...Walkthrough Enabled

Press the Right or Left Arrow to view other Saved Configs



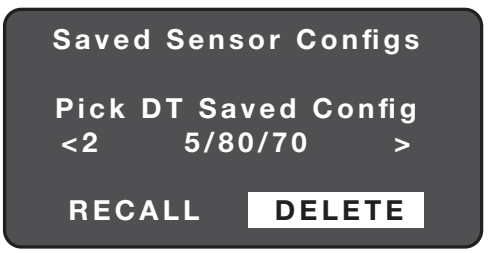


To Review the Config Settings Select RECALL:

Press Select

Press the Down Arrow for SAVE

Press Select



To Delete the Saved Config Select DELETE:

Press Select

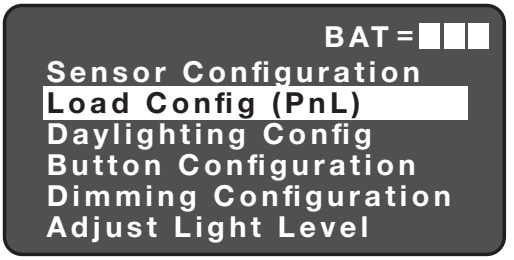
Press Select

Note: If no saved configurations exist, you will see:
No Sensor Configurations exist, Press 'Select'.

LOAD CONFIGURATION (PnL)

Use the Load Configuration function to identify load numbers, view and change load parameters and load bindings to sensors. You initiate Load Configuration (PnL) also known as Push n' Learn™ by pointing the LMCT-100 at any IR enabled DLM Local Network device when prompted.

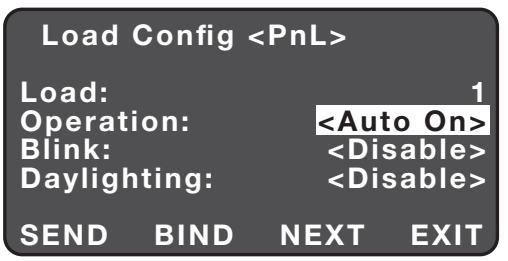
Important: To configure load binding from the LMCT-100, it must be initiated by the LMCT-100. After entering PnL you must exit before using the system.



Press Select

Press Select

When the device receives the signal from the LMCT-100, the DLM Local Network goes into PnL mode; the red LED on all communicating devices starts blinking at 2x/second and all loads turn OFF except Load 1 turns ON.



Right arrow to change setting for load 1

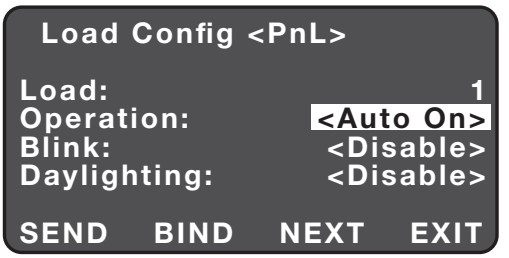
Down arrow to highlight NEXT then SELECT to go to next load

Load Selection

Settings for load 1 appear first.

Push ▼ to highlight NEXT and push the SELECT button to turn ON the next load and view its settings.

Operation Mode

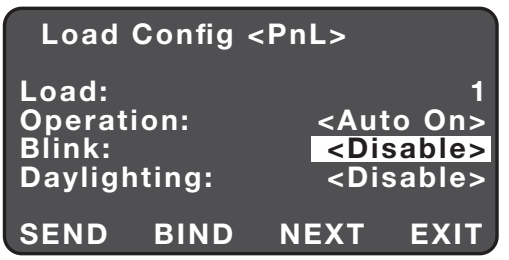


Operation Mode
<Manual On>
or <Auto On>

The operation mode determines if the load can be turned on automatically by a sensor, or only manually by a switch. Push ◀ or ▶ to adjust the Operation mode. Options are 'Auto On' and 'Manual On'.

Blink Warning

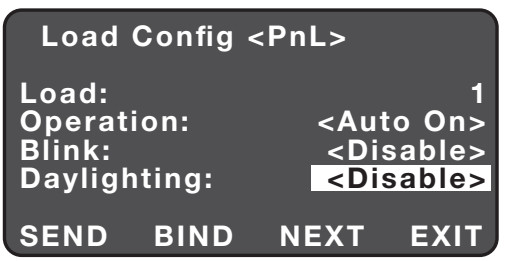
The Blink Warning flashes the load OFF then ON one minute prior to the sensor automatically turning the load OFF when the time delay expires.



Blink Warning
<Disable>
or <Enable>

Push ◀ or ▶ to adjust the Blink Warning. Options are 'Disable' and 'Enable'.

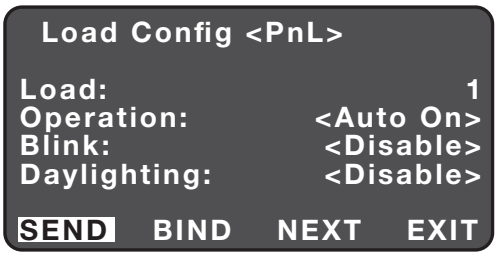
Daylighting Functionality



Daylighting
<Disable>
or <Enable>

This function enables and disables an LMLS-305 daylighting sensor to control the selected load.

Send

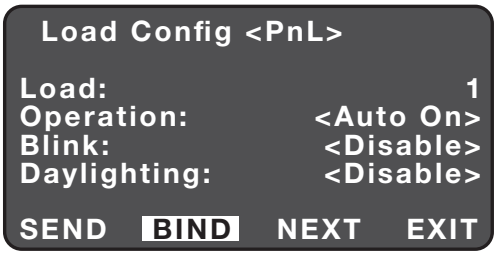


Press Select

Point and Press Select

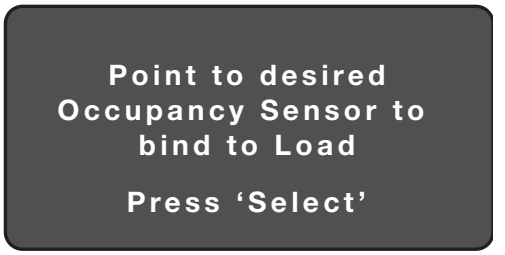
New settings have been sent to the selected load. Wait 5-6 seconds for the message to clear. Select another function (bind, next, exit). To instantly end load configuration press the HOME key.

Bind



Choose Bind

Press Select

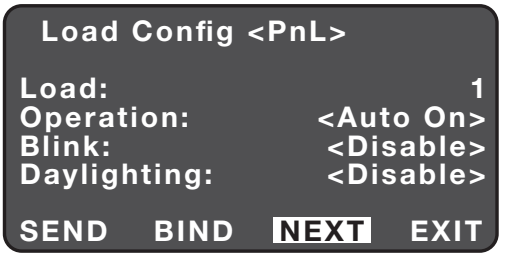


Point and Press Select

Binds the occupancy sensor to the selected load.

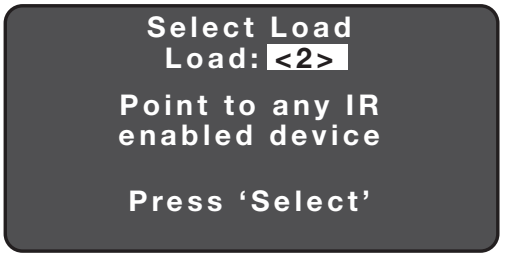
Next

Select another load. When NEXT is selected, Load 1 turns OFF and Load 2 turns ON.



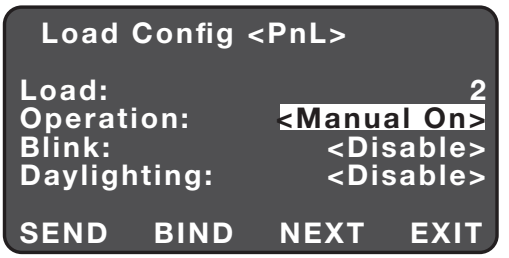
Choose Next

Press Select



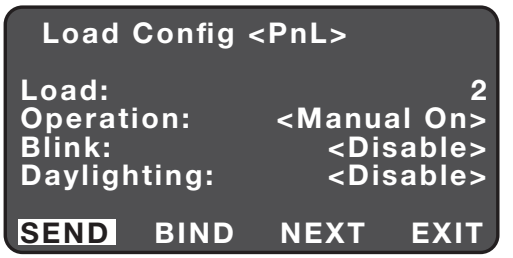
Choose desired Load

Press Select



Adjust settings as necessary.

Press Select

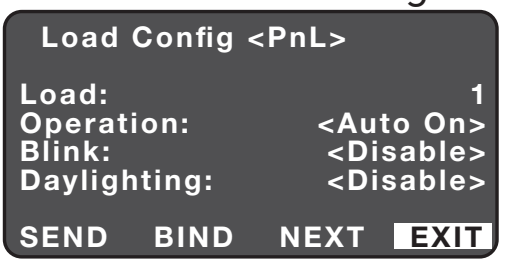


Press Select

Point and Press Select

Exit

This ends the configuration function and exits PnL.



Choose Exit

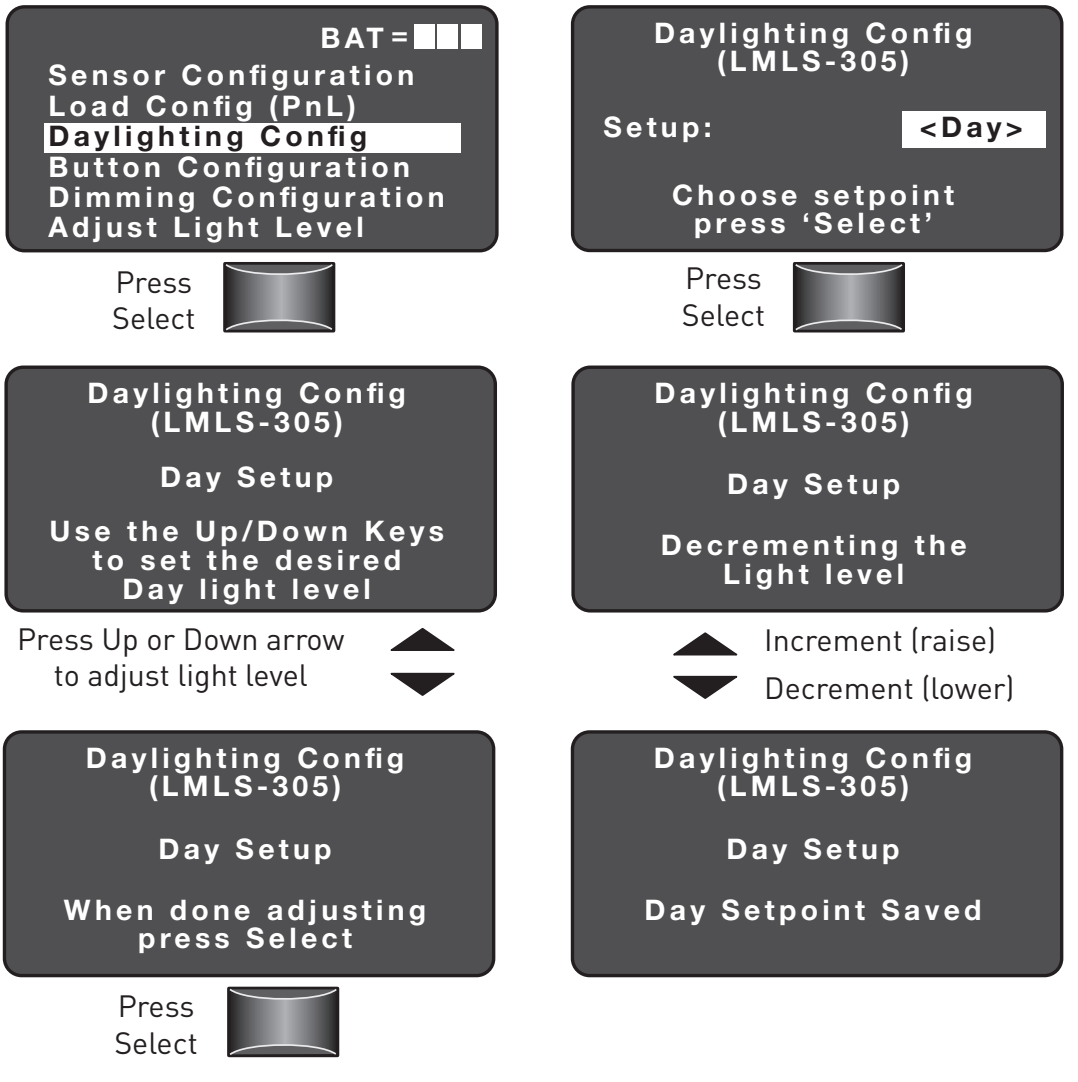
Press Select

Point and Press Select

DAYLIGHTING CONFIG (LMLS-305 ONLY)

Refer to the LMLS-305 installation instructions for details about daylighting setup and operation.

