DLM RULES & BEST PRACTICES

DLM INSIDE THE ROOM

- Always power Room Controllers with a constant hot (unswitched) circuit.
- Use WS LMRJ-xx Cat 5e cables for reliable communication.
- No more than 4 total 100 series room controllers (RCs) LMRC-10x / LMPL-101 / LMPB-100 on a DLM Cat 5e Room Network (aka IRB "In Room Bus"). Other DLM RCs and LMCPs have smart power supplies, so you can have a DLM max of 64 loads or 48 devices. (IRBs with only 100 series RCs have a max of 24 devices and 8 loads.)
- Check total mA consumption of DLM devices against total current available from all LMRCs, LMCPs & LMZCs on the Cat 5e network to a max of 800mA. LMRC-10x / LMPL-100 / LMPB-100 will not limit their 150mA current which is why their 4 unit max. Other LMRCs, LMCPs & LMZCs will limit their current on Cat 5e room network to ≤ 800mA.
- Don't overload rooms: DLM allows 150' Cat 5e (free topology) per intelligent DLM device, to a max of 1,000' per IRB. Suggest rooms have < 32 loads (and never more than 4 total 100 series RCs and < 24 DLM devices unless reviewed by Project Management.
- 2 & 3 Relay Room Controllers are for multi-level lighting or multiple zones inside a room, not multiple rooms.
- Rooms ideally should have only one "occupancy state". Multiple occupancy zones in a room are possible, but makes setup more challenging.
- LMLS units require another DLM device (LMCP, OS, etc...) to set initial On state, else set Load to "Auto On" in LMCS.
- Pay attention to all LMRC-22x warnings: 1) Don't share neutrals; 2) Don't mix dimming loads types on LMRC-222s; 3) Every dimming load type should be on separate circuits.

DLM NETWORKING (via MS/TP or "Segment Wire")

- ONLY USE WS LM-MSTP CABLE for DLM Networking.
- Only one Network Bridge per room. LMCPs and LMZCs have this device on their LMPI intelligence card.
- Do not run LM-MSTP to multiple floors (except for LMCP panel only runs). Locate LMSM-3E or a NB-ROUTER at start of all LM-MSTP runs on a network project, and ONLY ground shield there. MS/TP wire cannot exceed 4,000' and must be run in daisy chain topology to all rooms/panels. Pay close attention on how LM-MSTP connects to DLM networking devices and where terminating resistors are required (see device installation instructions and TB-179.2).
- WS Networks are defined and limited as follows:
  - BASIC: LMSM-3E with up to 3 LM-MSTP segment runs. Each segment limited to max 40 Rooms / 250 DLM devices. Integration only via LMSM Export Table.
  - ADVANCED: LMSM-6E with NB-ROUTERs and an NB-SWITCH (can connect to max 250 Rooms / 1000 DLM devices). Integration other than via Export Table is Advanced. Advanced requires WS PM review!

DLM LMCP RELAY PANEL

- Panels are basically large RCs, but DO NOT connect multiple panels with Cat 5e wire - use Network Bridges.
- Each LMCP Panel provides 2 separate Cat 5e IRB networks, each allowing max 47 DLM devices. Max loads for all relays in panel and in RCs stays max 64.
- Panels use below equivalency table when connecting to a LMSM (to calculate allowed segment room/device limits):

LMZC-301 panel	=	1 rooms / 10 devices
LMCP-8 panel	=	3 rooms / 20 devices
LMCP-24 panel	=	5 rooms / 30 devices
LMCP-48 panel	=	7 rooms / 40 devices

DLM On/Off Demonstration Kit

LMKT-DEMO

Prewired DLM kit includes:
(1) LMRC-102 (w/2 LED Lights)
(1) LMSW-102-W
(1) LMPC-100
(2) LMRJ-03
(1) LMCT-100
Demo kit is great training aid. Suggest one on larger projects.