Day Setpoint



Night Setpoint

Daylighting Config (LMLS-305)

Setup: <Day>

Choose setpoint press 'Select'

Press Left/Right arrow to scroll to Night Setpoint

Daylighting Config (LMLS-305)

Setup: <Night>

Choose setpoint press 'Select'

Press Select

Daylighting Config (LMLS-305)

Night Setup

Use the Up/Down Keys to set the desired Night light level

Press Up/Down arrow to adjust light level

Daylighting Config (LMLS-305)

Night Setup

Decrementing the Light level

Press Up/Down arrow

Increment (raise)

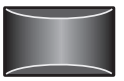
Decrement (lower)

Daylighting Config (LMLS-305)

Night Setup

When done adjusting press Select

Press Select



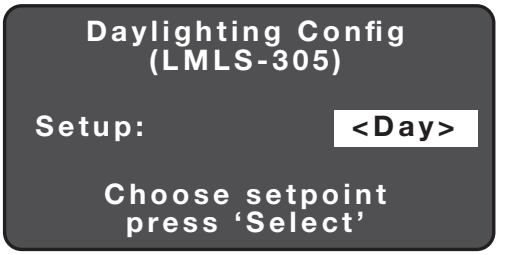
Daylighting Config (LMLS-305)

Night Setup

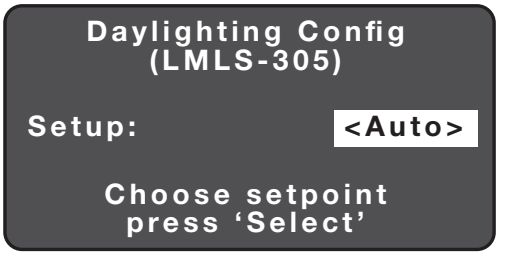
Night Setpoint Saved

Auto Setpoint

This function allows the LMLS-305 to automatically adjust its setpoints.

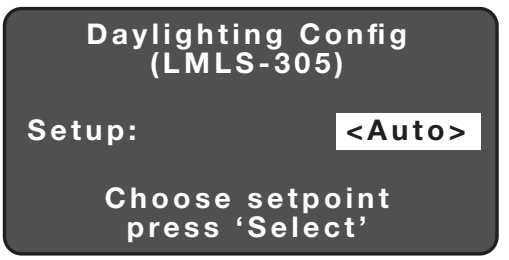


Press Left/Right arrow to scroll to Auto Setpoint

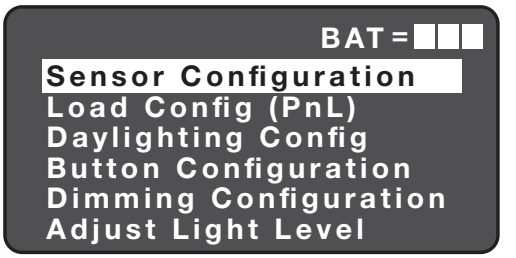


Press Select

Press the Home Button to return to the Home Page.



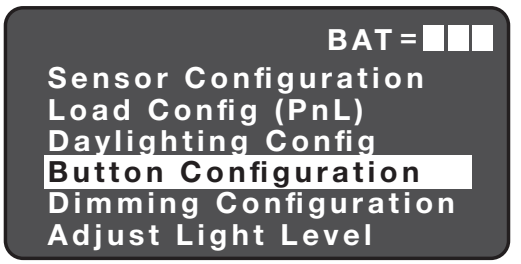
Press Home

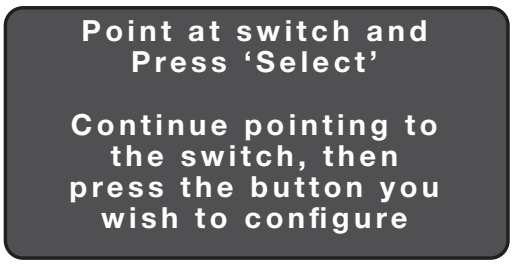


BUTTON CONFIGURATION

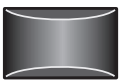
Refer to the DLM Dimming System Addendum for further information and system requirements.

Button Configuration enables communication between the load, its assigned switch and the LMCT-100. Use the Button Configuration function to change Type, Mode and Fade Times of a switch button and to lock scene buttons.





Press Select

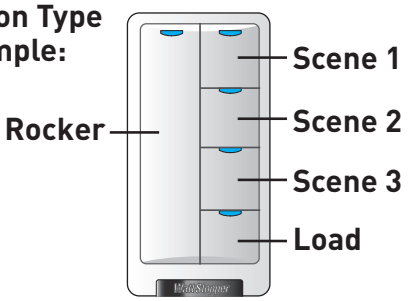


Point at Switch, Press Select, All Blue LEDs on Switch Blink

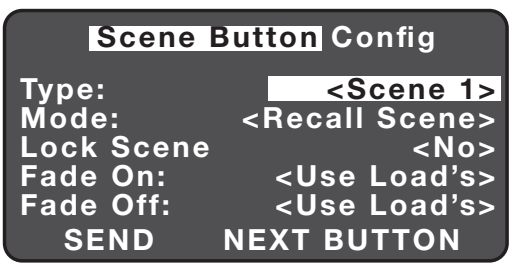
Continue Pointing at Switch, Press Button, The Button's LED Blinks

Based on whether the button pressed is a Scene Button, Load Button or Rocker Button, one of the following screens is presented.

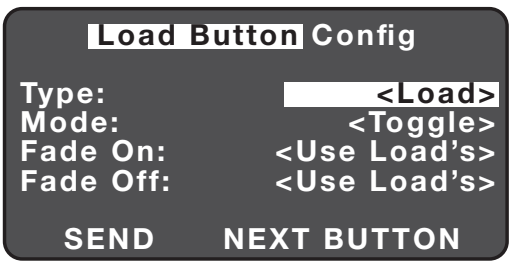
Button Type Example:



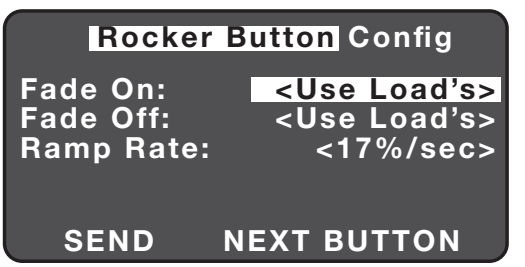
Scene Button



Load Button



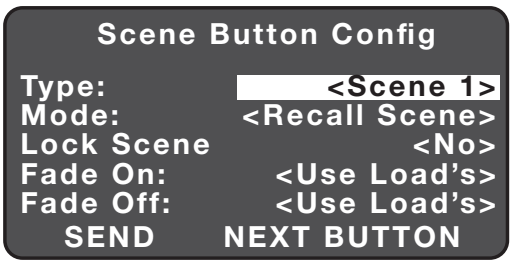
Rocker Button



Scene Button Parameters

Type

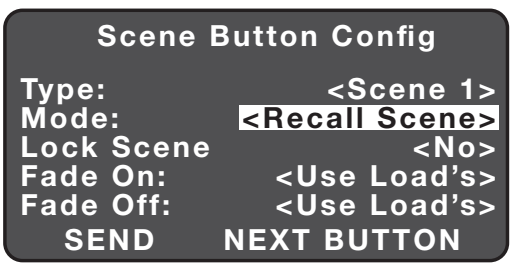
You may change the button type by scrolling through the values for Type. The options are Scene 1 through Scene 16 or Load. If you select Load and press ▼, a new screen appears containing adjustments particular to Load buttons (see Load Button Parameters on page 24).



Choose <Scene 0-16> or <Load>

Mode

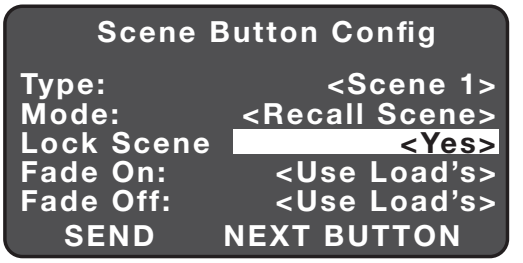
Mode options for Scene buttons are:



Choose <Recall Scene>, < Scene Off> or <Recall/Off>

- **Recall Scene** (default). Each time the button is pressed turns ON the scene.
- **Scene Off**. Each time the button is pressed turns OFF the scene. Note: when Scene Off mode is set, the blue LED on the button is never lit.
- **Recall/OFF** is similar to a toggle function, pressing the button once when the scene is not active recalls the scene; a subsequent button press while the scene is active turns OFF all members of the scene.

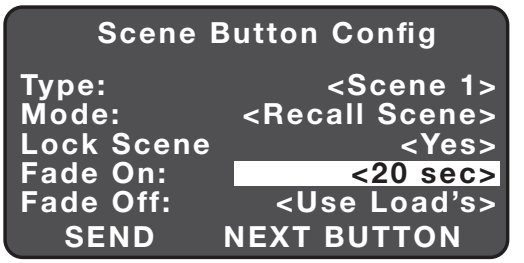
Lock Scene



Choose <Yes> or <No>

Lock Scene options are Yes and No. Selecting Yes limits the button function to executing the scene per the Mode setting; light levels for the assigned scene can not be recorded from this scene button. A user can record the scene light level from this button if Lock Scene is No.

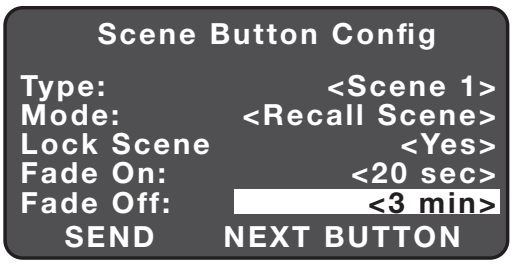
Fade On, Fade Off



Choose <Use Load's> or <None up to 18 hours>

Fade On and Fade Off determines how much time it takes for the loads to reach their target levels when this button is pressed.

The fade time defaults are Use Load's. By default, all loads in a scene carry a two second ON and OFF fade time. Each button can be set for different fade times independently for the same scene. Application: This feature allows the user to recall a scene quickly from one button, but from another button the scene recall is much slower and gradual.

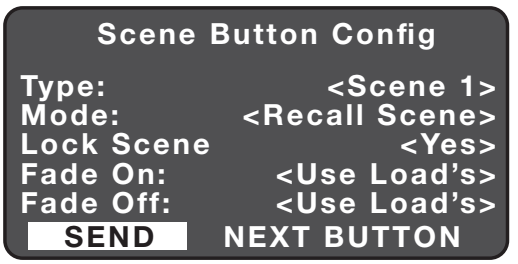


Choose <Use Load's> or <None up to 18 hours>

Fade time value options are from None (immediate) to 18 hours in duration. As you scroll through the values, the units of measure change from seconds to minutes to hours.

Send

Choosing SEND and pressing Select saves the new settings to this button. After pressing select, the "Point at Switch" screen is presented. From this screen you can either configure another button or exit Button Configuration.



Choose SEND

Press Select

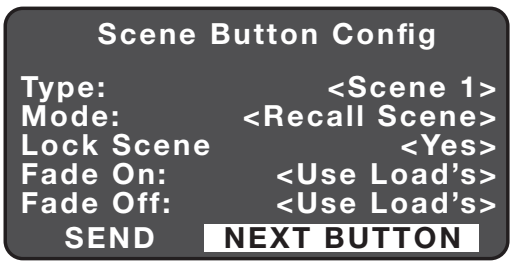
Point at Same Switch, Press Select

To Exit , Press HOME

Next Button

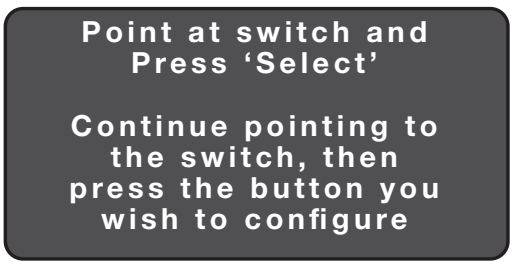
Important: After configuring a button, always choose SEND before going to the next button. New settings are not saved until sent to the button.

To configure another button, press ▲ once to go directly to NEXT BUTTON, or press ▼ to scroll down to NEXT BUTTON. Press Select to bring up the screen instructing you to "Point at switch and Press 'Select'. Follow the instructions on this screen.



Choose NEXT BUTTON

Press Select

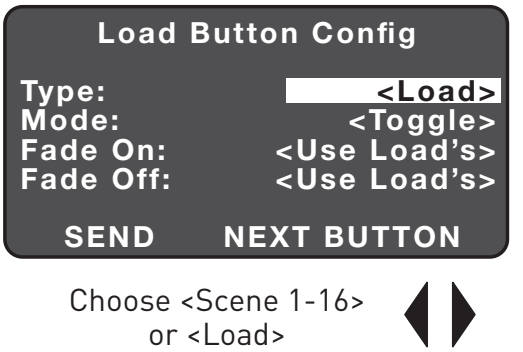


Point at Switch, Press Select. Then, press the button; it's LED starts blinking.

Load Button Parameters

Type

You may change the button type by scrolling through the values for Type. The options are Scene 1 through Scene 16 or Load. If you select Scene 1 through 16 and press ▼, a new screen appears containing adjustments particular to Scene buttons (see Scene Button Parameters on page 21).

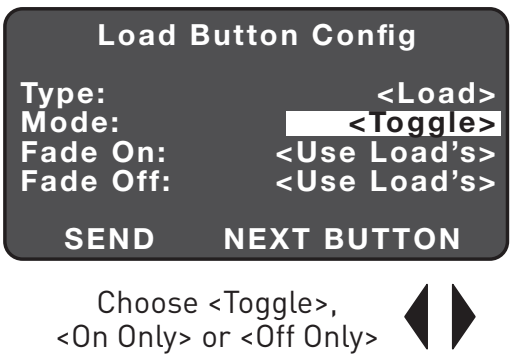


Choose <Scene 1-16> or <Load>

Mode

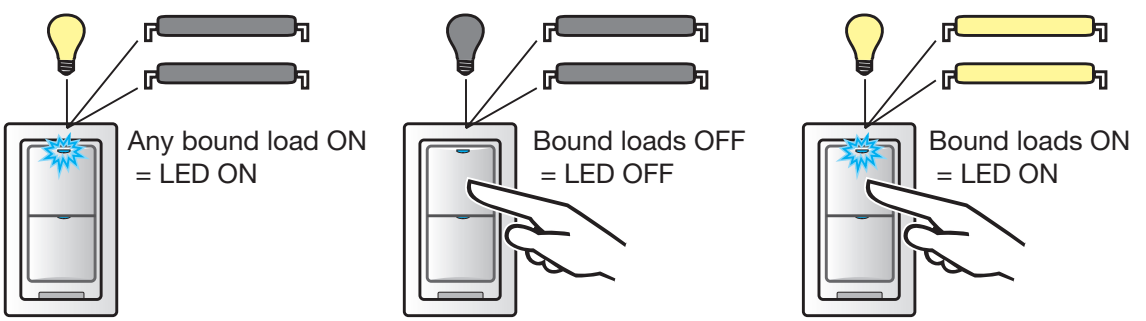
Mode options for Load buttons are Toggle (default), On Only and Off Only.

In On Only or Off Only mode, each button press only causes the associated action.

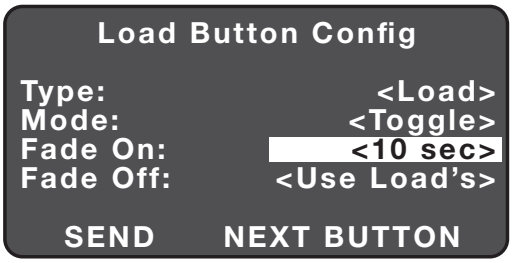


Choose <Toggle>, <On Only> or <Off Only>

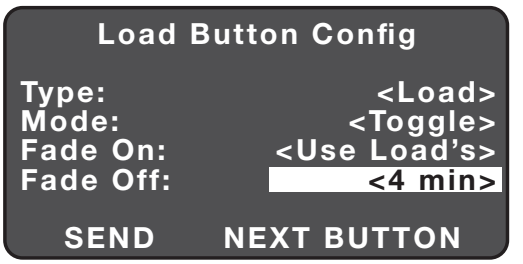
In Toggle mode, if there are multiple loads bound to a button and any load is ON, the LED will be lit. Pressing the button turns OFF all loads and the LED on the button turns OFF. Pressing the button again turns ON all loads bound to the button.



Fade On, Fade Off



Choose <Use Load's> or <None up to 18 hours>



Choose <Use Load's> or <None up to 18 hours>

Fade On and Fade Off determines the time that it takes for loads bound to this button to reach the target level.

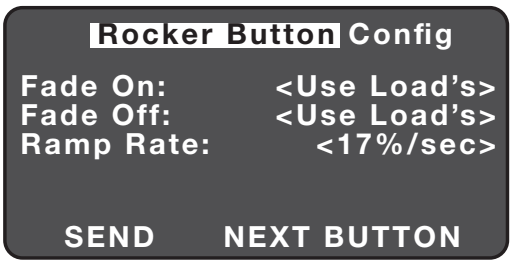
The fade time defaults are Use Load's. By default, all loads carry a two second ON and OFF fade time. Each button can be set for different fade times independently for the same loads, allowing fast or slow load fade, depending on the button pressed.

Fade time value options are from None (immediate) to 18 hours in duration. As you scroll through the values, the units of measure change from seconds to minutes to hours.

Send, Next Button

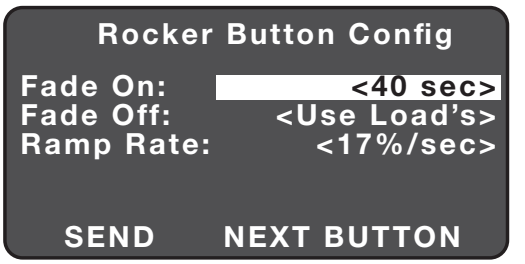
These selections are described on page 23.

Rocker Button Parameters

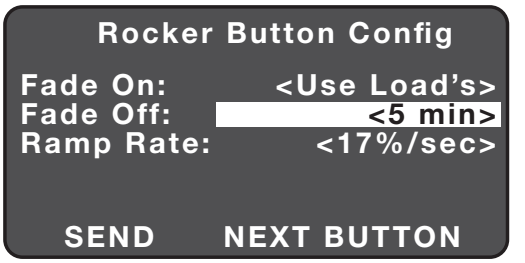


A rocker button, or paddle, is a type of load button. It cannot be changed to be a scene button. Parameter options are Fade On, Fade Off, and Ramp Rate.

Fade On, Fade Off



Choose <Use Load's> or <None up to 18 hours>



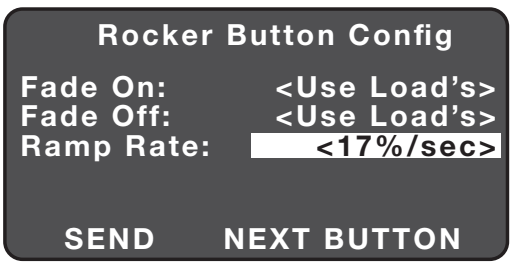
Choose <Use Load's> or <None up to 18 hours>

Fade On and Fade Off determines the time that it takes for loads bound to this rocker to reach the target level.

The fade time defaults are Use Load's. By default, all loads carry a two second ON and OFF fade time. Each rocker and button can be set for a different fade time independently for the same loads, allowing fast or slow load fade depending on the button or rocker used.

Fade time value options are from None (immediate) to 18 hours in duration. As you scroll through the values, the units of measure change from seconds to minutes to hours.

Ramp Rate



Ramp Rate determines the speed (or rate) at which the light level of bound loads increases or decreases when the top or bottom of the rocker is **pressed and held**. The default value is 17%/second which means that it takes approximately 6 seconds to ramp from 0-100%.

Send, Next Button

These selections are described on page 23.

DIMMING CONFIGURATION

Dimming Configuration enables communication between the load and the LMCT-100. Use this function to change dimming parameters.

Refer to the DLM Dimming System Addendum for further information and system requirements.

Press Select

Press Select

Load 1 quickly turns ON and OFF (or OFF and ON depending on its original state).

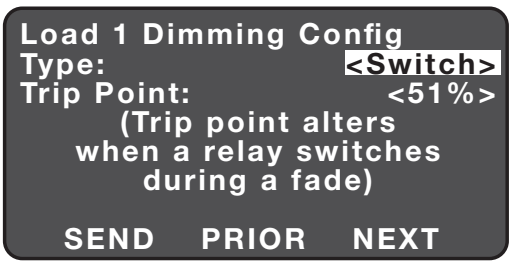
Based on the room controller type (Dim or Switch) one of the following screens is presented for load 1.

Type: Dimming

Choose Load Type: Dim or Switch

Press

Type: ON/OFF Switch



Choose Load Type: Dim or Switch

Press

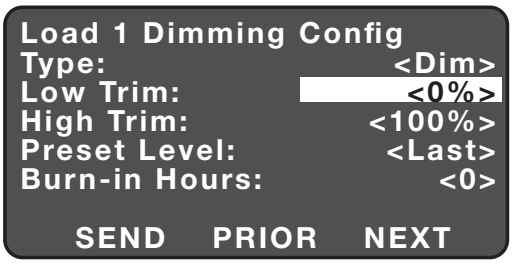
Important: All loads connected to dimming capable room controllers default to Load Type <Dim>. Be sure to select the appropriate load type because these room controllers can control either type of load. Default settings are based on the load type selected.

Dimming Load Parameters

Refer to the DLM Dimming System Addendum for further information and system requirements.

Low Trim

Entering a Low Trim value limits how low a load is allowed to dim. This overrides any other light level settings. The value options are 0-99% in 1% increments.



Choose Low Trim:
<Last> or <0-99%>

High Trim

Entering a High Trim value limits how high a load is allowed to dim. This overrides any other light level settings. The value options are 1-100% in 1% increments.

Choose High Trim:
<Last> or <1-100%>

Preset

Entering a Preset value causes the lights to go to this light level each time they are turned on. By default, the value is set to Last, which turns the load on to its last used level. The value options are Last or 1-100% in 1% increments.

Choose Preset Light Level:
<Last> or <1-100%>

Burn-in

This feature allows the user to burn-in, or season, all of the lamps associated with the load. This is most often done to fluorescent lamps to insure stabilization of the lamp and/or dimming compatibility.

Choose Burn-in Hours
<0, 12 or 100>

The value options are 0, 12 or 100 hours. If 12 or 100 hours is entered, then the associated lights remain at 100% light level at any time they are turned ON until the number of hours have elapsed. The light may be turned ON or OFF as desired, however they do not respond to dimming during this time.

Send

Choosing Send and pressing Select saves the new settings to load 1. After pressing select, the "Point to any IR enabled device" screen is presented. From this screen you can either configure another load or exit Dimming Configuration by pressing the HOME or BACK buttons.

Choose SEND

Press Select

To Configure Next Load
Point at Device, Press Select

To Exit , Press HOME

Next

Important: After configuring a load, always choose SEND before going to the next load. New settings are not saved until sent to the load.

To advance to the next load, press ▲ once to go directly to NEXT, or press ▼ to scroll down to NEXT. Press select.

Choose NEXT

Press Select

To Configure Next Load Point at Device, Press Select

Prior

To go to the prior load, press ▲ or ▼ to scroll to PRIOR. Press select.

Choose PRIOR

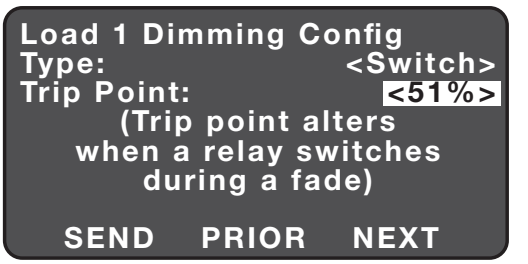
Press Select

To Configure Prior Load Point at Device, Press Select

Switched Load Parameters

For a Switched load, the only parameter that is adjustable is the Trip Point. The Trip Point determines at what point in a ramp or fade the load turns ON or OFF. The value options are 1%, 25%, 75%, 51% or 100%. The default is 51%.

Choose Switch



Choose Desired Trip Point
<1%, 25%, 51%, 75% or 100%>

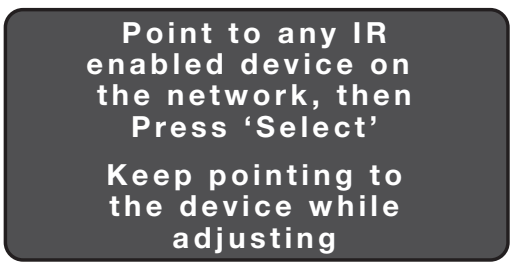
Send, Next, Prior

These selections are described on pages 29-30.

ADJUST LIGHT LEVEL

Adjust Light Level enables communication between the load and the LMCT-100. This feature allows a user to manually adjust the light level of a load without the need for a dimming switch or load button. This is particularly useful for setting scenes.