OCC. SENSORS

Ceiling Mounted

LMDC-100
Dual-Tech
Occupancy Sensor

20mA Low Voltage

LMUC-100
Ultrasonic
Occupancy Sensor

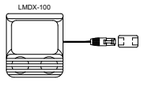
20mA Low Voltage

LMPC-100
PIR
Occupancy Sensor

7mA Low Voltage
LMPC-100 Lens Types
Standard = 360° View
-1 = High Density Lens
-5 = High Bay Lens

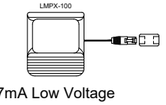
Wall or Corner Mounted

LMDX-100
Dual-Tech
Occupancy Sensor



20mA Low Voltage

LMPX-100
PIR
Occupancy Sensor



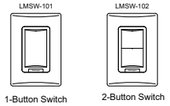
7mA Low Voltage
LMPX-100 lens types:
Standard = 90° View, 45'
-1 = Long Range Lens
-3 = 2-Sided Aisle Lens
-4 = 1-Sided Aisle Lens

Multiple sensors can be installed in a DLM Room Network with each assigned control of all or a group of loads within the room.

WALL CONTROLS

ID color by suffix: -W=White, -I=Ivory, -LA=Light Almond, -B=Black, -G=Gray, -R=Red

LMSW-10x
Wall Switch



8-Button Switch
5mA Low Voltage

LMDM-101
Dimming Switch

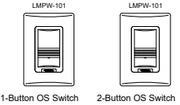
5mA Low Voltage

LMSW-105
Scene Switch

5mA Low Voltage

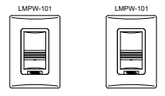
Wall Switch Occupancy Sensors

LMDW-10x
Wall Switch Dual-Tech
Occupancy Sensor



20 mA Low Voltage

LMPW-10x
Wall Switch PIR
Occupancy Sensor

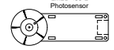


8 mA Low Voltage

DAYLIGHTING

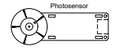
Room Photosensors

LMLS-400(-L)
Daylighting Sensor
Closed Loop
1 Zone, 1 - 6,553 FC



7mA Low Voltage

LMLS-500(-L)
Daylighting Sensor
Open Loop
3 Zone, 1 - 6,553 FC



7mA Low Voltage

LMLS-600
Daylighting Sensor
Dual Loop
1 Zone, 1 - 6,553 FC

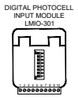
7mA Low Voltage

LMLS-400/500 fits ceiling tiles 0" - $\frac{5}{8}$", -L fits $\frac{5}{8}$" - 1$\frac{1}{2}$". LMLS-600 ships with it's own mounting arm. Zones can be Switching, Bi-Level, Tri-Level or Dimmed (requires dimming LMRC controller).

Network Photocells and Interface

Requires LMSM to program unless landed in a LMCP. One LMIO-301 per LMPO or LMPS head.

LMIO-301
Digital Photocell Interface



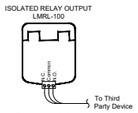
20mA Low Voltage

LMPO-200
Exterior Photocell
0-200 FC

LMPS-6000
Skylight Photocell
0-6000 FC

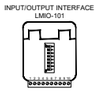
INTERFACES

LMRL-100
Isolated Relay



7mA Low Voltage
Provides occupancy contact for fans, HVAC or Alarms (doesn't count as intelligent DLM device)
24V 1A SPDT Relay
1 NO/NC output terminal

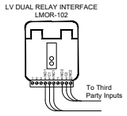
LMIO-101
Input/Output Interface



20mA Low Voltage

Allows contact closures to control loads in a DLM room. Output signals room occupancy.
2 dry contact inputs
1 NO/NC output terminal

LMOR-102
LV Dual Relay Interface



20mA Low Voltage

Two isolated low voltage mech. held relays that can be bound to DLM devices.
Max 1A @ 24V, 2 SPDT Relays with NO/NC output terminals

LMDI-100
RS-232 Interface

20mA Low Voltage

Allows bi-directional RS-232 from other products to send commands and/or request status from DLM room devices.

LMIO-201
Analog Sensor Interface

20mA Low Voltage

Allows a WattStopper Low Voltage occupancy sensor to be used as an input to a DLM system. Requires use of a BZ powerpack.

LMIN-104
LV Input Interface

20mA Low Voltage

LMIN-104 allows up to 4 dry contact closures to control loads/scenes/groups in a DLM room.

LMIO-102 / LMPS-104
Partition Interface and
Partition Switch

20mA Low Voltage — 5mA Low Voltage

LMIO-102 Partition Interface allows contact closures to change 16 profiles in a DLM room via 1-4 wall status contacts. LMPS-104 switch allows 16 profiles to be set manually.