Press Select



Press Select

Keep pointing to the device while adjusting

Press the right or left arrow to select load. The selected load quickly turns ON and OFF.

Press the up or down arrow to adjust light level

A quick tap on ▲ turns ON the selected load, a quick tap on ▼ turns OFF the load. Pressing and holding ▲ ramps the light level up, pressing and holding ▼ fades the light level down.

Exit

Press HOME when done

TROUBLESHOOTING

Problem: Display doesn't come on when I press the Power On button.

1. Make sure batteries are installed correctly.
2. Make sure batteries are good.

Problem: Error message when the LMCT-100 requires a response from a device.

Press Select to return to the Home menu, then re-select the menu function.

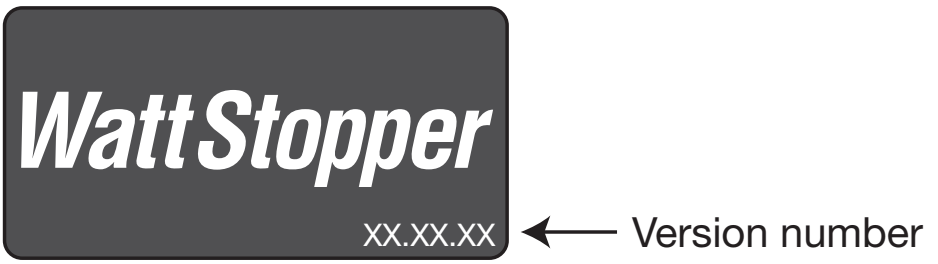
Problem: If the LMCT-100 still can't get a response from the device:

1. Point to the device and try again.
2. Make sure you are pointing at the correct type of device.
3. Make sure the device is within range.
4. Make sure the device you are pointing at is powered and connected to the DLM Local Network.
5. Make sure the device is IR equipped.
6. Make sure the IR lenses on the device and the LMCT-100 are clean.
7. Check batteries.

Problem: The Home Menu does not display all the configuration functions described in this manual.

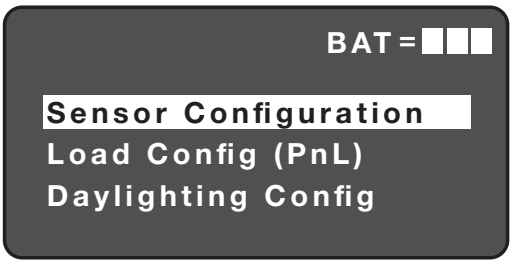
Explanation: Check the Start-up Screen for version number.

Start-up Screen

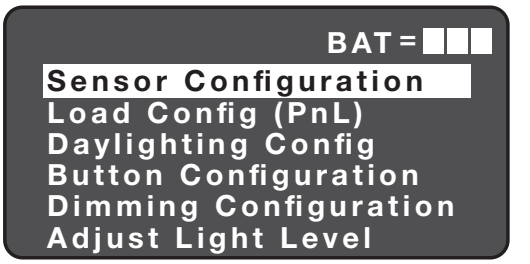


Home Menu

Version 03.02.20 or 04.02.20



Version 03.02.21 or 04.02.21



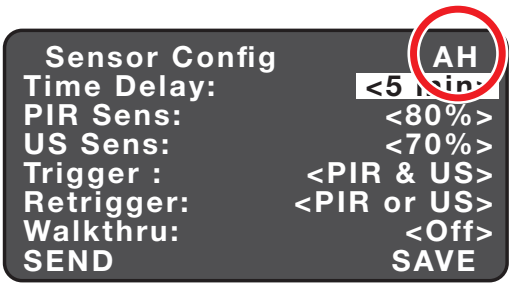
If using a LMCT-100 version prior to 03.02.21 or 04.02.21, configuration functions are described on pages 1 through 19.

Problem: A parameter value field shows <????>.

Explanation: If <????> appears in any value field, the current setting is invalid. Adjust the setting to one of the valid options.

For other questions concerning versions, contact Technical Support.

Problem: An "AH" appears in the upper right corner on the menu title line. For example:



Explanation: There are two sets of parameters in every device, one for normal hours, which is the default configuration, and one for After Hours. "AH" is a flag that appears on a screen if the device that the LMCT-100 is communicating with is in After Hours mode.

If this indicator does not appear then the device or load is in Normal Hours.

Parameters changed while in one of these modes will be changed for that mode only.

After Hours parameters are only available in network systems where a Segment Manager is used to set After Hours schedules for a load or device.

Problem: I need more information about the DLM System.

1. The DLM System Installation Guide, Dimming System Addendum, and Segment Management Networking Addendum are available at www.wattstopper.com ⇨ Resources ⇨ Downloads ⇨ Installation Instructions ⇨ Digital Lighting Management.

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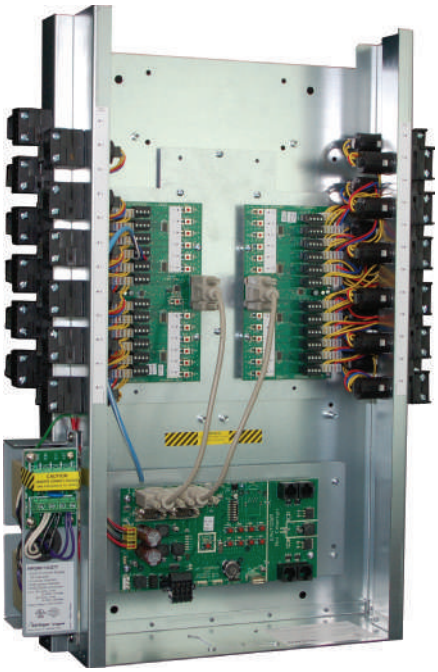
Relay Panel Interiors

Panel with Digital Lighting Management Support

Models: LMCP8, LMCP24, LMCP48

User Manual



SPECIFICATIONS

Input voltage...115/277V 60 Hz, 120/347V 60 Hz, 240V 60 Hz
Class 2 connection to two independent DLM local networks...
24VDC output, up to 250mA across 2 RJ45 ports per local network (A and B networks, 250 mA each).
Free-topology DLM local network segments may include Digital Lighting Management (DLM) switches, occupancy sensors, daylight sensors and input modules; Category 5e cable, up to 1,000 ft. total per local network
Terminals for connection to DLM segment network (BACnet MS/TP)
Segment network parameters
WattStopper LM-MSTP wire
Linear topology; 4000 ft. maximum per segment
Auxiliary power (jumper selectable)
LMCP8.....N/A
LMCP24.....650 mA @ 15VDC, 400 mA @ 24VDC
LMCP48.....650 mA @ 15VDC, 400 mA @ 24VDC
.....15VDC to power Segment Manager
.....24VDC for Class 2 accessory devices

HDR relays:
Coil voltage, 24 VDC, pulse ON and pulse OFF
Mechanically latched contacts
½" K.O. mounting, LV plug-connection, individually replaceable

Contact ratings:
@ 277V .....30 amps ballast
@ 347V..... 20 amps ballast
@ 120V.....20 amps tungsten
@ 347V.....30 amps resistive
@ 120V.....1.5 HP

SCCR (short circuit current rating) 14,000 amps with HDR Heavy Duty Relay
Operating conditions:
..... for indoor use only
.....32-140 °F (0 – 60 °C)
..... 5-95% RH, non-condensing
UL and CUL listed

WattStopper®

Santa Clara, CA 95050

CONTENTS

LIST OF FIGURES

INTRODUCTION

The LMCP series panel provides simple network-capable lighting control enabling the automation of lighting functions throughout an entire facility. The HDR relays in the panel can respond directly to inputs from Digital Lighting Management (DLM) switches, occupancy sensors, daylight sensors, and input modules.

Figure 1: Panel interior and enclosures

Relays in each LMCP panel can be assigned to up to 99 automation groups in any combination. There are 99 groups per panel, 254 schedules per panel and 32 dark/light per panel. Photocell operations are set up via an LMCT-100 handheld configuration tool. A group can also respond to schedules sent from a BACnet-enabled building automation system (BAS). Individual relays, or groups of relays, can also be controlled by DLM digital switches, occupancy sensors, LMLS series daylight sensors, and LMIO series input modules. DLM devices are assigned to relays using Push n' Learn directly from the user input device, or via an LMCT-100.

Multiple panels may be networked together for global control operation without the use of a BAS. The LMCP panel also provides a native-BACnet integration solution via BACnet MS/TP. Relay, group, and control device status, including occupancy sensor status, are available as BACnet objects.

LMCP panels provide effective, code-compliant control of building exterior lighting as well as larger interior areas to provide centralized control for the panels. Recommended applications include office building lobbies, corridors, loading docks, etc., as well as school gymnasiums, commons areas and hallways. LMCP panels are also ideal for retrofit scenarios where mounting control equipment near existing branch circuit breakers is beneficial and digital switch and sensor devices and load parameter configurability are required to meet complex operational sequences.

Before installing the LMCP, read the instructions completely. For any questions, call our Technical Support team at: 800.879.8585.

Important Installation Notices

- All power must be turned OFF prior to wiring, installation or service.
- More than one disconnect may be required to de-energize power to the LMCP.
- External circuit protection to the LMCP is required (e.g., circuit breaker).
- Installation shall be in accordance with all applicable regulations, wiring practices, and codes.
- Care should be taken not to mix Class I and Class II wires.
- Do not energize wiring until the unit is fully assembled and connected circuits have been tested and found to be free of electrical shorts.
- The LMCP is ESD sensitive. Observe precautions.

WARNING

THE DB9 CABLES CANNOT BE PLUGGED IN OR UNPLUGGED WITHOUT POWERING DOWN THE PANEL.

WARNING

IMPROPER INSTALLATION OR CONNECTION OF THIS PANEL MAY RESULT IN SERIOUS PERSONAL INJURY AND/OR DAMAGE TO THE PANEL AND OTHER DEVICES.

LMCP24

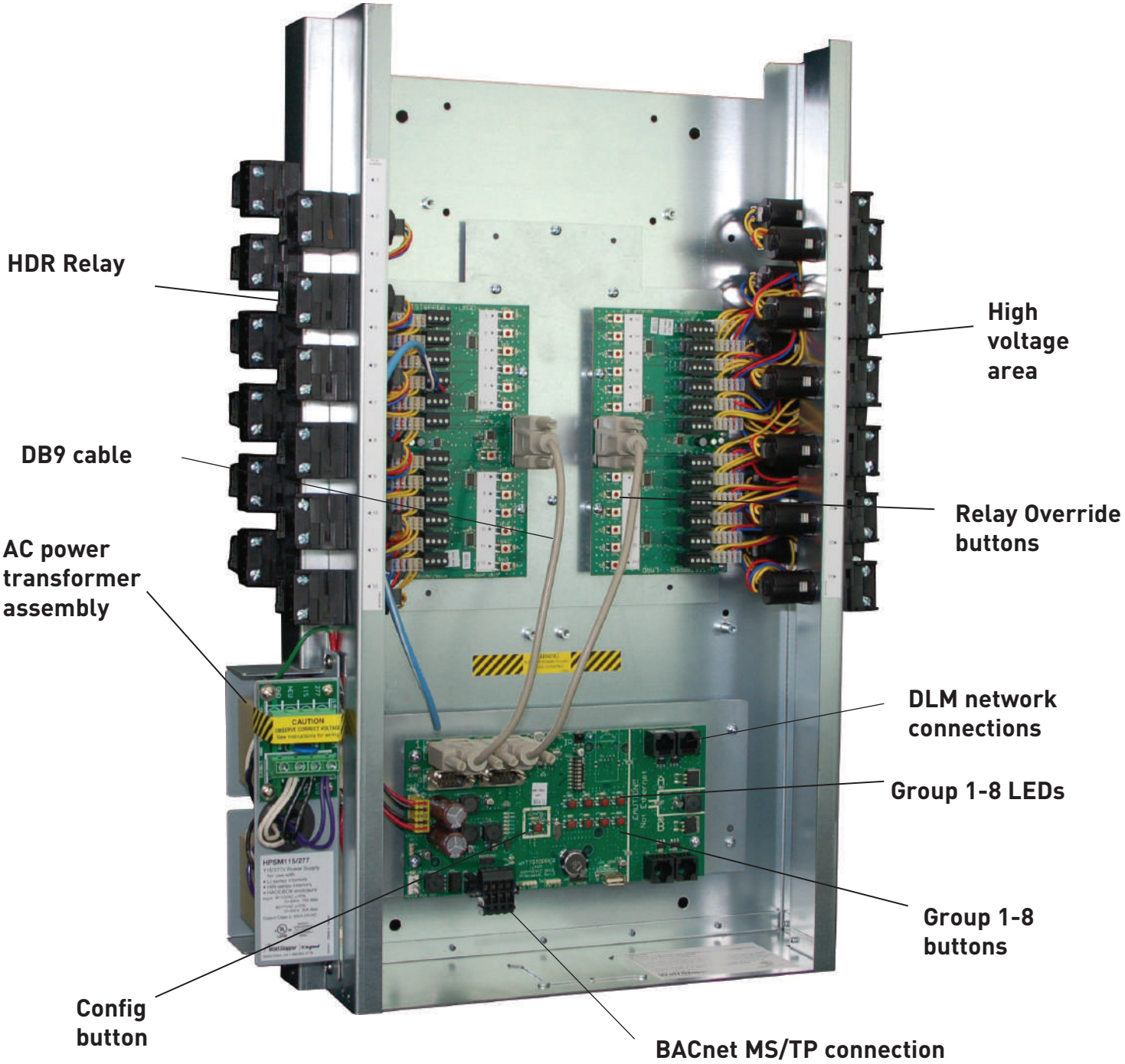


Figure 2: Components

A. Mount the LMCP Enclosure

1. Attach the enclosure to the wall. The enclosure should be level, plumb and rigidly installed. Refer to the instructions provided with the enclosure for flush or surface mounting procedures.
2. Determine the appropriate wire entry locations. Make sure that all line and low voltage wiring entry locations are confined to the appropriate compartments as shown in the figure below.

   Do not run low voltage wiring with line voltage or power wiring.
3. Drill or knock out openings to bring wiring conduit into the enclosure.

CAUTION

OBSERVE LINE AND LOW VOLTAGE SEPARATION WHEN ROUTING CONDUIT AND WIRE

B. Install the LMCP Interior

Do not install the interior assembly until after the LMCP enclosure has been securely mounted to the wall and the conduit/wiring holes have been drilled or knocked out.

Note: If this enclosure includes the optional DMP-1 Din Rail Mounting Plate, place DMP Plate over lower studs before installing the interior.

1. Place the interior in the enclosure and align the interior with the studs provided in the enclosure.
2. Attach the interior assembly to the back of the enclosure using the four sets of nuts and washers provided.
3. After all wiring is completed, attach the cover according to the instructions provided with the enclosure.

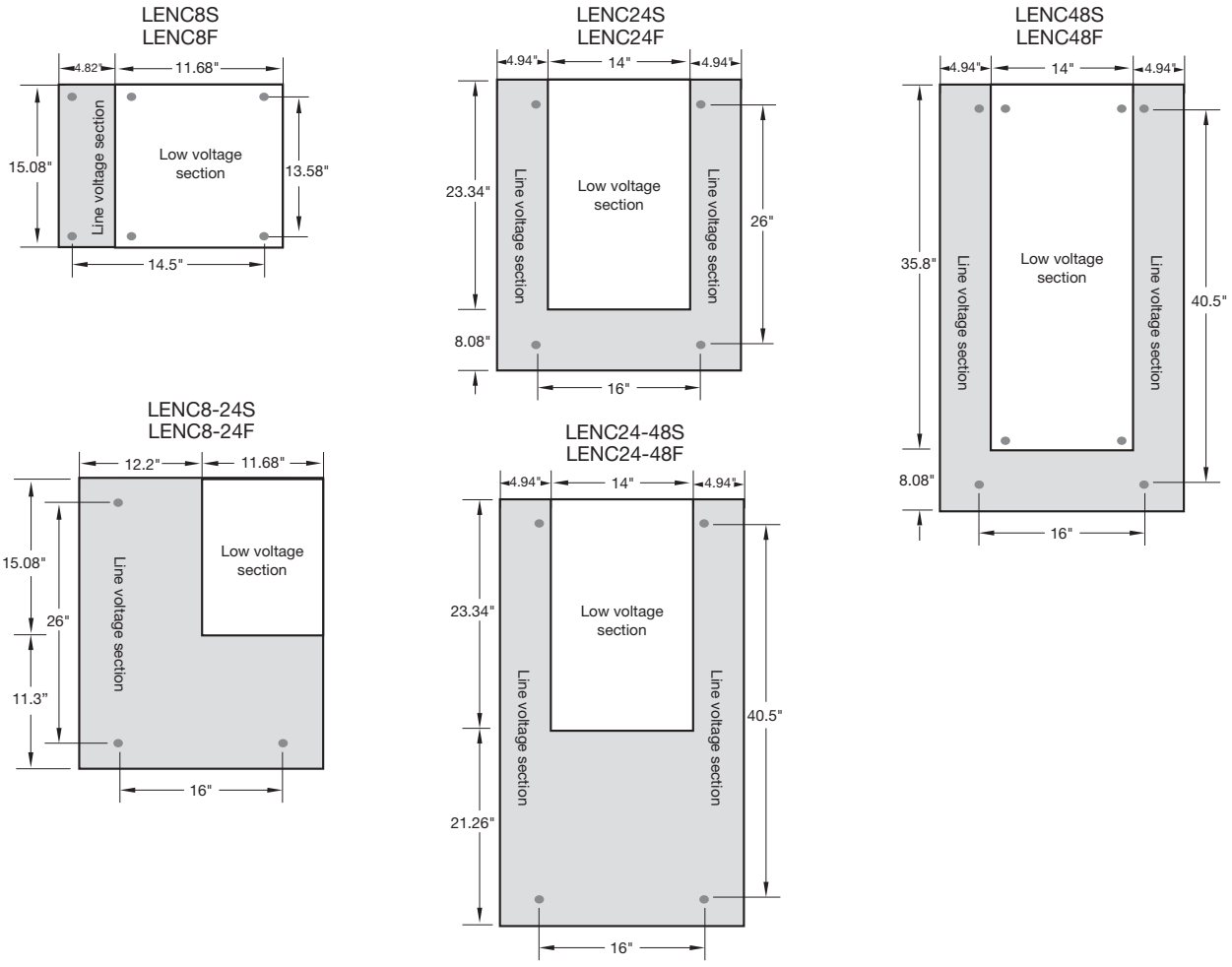


Figure 3: Enclosure dimensions

C. Connect the AC Power Supply to Power Source

The LMCP has several power supply options that allow it to operate with 115VAC, 240VAC single phase, 277VAC or 347VAC line voltage. These power supplies function with either 50 or 60 Hz. They have internal overcurrent protection. The transformer automatically turns OFF when overloaded and resets when the fault is removed. The power supply contains MOVs to protect all downstream electronics from transient powerline voltage surges.

CAUTION

VERIFY WHETHER THE SUPPLY LINE VOLTAGE IS 115VAC, 240VAC, 277VAC, OR 347VAC AND THAT THE POWER SUPPLY IN THIS PANEL MATCHES THAT LINE VOLTAGE. WIRING TO THE INCORRECT VOLTAGE TERMINAL MAY RESULT IN DAMAGE TO THE POWER SUPPLY AND/OR THE PANEL, AND WILL VOID THE PRODUCT WARRANTY.

1. Read and remove the CAUTION label covering the terminals.
2. Note that there are different terminals for supply voltage input.
   Wire to **ONLY ONE** of these terminals. Match the input voltage to the correct terminal.

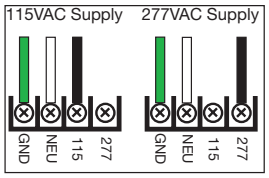


Figure 4: P115/277 wiring

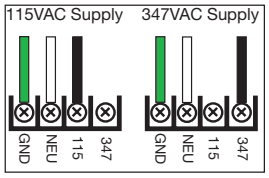


Figure 5: P115/347 wiring

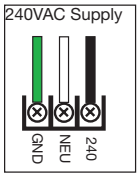


Figure 6: P240 wiring

D. Connect Load and Line Voltage to Relays

Before making any connections to the relays, make sure that none of the load circuits are shorted. Route conductors from the circuit breaker through each relay's SPST output terminals, and from there to the loads. Confirm that each circuit is wired to the relay specified in the electrical construction drawings and relay schedule forms provided with the panel.

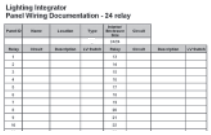

Lighting Integrator
Panel Wiring Documentation - 24 relay

Figure 7: Relay Schedule form

Power Up and Test Relays

1. Apply power to the LMCP power supply ONLY.
   Do NOT apply power to the controlled circuit loads.
2. Locate the relay control buttons on the Relay Driver card next to each relay's 5-wire plug-in termination. Press the relay control button to toggle it ON/OFF. The relay clicks, the relay's mechanical override switch moves and the LED status indicator changes.
3. Confirm the operation by measuring the continuity at the line voltage terminations of each relay.
4. Apply power to the relays.
5. Being careful not to touch any line voltage wiring, toggle each relay ON/OFF again and confirm that each relay controls the appropriate load.

Load Binding to Groups (SmartWire)

The panel enters and exits the load binding mode by pressing the Group button for groups 1-8, LMCT-100 for 1-99. Only the LED associated with the relay turns on.

Groups are assigned through the LMCT-100. See the screens later in this user manual to see how to assign groups using SmartWiring. Group buttons 1-8 toggle their respective group when pressed and released for loads in this panel only. The panel enters SmartWire mode (binding panel loads to a group) for Group 1 to 8 when pressed for at least 5 seconds and held. The panel exits SmartWire mode and saves group members when pressed while in SmartWire mode.

Group LED - Indicates the status for Group 1 to 8 for loads in this panel only, where any member load ON indicates ON, and all member loads OFF indicates OFF. Blinks during SmartWire mode.

While in SmartWire mode, press the button associated with each relay to create a grouping of relays that may then be bound to a DLM device.

Alternately, relays can be assigned to DLM devices using an LMCT-100 (described later).

Groups

With a number of panels connected together on an MS/TP network segment, a group function allows a button on a DLM switch connected to one panel to be capable of controlling relays in any number of panels simultaneously. The LED on the button automatically tracks the composite state of the group such that if any member is on, the LED is on.

Groups also provide the mechanism to facilitate BACnet control of relays spanning multiple panels. Object support for accessory devices is identical to that described in Technical Bulletin 175 (available at www.wattstopper.com). The only panel-specific BACnet objects are BV201-299 for Channel Occupancy Control. Writing TRUE to a channel BV will transition the member relays of its controlled Group to Unoccupied, also referred to as After Hours operation. Writing FALSE to a channel BV will transition the member relays of its controlled Group to Occupied, also referred to as Normal Hours operation. Normal Hours operation is the default state for a given channel thus After Hours mode must be activated. While BV201-299 controls Channels 1-99, and the member relays for each Channel are Groups 1-99 by default, the Group number controlled by Channels 1-99 is software configurable. For example, BV1 may be programmed to control Group 317. Thus, while only 99 Channels may be scheduled via BACnet objects, those 99 Channels are allowed to be any of the 65,534 possible system Groups (Channels are occupied or unoccupied. Groups are the set of relays affected by the channel. Groups can turn on an off without their occupancy status changing. Occupancy status is changed by controlling the channel). Full group support is only recommended in conjunction with the LMCS WattStopper configuration software. Writing the BV channel object for any one panel results in a global action for all panels that have relays that are members of the group associated with that channel.

Each panel supports 99 groups numbered 01-99. Groups 1-8 can be programmed via the panel pushbuttons on the LMPI card or LMCT-100. Groups 1-99 can be programmed via the LMCT-100.

A group action (button press, etc.) will always broadcast across the network. Every panel that has a group configured with the target group number responds to the action. Group set up is a local function that is conducted at each panel location.

Groups have settings that affect the normal hours/after hours mode of the loads that are assigned to the channel. Each Group offers a choice of macros (pre-defined parameters). The 5 available Group macros have the following intended use cases:

Manual

Transition AH>NH: Do nothing
Transition NH>AH: Do nothing
Time Delay NH: 0 min
Time Delay AH: 0 min
Blink: 5 min
Sensor NH: OffOnly
Sensor AH: OffOnly

Override Time AH

Transition AH> NH: Turn on
Transition NH> AH: Turn off
Time Delay NH: 0 min
Time Delay AH: 120 min
Blink: 5 min
Sensor NH: OffOnly
Sensor AH: OffOnly

Sensor Day Disable

Transition AH> NH: Turn on
Transition NH> AH: Turn off
Time Delay NH: 0 min
Time Delay AH: 120 min
Blink: 5 min
Sensor NH: Follow On Only
Sensor AH: Auto

Sensor Man-On NH

Transition AH>NH: Do nothing

Transition NH>AH: Turn off

Time Delay NH: 0 min

Time Delay AH: 120 min

Blink: None

Sensor NH: OffOnly

Sensor AH: Auto

Sensor Auto

Transition AH>NH: Do nothing

Transition NH>AH: Do nothing

Time Delay NH: 0 min

Time Delay AH: 120 min

Blink: 5min

Sensor NH: Auto

Sensor AH: Auto

"Manual" should be used when there are no occupancy sensors or switches associated with the Group and only on/off actions from schedules or dark/light are intended. Since no behavior changes occur with occupancy, only On/Off type actions from schedule or dark/light events should be used.