LMSW-105-CCT / LMTS-101-CCT
Tunable White Preset Switch and Timeclock
ID color by suffix: -W=White, -I=Ivory, -LA=Light Almond, -B=Black, -G=Gray, -R=Red

5mA Low Voltage — 15mA Low Voltage

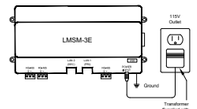
Tunable White Controls require fixtures with Blanco/Araya Logic Module and -DLM Control Card. See Blanco/Araya info on page 2.

NETWORKING

LMBC-300
Network Bridge Connector

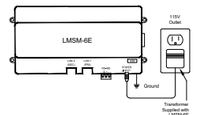
30mA Low Voltage
Provides BACnet connection (via LM-MSTP wire) to DLM Cat 5e Room Network

LMSM-3E
Segment Manager 3-Port



Monitor, Control & Program 3 MS/TP Segments, each of max 40 DLM Rooms / 250 devices via Web Browser. Standard and Astronomic Schedules

LMSM-6E
Segment Manager
for use with NB-ROUTERS

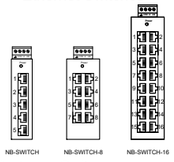


Monitor, Control & Program multiple Segments connected to NB-ROUTERs (and 1 MS/TP Segment), for a total of max 200 DLM Rooms / 1100 devices via Web Browser. Standard and Astronomic Schedules

NB-ROUTER
MS/TP to Ethernet Interface

Provides routing of BACnet messages from a MS/TP segment to IP infrastructure.

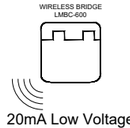
NB-SWITCH(, -8, -16)
Ethernet Switches



Network Switch provides ports to connect IP devices.
Standard = 5 ports
-8 = 8 ports
-16 = 16 ports

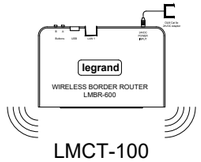
WIRELESS & OTHER

LMBC-600
Wireless Bridge Connector

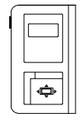


20mA Low Voltage
Wireless connects DLM room to Border Router

LMBR-600
Wireless Border Router

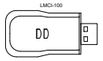


LMCT-100
Wireless
Configuration Tool



Include at least 1 LMCT on every project.

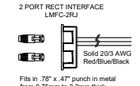
LMCI-100
USB Interface to PC for LMCS Software



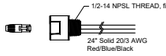
LMCS
Software to program, document and upgrade DLM room devices (via LMCI-100 or NB-ROUTER). Available from WS Website
(Computer by Others)

Cat 5e Accessories for Fixture Controls

LMFC-2RJ
2 Port Rect Interface



LMFC-RJ-50-24
1 Port Round Interface



CABLES

Cat 5e Cables

B-to-B Cat 5e cables in multi lengths with green jacket. No "P" before length = non-Plenum, add "-W" after length for White jacket (Plenum rated only).

LMRJ-01	6"

6" for ganged DLM wall controls. Green non-plenum only.

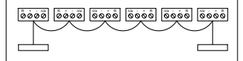
LMRJ-P03	3'
LMRJ-P10	10'
LMRJ-P15	15'
LMRJ-P25	25'
LMRJ-P35	35'
LMRJ-P50	50'
LMRJ-P75	75'
LMRJ-P100	100'

MS/TP Segment Cable & Harness

WS plenum-rated 22/3 shielded wire is required for DLM segment networks. "-MSTP" has green jacket, add -B for Black, -W for White, and -DB for Direct Burial Black. Order by foot, or green available in 1,000', 2,000', or 4,000' reels (add suffix -S1000, -S2000, or -S4000)

LM-MSTP

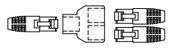
LMBC-300-H6
Network Wire Harness



Cat 5e Accessories

LMRJ-C8
Coupler

LMRJ-S8
Splitter



LMRJ-CS8
Plenum Coupler/Splitter

LMRJ-WA-5PK
20/4-to-DLM Cat 5e Converter
(comes 5 to a pack)

Revised: June 19, 2017. Support available at 800 879-8585
CAD@wattstopper.com or charles.knuffke@legrand.us
Note: Not all DLM Devices are drawn to exact scale.