If only switches are to be used, and an override time delay is called for, override time delays need to change with occupancy and the occupancy action can be configured either to turn on relays or do nothing (manual on). The "Override Time AH" macro implements this behavior with an On action when entering Normal Hours. To implement a manual on sequence, start with the "Override Time AH" macro when creating the group, select CUSTOM, and modify the "AH > NH" action to be "Do Nothing."

For use with occupancy sensors, the "Sensor Day Disable" macro implements a sequence of operations where all loads are manual on and manual off during Normal Hours, with no override time delay. On transition to After Hours, loads are swept off, sensor functionality is restored to Auto On/Off, and a 120 minute time delay is implemented for convenience in case some relays that share this operational time window are not bound to sensors. That way a single group could be created and scheduled without having to specifically configure relays without sensors or adding them to a separate group.

The "Sensor Man-On NH" macro is meant to address a common legacy application where relays are left off on transition to NH, occupancy sensors trigger relays on occupant arrival, but do not time out until after hours. Transition to After Hours will sweep lights off, revert sensor operation to auto ON/Off and, similarly to "Sensor Day Disable," implement a 120 minute override time delay for convenience. This is in case any relays not bound to sensors that were manual on/off during the day also share the same operational time window.

The "Sensor Auto" macro leaves sensors as auto on/off for both Normal Hours and After Hours operation, and takes no action on transition other than to implement a 120 minute override time delay. This allows for consistent functionality in response to sensors at all times while accommodating the inclusion of relays not bound to sensors that share the same operational time window.

Schedules associated with Groups

Each group can be acted on by one or many of the 254 possible events. Each schedule has a user setting that sets the schedule to be for the local panel only or to automatically broadcast to the same group in each panel. Every group is global and will be automatically broadcast to the same group in every panel. By default, one panel may be programmed with a set of schedules that broadcast to a network of panels. To apply a schedule in a stand-alone panel scenario on a network of panels, group numbers must be unique for each panel. This feature allows application of the panel in a stand-alone scenario. Or, one panel may be programmed with a set of schedules that broadcast to a network of panels.

Push n' Learn

Push n' Learn (PnL) is the method used to bind loads (relays) using sensors, LMLS-400/500 and switches via button pushes. Go into Push n' Learn by pressing and holding the Config button on the switch or sensor for 3 seconds to cycle through the loads or using the LMCT-100. Press the button to select the appropriate load. The load's light turns on when it is bound. To exit, hold the Config button for 3 seconds. The LED stops blinking.

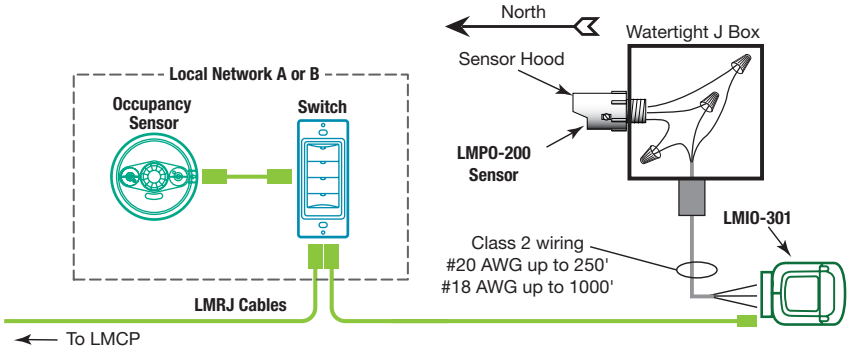


Figure 8: Connection of LMCP to LMIO-301

A primary difference in operation of the panel compared to a DLM Room Controller is that while in load configuration mode, the panel relays do not turn on in sequence as the Config button is pressed. Only the LED associated with the relay turns on. When the panel enters load binding mode, the LED for relay (load) #1 illuminates. Subsequent presses of the Config button advances the LED illumination from relay to relay. Once the last relay is reached either the sequence returns to relay #1 or advances to the Room Controller on the local bus with the most significant serial number. Load action on the Room Controller(s) is DLM standard "load on" action. Binding is accomplished to the DLM devices per DLM standard.

PnL vs SmartWiring

PnL is initiated from the device itself by the Config button or the LMCT-100. Each relay is then associated with the requesting device in exactly the same way that a Room Controller load can be bound to more than one button or more than one button can be bound to a Room Controller load. Creating this association does not create a group even if more than one relay is bound. Schedules and Dark/Light events cannot control PnL relay list associations.

Group creation (SmartWire) is initiated from the panel by one of the 8 channel buttons or the LMCT-100. One or more relays are then associated with a Group. If the LMCT-100 is used, DLM loads, as well as the panel relays can also be included in the Group, and the overall behavior of the member relays can be configured at the same time by choosing one of the parameter macros. Groups can be controlled either by associating a button (activated during or configured after SmartWire), or by associating an event such as a Schedule or Dark/Light criteria (configured after SmartWire).

To clarify, PnL is done one relay at a time, associating multiple DLM device inputs. SmartWire is done one or more relays at a time, associating multiple inputs, to a single group that can be later associated with other inputs or events.

Accessory Device Support

Each CAT5 DLM Room Network port, labeled A and B, supports a maximum of 48 communicating devices with the panel itself counting as one device, for a maximum of 94 possible accessory devices per panel. A network that has fewer than 5 accessory devices supports a maximum of 900' of total CAT5 cabling with no minimum or maximum spacing between devices. For example, each of the 5 devices could be separated by a 10' LMRJ (4 total) and the first switch could then be 860' from the first panel. Adding additional accessory devices beyond 6 total allows for a maximum network length of 1000' for each channel.

Analog Photocell Operation

The panel's local network supports the LMIO-301 Analog Photocell Module. This module supplies the "light" and "dark" trigger for the appropriate schedule scenarios. The panel has user settings for time delay, and foot candles. The time delay is used before triggering "light" and "dark" events to establish a dead band and prevent flutter. Only one LMIO-301 per panel can be programmed via the LMCT-100; more can be connected through LMCS support.

Occupancy Sensor Operation

The panel's local network supports all models of DLM occupancy sensors. Any number of occupancy sensors may be PnL'd to control the same relay(s) in the local panel. In this case, all sensors must time out before the relay(s) turn off.

LMLS-400, LMLS-500 Daylight Sensor Operation

DLM daylight sensors connected on the panel's local network are capable of controlling relays in the panel as switching loads.

Wiring

The LMCP can only be wired to 2-wire momentary type of switch.

Both pilot common and override common signals are electrically the same; they are provided for convenience to be able to land both wires independently without the use of a wire nut (see LMRD Circuit Board, Fig 10).

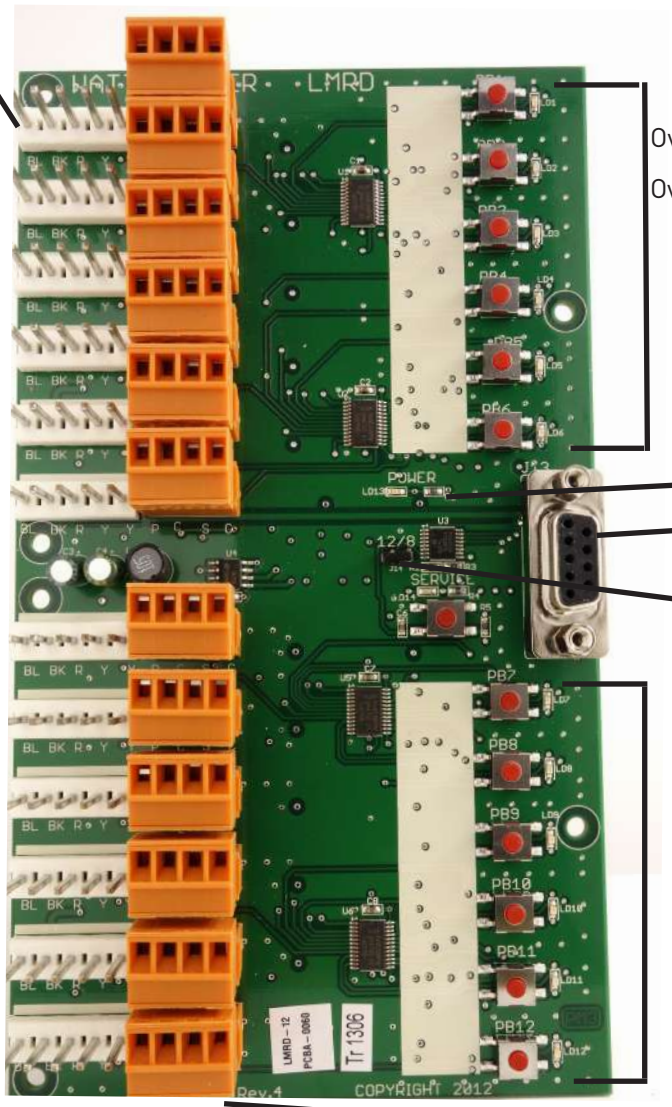
If both the pilot light and the momentary switch are part of the same device, then it is likely that there will be a single "common" or "ground" signal; it can be wired to either of the terminals labeled C.

Figure 9: 2-wire momentary switch wiring

III. OPERATION GUIDE

The LMCP contains two circuit boards: the upper board is the LMRD and houses the relay override buttons and LEDs, relay plugs, remote input and pilot plugs (see Fig. 10). The lower board is the LMPI and houses the group buttons, group LEDs, dip switches, RJ-45 jacks, DB9 connections and Config button (see Fig. 11). The two boards are connected by DB9 cables. It is important that the top left cable is connected from the connection of the LMRD to the top left connection of the LMPI (1). The second cable is connected from the connection to the top right connection of the LMPI (2). See Fig.2. Connections 3 and 4 are not used in the LMCP24; they are used in the LMCP48.

Power to the relays comes from the transformers through the LMPI and into the LMRD boards. There are two networks, network A and network B. Each network has 2 RJ-45 jacks. It is not important which jacks are used. DLM devices such as the LMIO-301 and LMLS-400 or LMLS-500 connect to the panel via the RJ-45 jacks located on the right side of the LMPI board.



Relay connection header

Override Button 1-6

Override LED 1-6

Relay Override LED: in Pilot mode, will be ON when pilot is closed, and OFF when pilot is open. When not in Pilot mode, will be ON when relay is commanded ON, and off when relay is commanded OFF. In SmartWire mode, the LED will be ON when relay is included in Group, and OFF when relay is excluded from Group. In PnL mode, the LED will be ON when relay is selected for binding with buttons, and OFF when not selected.

Power Indication LED

DB9 cable connects to LMPI card.

Jumper for configuring whether the card drives 8 or 12 relays (jumpered by default in LMCP8 panels)

Override LED 7-12

Override Button 7-12

Relay Override Button: toggle relay ON or OFF depending on the state of LED. In SmartWire mode, selects or deselects relay to be included into a Group. In PnL mode, selects relay to be bound.

Pilot light and remote override plug

P: Pilot signal

C: Pilot common

S: Override signal

C: Override common

Can only be wired to 2-wire momentary type of switch.

Figure 10: LMRD Circuit Board

Auxiliary power is only available in LMCP24 and LMCP48 models, not in the LMCP8. It can be configured (via a jumper just above the connector) to supply either 15VDVC or 24VDC of isolated power. The micro USB port is used for upgrading firmware into the LMCP.

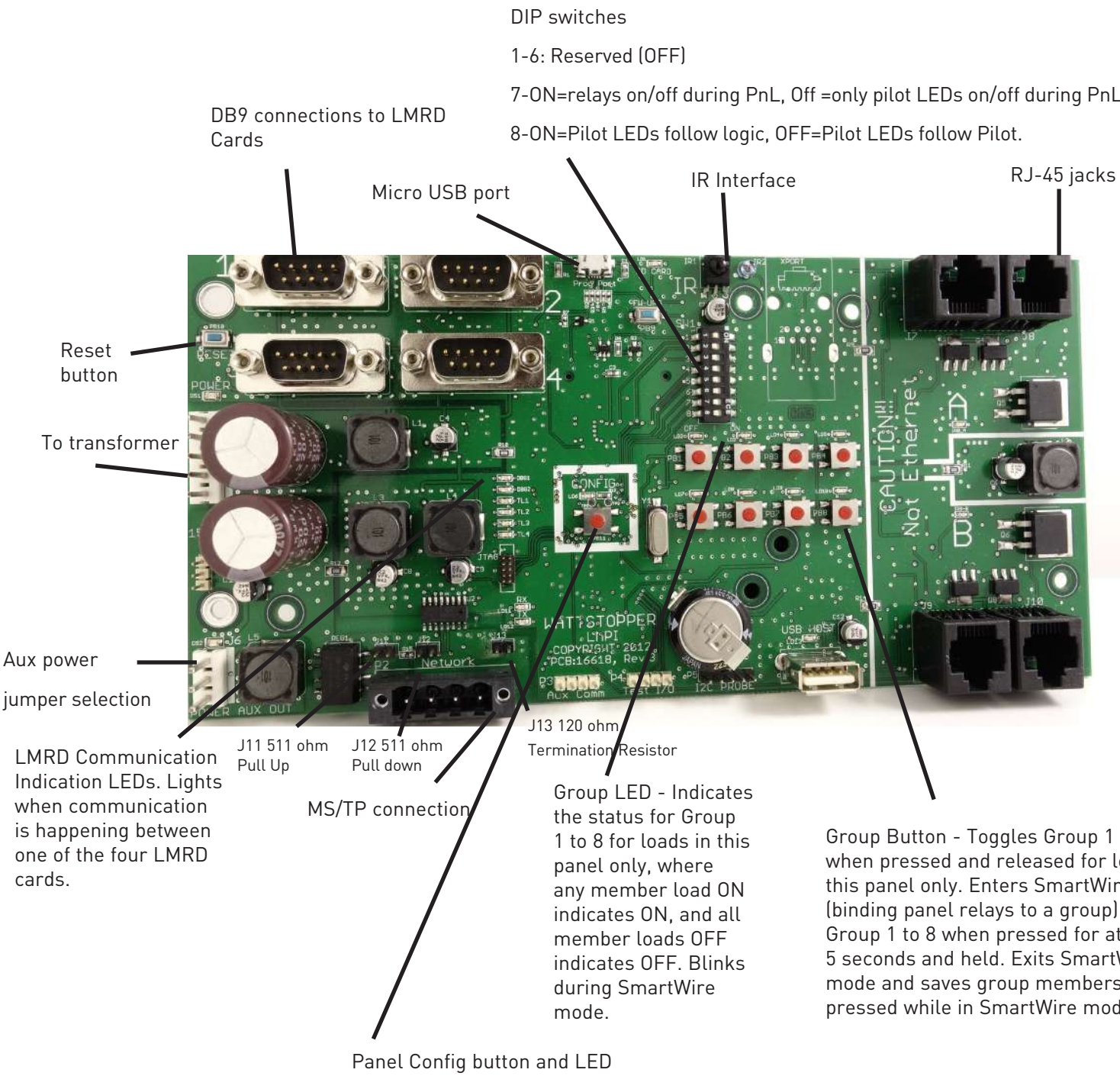
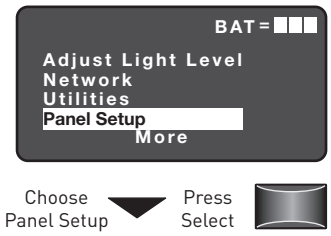


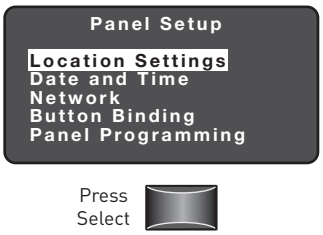
Figure 11: LMPI Circuit Board

LMCT-100 SCREENS

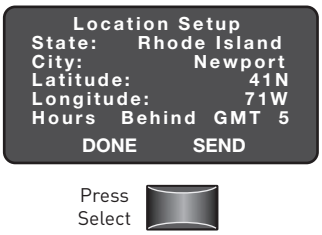
The LMCP is programmable via the LMCT-100. Refer to the following screens for detailed directions.



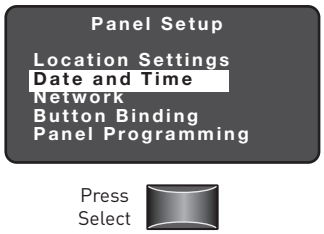
Select Panel Setup above. Point to any IR device.



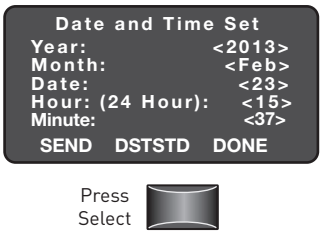
Select Location Setting from the Panel Setup menu. Point to the panel at the IR Interface shown previously in Fig. 11.



Select the desired state, and one or more city. The Latitude/ Longitude/Behind/Ahead Hours are fixed values. DONE will return to the Panel Setup Screen, as will the BACK key. SEND sends the values to the panel.

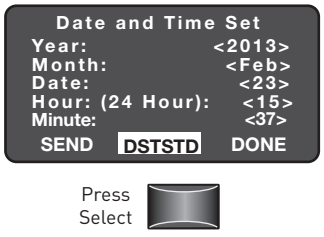


Choosing "Date and Time" from the Panel Setup Menu will prompt the user to point to the panel.

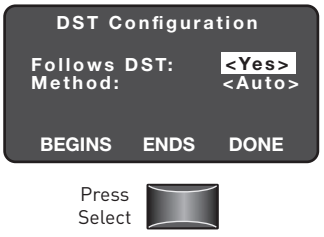


The following screen is shown after pressing select.

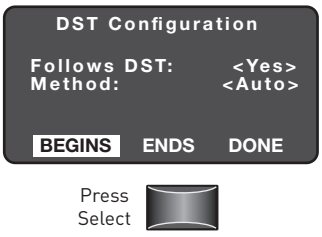
The values on this screen are static - remaining on this screen the minutes will not increase since the LMCT does not have a clock. An illegal date cannot be entered. For example, entering 2014, Mar. 31, then changing the Month to Feb, the Date would automatically be lowered to 28 (since 2014 is not a leap year). The time is set after pointing to the panel and pressing SEND.



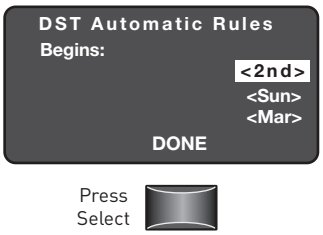
When DSTSTD is selected from the Date and Time menu, the DSTSTD Configuration Menu is shown. The default values for this are to Follow DST automatically. Changes made to the DST Configuration are sent to the panel after returning to the Date and Time screen and pressing SEND.



DST Configuration menu.

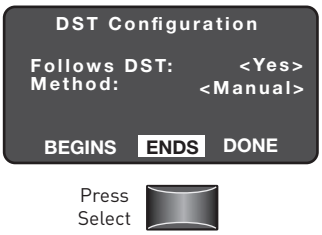


Select BEGINS and Auto.



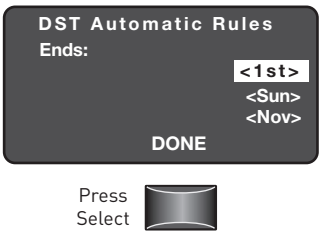
Press Select

When the method is Auto, the screen above presents the default rules for the DST begin date. Modify these by selecting the 1st, 2nd, 3rd, 4th, last for which week it begins: any day of the week, and any month.



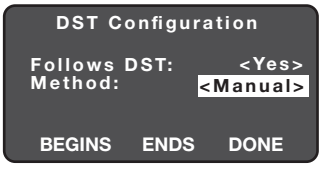
Press Select

Select ENDS.



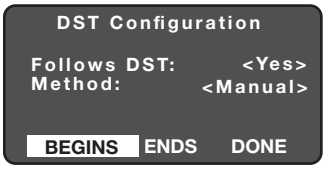
Press Select

This screen which begins with the current default rules displays.



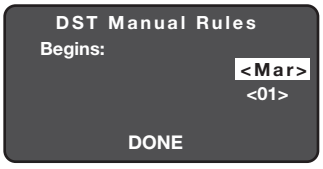
Press Select

Change the DSTSTD routines to be manual by setting the Method to Manual.



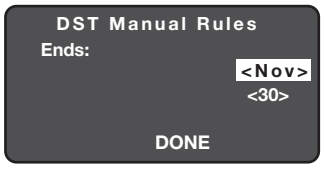
Press Select

By selecting BEGINS on the menu above, specify the Begin date for the change to DST.



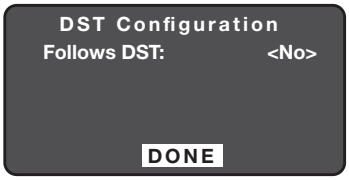
Press Select

Select Begin date.



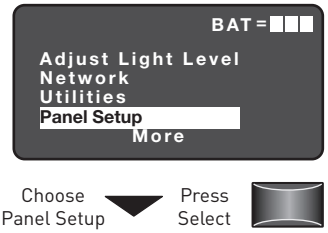
Press Select

By selecting ENDS, select the End date.

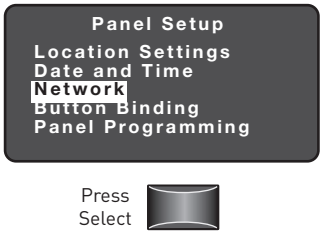


Press Select

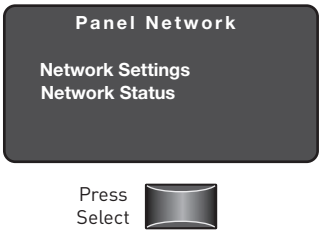
Disable DSTSTD changes by setting Follows DST to No.



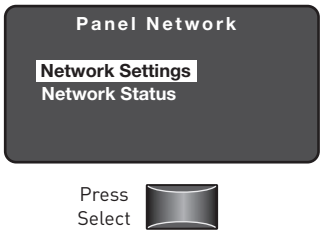
Select Panel Setup.



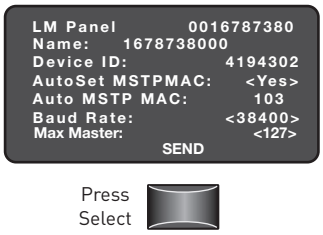
Select Network.



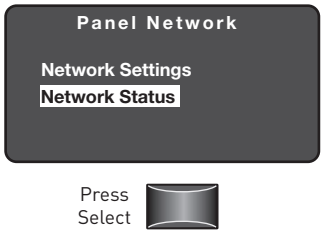
Two options are presented: Network Settings and Network Status.



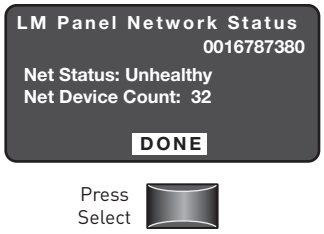
Choose Network Settings, point to any IR device. Press Select.



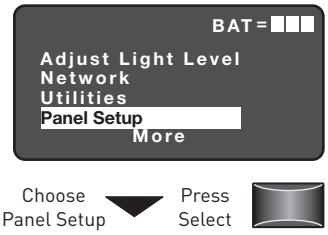
The first line shows the MAC address of the panel which is fixed. The second line shows the Name as it will appear on the BACnet Interface Location Description field. This name can be edited. The BACnet Device ID shows next. It can also be edited. Either automatically establish a MSTPMAC address (shown) or specify one manually. By selecting SEND, point to an IR device, which will send the data and return to the Panel Setup Menu.



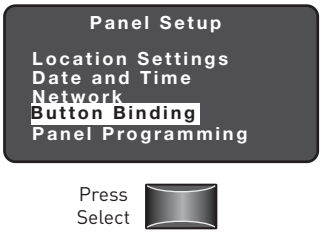
Choose Network Status, the following Diagnostic information is displayed.



Press DONE, and return to the Panel Network Menu.

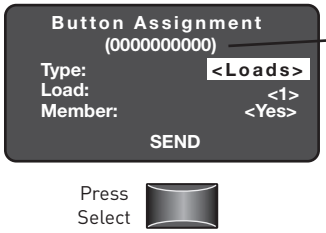


Select Panel Setup menu.



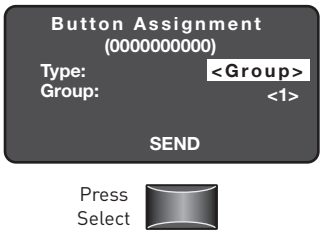
Select Button Binding.

As soon as Select is pressed, all the LEDs on the switch will flash. In 15 seconds pick a particular button. Continue to point to the switch so that the Button Identification message from the switch is received by the LMCT-100.

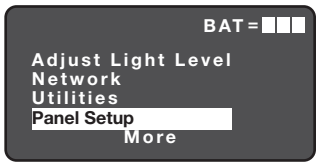


The MAC address of the switch is shown in parantheses. Since this button is controlling loads, the Type is set to Loads. Scroll through any load number (1 to 64) and see if it is a member (part of the load table for that button). Change the Type to Group if desired. Pressing SEND and point to the switch again, and data will be sent to the switch, and return to the Panel Setup menu.