Wattstopper Digital Lighting Management (DLM) Typical Wiring Details

Based on a visionary drawing by Tom Herlihy of OCS, San Diego

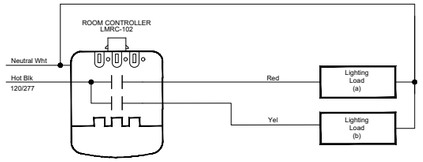
LOAD CONTROLLERS (ROOM and FIXTURE)

ON/OFF Room Controllers

LMRC-10x rated 20A, 120/230/240/277VAC, 50/60 Hz, have 3-Cat 5e DLM ports, and provide 150mA 24VDC for DLM devices (see 4 max rule for LMRC-10x/LMPB-100/LMPL-101)

LMRC-102 *(LMRC-101 not shown)*

2-RELAY ON/OFF CONTROLLER
Two (2) controllable switch-legs, 20A max

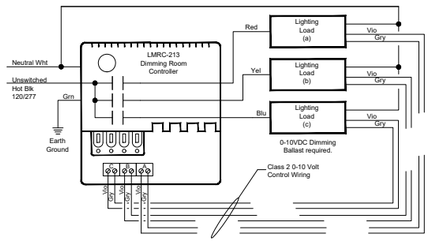


0-10V Dimming Room Controllers

LMRC-21x units are rated for 20A, 120/230/240/277VAC 50/60 Hz input circuit (or 347VAC), have 4-Cat 5e DLM ports, an Input Current Monitor, and intelligently provide 250mA 24VDC for DLM Cat 5e devices

LMRC-213 *(LMRC-211, LMRC-212, and "-347" versions not shown)*

3-RELAY 0-10V DIMMING CONTROLLER
Three (3) controllable switch-legs with 0-10V dimming, 20A max

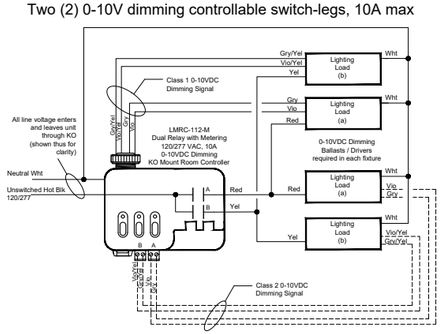


KO Mount 0-10V Dim. Room Controllers

LMRC-11x rated for a 10A, 120/277V 50/60 Hz input circuit (347VAC version soon), have 2-Cat 5e DLM ports, and intelligently provide 150mA 24VDC to power DLM Cat 5e devices. -M suffix includes a Current and Voltage Input Meter.

LMRC-112-M *(LMRC-111, LMRC-111-M, and LMRC-112 not shown)*

2-RELAY 0-10V KO MOUNT DIMMING CONTROLLER
Two (2) 0-10V dimming controllable switch-legs, 10A max



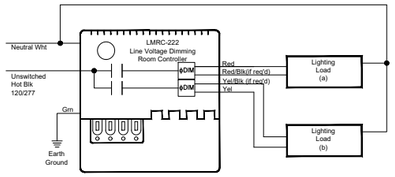
Notes:
- Class 1 and Class 2 wires can be used individually or together.
- A "-M" suffix identifies units with an internal Voltage and Current monitoring circuit.

Forward Phase Dimming Room Controllers

LMRC-22x rated 20A, 120/277V, 50/60 Hz, have 4-Cat 5e DLM ports, Input Current Monitor, and intelligently provide 250mA 24VDC power for DLM devices.
Uses Forward Phase Dimming for three different load types:
Type 1) *Incandescent, MLV, some ELV / LED, Cold Cathode, Neon;*
Type 2) *2-wire dimming Ballast/Driver (ie Advance Mark 10); or*
Type 3) *3-wire dimming Ballast/Driver (ie Lutron Hi-Lume).*
Do not share neutrals on different types of dimming loads
Do not mix different dimming load types on an LMRC-222
Do not mix different dimming load types on a circuit

LMRC-222 *(LMRC-221 not shown)*

2-RELAY FORWARD PHASE DIMMING CONTROLLER
Two (2) dimmable controllable switch-legs



0-10V Dimming Fixture Controller

LMFC-011 rated 3A, 120/277V, 50/60 Hz. Connects via LMFC-xRJ adaptor to DLM room devices. Provides 0mA (zero) to Cat 5e, so LMZC-301 or other Load Control DLM device required.