If the switch has been previously configured to control loads this screen will be displayed.



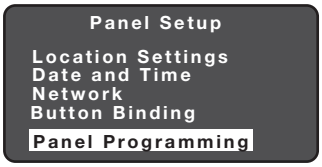
If the switch has been previously configured to control a group, or if a change to this type of control occurs, this screen will be presented.



Choose Panel Setup

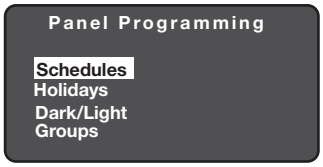
Press Select

Select Panel Setup.



Press Select

Select Panel Programming.



Press Select

Select Schedules.Point to any IR device. Press Select.

Press Select

Up to 254 events can be programmed since 255 is a special value and 0 is not used. The time is entered in 24 hour format. All Schedule Events are done by group, so any of the panel groups (1 to 99) can be assigned. Any time the Schedule Number is changed, point to the IR device again so information for that schedule can be obtained.

Schedule Types	Action Descriptions
After Hours	Transitions Groups to Unoccupied parameters
Normal Hours	Transitions Groups to Occupied
On	Turns group loads On without changing occupancy
Off	Turns group loads Off without changing occupancy
Do Nothing	No action

Press Select

Select ACTIVE DAYS from the Programming Schedules Menu.

Press Select

Select which days of the week the schedule will be active on, and/or if it is active on a Holiday.

Press Select

Delete an existing schedule by choosing DELETE from the Programming Schedules Menu.

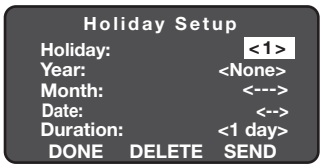
Press Select

Press Select

Select Holidays from the Panel Programming Menu (after being prompted to point to any IR device).

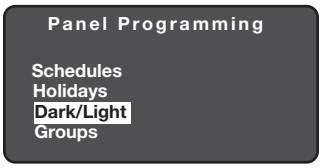
Press Select

Specify any Holiday entry from 1 to 99. An optional duration can be applied which will extend the holiday for the number of specified days (1 to 255). Pressing SEND will ask the user to point to any IR device, and the holiday information will be sent to the panel, then return to the Holiday Setup Menu. Pressing DONE will returns to the Programming Panel Menu. Any time the Holiday Number is changed, point to the IR device again so information for that holiday can be obtained.



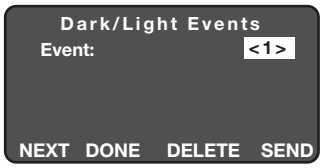
Press Select

Should this be a new (empty) entry, or if an entry was deleted, the Holiday schedule will appear above.



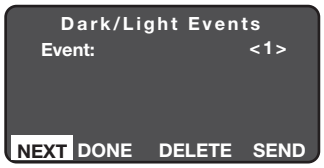
Press Select

Select Dark/Light from the Panel Programming Menu.



Press Select

Program up to 32 Dark/Light events by selecting Dark/Light from the Panel Programming Menu.



Press Select

Select NEXT from the Dark/ Light Events Menu.

Press Select

If the event was defined as Astro (or no event exists), the details can be seen here. Specify the controller type (Astro or LMIO-301). If changed to the LMIO-301, the screen will change to Dark/Light Event LMIO-301.

When using Astro, specify the Dark and Light Actions (On, Off, None). If programmed as <More Light> with an offset other than 0, the Light Event occurs before sunrise and ends after sunset a total of <More Light> extra minutes, equally split before sunrise and after sunset. The Dark event begins after sunset and ends before sunrise. If programmed as <Less Light> with an offset other than 0, the Dark Event occurs before sunset and ends after sunrise a total of <Less Light> extra minutes, equally split before sunset and after sunrise. The Light Event begins after sunrise and before sunset.

Press Select

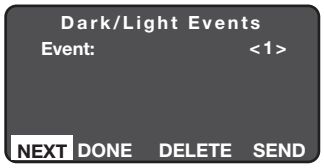
Pressing DONE will return back to the Dark/Light Events screen.

Press Select

Select ACTIVE DAYS.

Press Select

Specify which days of the week the Dark/Light event will be active on. Press DONE and return to the Dark/Light Event Astro Screen.



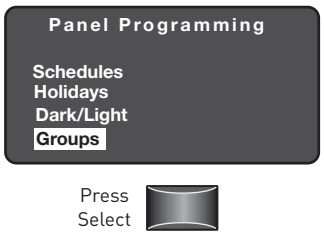
Press Select

When the controller type is set to LMIO-301, the details can be seen when the user presses NEXT from the Dark/Light Events Menu.

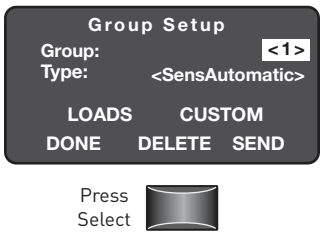
Press Select

Actions
On
Off
None

For LMIO-301 events, specify what action is to be taken when the light level is less than the setpoint (Dark), or more than the setpoint (Light): pick On, Off or None. An optional delay (0 to 240 minutes) can be specified, which means the event will happen that many minutes after the setpoint condition is met.



Press Select



Press Select

Select Groups from the Panel Programming Menu.

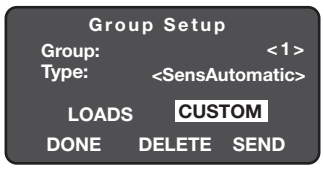
Setting Up a Group

1. Pick a group number from 1 to 99.

2. Pick a Control Type for that group. There are several pre-defined Macros: SensAutomatic (default for an empty group), AutoSwitch-100, Manual, OverrideTimeAH, SenDayDisable, and SenMan-OnNH. Each of these has a specific pre-defined set of operating parameters. There is another choice, CUSTOM , that means that the setting differs from one of the pre-defined values shown above. For all of those choices, the CUSTOM choice can be selected to show the settings (or modify them). If the settings are modified and they match a pre-defined setting, then CUSTOM will show up as the Type when returning to the Group Setup Menu.

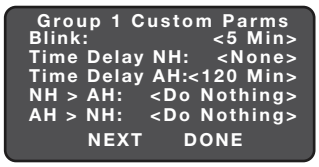
3. Specify the Loads that belong to the group

4. Programming must be sent to the Panel by using the SEND option. A user can delete the programming of a group by using the DELETE option. A deleted group will default to SensAutomatic.

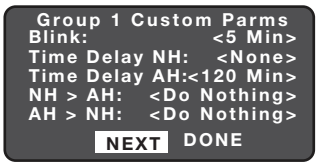


Press Select

Select CUSTOM from the Group Setup Menu.

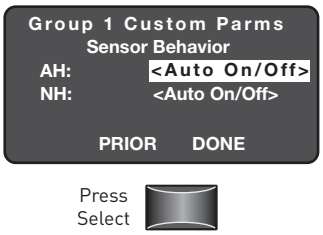


Specify a Blink Warning Interval of None (no blink) to 120 minutes. A time delay of 0 to 120 minutes can be specified for operation during Normal Hours and After Hours. What is supposed to happen to the group on a transition from Normal Hours to After Hours, as well as After Hours to Normal Hours is also specified (Do Nothing, Turn On, Turn Off. Pressing DONE will return to the Group Setup Menu.



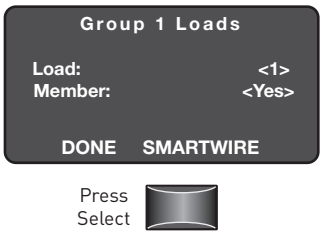
Select NEXT from this screen.

Custom Parameters	Possible Values
Blink Warning	None to 120 min
Time Delay	0 to 120 minutes
NH > AH	Do Nothing, Turn On, Turn Off
AH > NH	Do Nothing, Turn On, Turn Off



Press Select

Both the After Hour and Normal Hour behavior of this group can be specified. The choices are: Auto on/Off, Do Nothing, Man On/Auto Off, and Auto On/Manual Off. Pressing PRIOR takes the user back to the first page. Pressing DONE takes the user back to the Group Setup Menu.

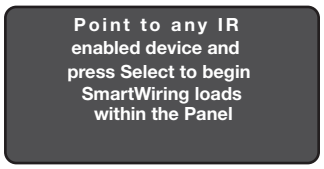


Press Select

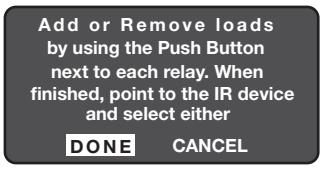
The third part of setting up a Group is specifying the loads to be controlled. There are two ways of doing this. The first uses the LMCT to pick and choose loads for the group. Loads that might be in other Room Controllers and not in the panel itself can be assigned this way. Move through the loads (1 to 64) and see if they are a member of the group or not, and change any of those settings. Press DONE and return to the Group Setup Menu.

Press Select

Alternatively, perform load assignment by selecting SMARTWIRE.



Press Select



Press Select

This will remain on the screen during the SmartWiring process. Pressing DONE will exit the SmartWire screen and return to the panel setup menu. To save the group SmartWire loads, press any Group input button on the LMPI card to exit.

APPLICATION EXAMPLES

1. For customers that want lights on during the day and not to turn off by sensor during that time. However, they may still want the added convenience and energy savings of operating via occupancy sensor at night. To implement a scheduled on, schedule sweep off, with sensors disable during the day time M-F use the following configuration.

- From the "Groups" menu, create a group containing the panel relays to be controlled.
- Select the group type as "Sensor Disable Day"
- From the "Schedules" menu, create a "Normal Hours" event for turning on with active days M-F and set the appropriate turn on time (ex. 7AM)
- From the "Schedules" menu, create an "After Hours" event for turning off at 6PM

2. If the customer wishes to have variable on/off times that correspond to Sunrise and Sunset, calculated astronomical schedules are an option. In addition turning lights on and off, these transition times can also trigger changes in sensor function. To implement an astro on, astro off schedule that causes sensors to function in vacancy mode during the day, but to function as auto on/off at night use the following steps.

- From the "Groups" menu, create a group containing the panel relays to be controlled
- Select the group type as "Sensor Man-On Day"
- From the "Dark/Light" menu, create an event with source of "Astro"
- For the Dark action select "After Hours" and for the Light action select "Normal Hours"

3. Some customers with predictable business hours may want automatic occupancy sensor control at all times, but also to have a sweep at some point to achieve extra savings by turning off areas where sensors are already in countdown mode. To achieve sensor auto On/Off with a 6PM sweep with blink-warn use the following steps.

- From the "Groups" menu, create a group containing the panel relays to be controlled
- Select the group type as "Sensor Auto"
- Next, select "CUSTOM." This will enter the Custom group parameters creation screen but send it with the parameter set for "Sensor Auto"
- Change the "NH > AH" transition to "OFF" so that on transition to AH the sweep and Blink Warn will occur.
- From the "Schedules" menu create a "Normal Hours" event for going occupied at 3:01AM
- From the "Schedules" menu create an "After Hours" event for going occupied at 6:00PM

Basic power-up testing

Test	Response	What next? If the panel continues to fail a test, call Technical Support
Observe the two Blue LEDS on the LMPI board	Blue LEDs alternately blink at a regular tempo.	Go to next Test.
	Blue LEDs OFF or continuously lit for more than one minute.	Reset panel power. Check Blue LEDs again.
Observe the Green Power LEDs on the LMPI board	Green Power LED is continuously lit.	Go to next Test.
	Any Green Status LED is OFF.	Reset panel power. Check LEDs again.
Relay Operation: Press each Relay control push-button	Red LED for each relay lights and relay clicks. Press button again, relay clicks and Red LED goes OFF.	Check power connection to LMPI board.
	Red LED doesn't light and/or relay doesn't click.	Reset panel power. Check LEDs again.

Troubleshooting

No power to panel

Make sure not to plug or unplug DB9 cables while powering the panel. If this is done, the boards may have been damaged. Contact Technical Support at 800.879.8585.

Relays are not recognized

Check to make sure DB9 cables are connected to the correct connection (upper left on the LMRD card to 1 on on the LMPI card, the second cable is connected from the connection on the LMRD card to the top right connection of the LMPI card (2). Connections 3 and 4 are not used in the LMCP24 but for the LMCP48 only.

WARRANTY INFORMATION

WattStopper warranties its products to be free of defects in materials and workmanship for a period of one (1) year. There are no obligations or liabilities on the part of WattStopper for consequential damages arising out of, or in connection with, the use or performance of this product or other indirect damages with respect to loss of property, revenue or profit, or cost of removal, installation or reinstallation.

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