LMFC-011

INDIVIDUAL 0-10V FIXTURE CONTROLLER
One (1) 0-10V dimming controllable switchleg 3A

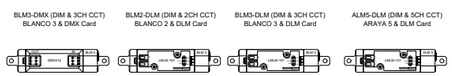
requires 3mA 24VDC

Blanco/ARAYA w/DLM Control Card

BLANCO/ARAYA LED Logic Module (LM) with DLM Control Card. Each counts as 1 DLM load & 1 DLM device. Use two for direct / indirect fixtures. DLM Card (Cat # LMLM-101) connects via LMFC-xRJ adaptor DLM room devices. Requires 2mA 24VDC from Cat 5e. LM can instead use a DMX Card for LCAP Architectural Dimming, or no card for 0-10V input(s).

BLM1, BLM2, BLM3, ALM5 - 010, DLM or DMX

INDIVIDUAL FIXTURE LOGIC MODULE & OPT. CONTROL CARD
Each LM Drives max. 8' LED Array

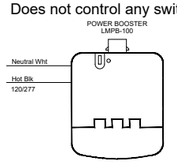


Power Booster

LMPB-100 requires a 120/277VAC, 50/60 Hz power, has 3-Cat 5e DLM ports, and provide 150mA 24VDC to power DLM Cat 5e devices (see 4 max rule for LMRC-10x/LMPB-100/LMPL-101)

LMPB-100

POWER BOOSTER
Does not control any switchlegs



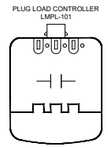
PLUG LOAD SOLUTIONS

ON/OFF Plug Load Controllers

LMPL-xxx units are UL Listed for Plug Load control. They are rated for 20A, 120V 60 Hz input circuit, have 3-Cat 5e DLM ports, and provide 150 or 250mA 24VDC to power DLM Cat 5e devices (Note LMCP relays are also Plug Load rated).

LMPL-101

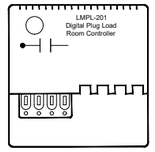
Basic Plug Load
1 Circuit



Provides 150mA 24VDC power for DLM devices (see 4 max rule for LMRC-101/ LMPB-100/LMPL-101)

LMPL-201

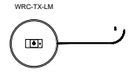
Enhanced Plug Load
1 Circuit



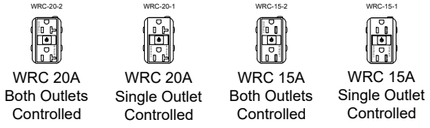
Includes current monitor, provides 250mA 24VDC power for DLM devices.

WRC Series

WRC-TX-LM Wireless Transmitter and WRC-XX-X Controlled Decorator Receptacles. Transmitter controls max 16 receptacles up to 30' (further with direct line of sight). ID Receptacle color by suffix: -W=White, -I=Ivory, -LA=Light Almond, -B=Black, -G=Gray



DLM Wireless Transmitter
for WRC Controlled Receptacles
requires 3mA 24VDC



WRC 20A Both Outlets Controlled	WRC 20A Single Outlet Controlled	WRC 15A Both Outlets Controlled	WRC 15A Single Outlet Controlled

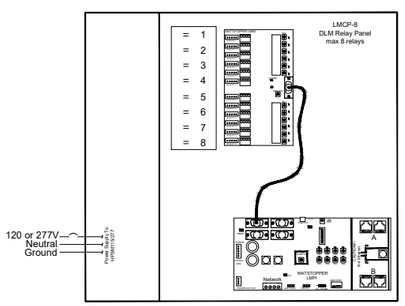
LMCP Panels

In addition to entirely new LMCPs, Wattstopper also offers Retrofit Kits for some older GE, Horton Control, and Wattstopper panels.

LMCP-LI8	LMCP-GE12
LMCP-LI24	LMCP-GE24
LMCP-LI48	LMCP-GE48

8 Relay Control Panel

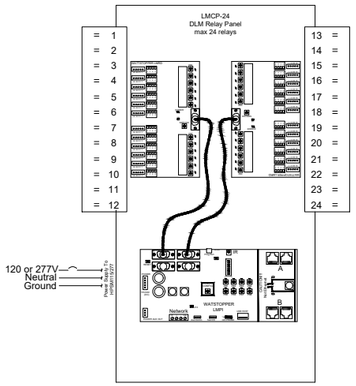
LMCP-8 units have up to 8 SPST Plug Load rated WattStopper HDR relays. Each HDR can control a 20A, 120/277/347V, 50/60 Hz circuit. Panel has 4 Cat 5e DLM ports (via 2 separate networks that each provide 250mA 24VDC) to power DLM Cat 5e devices. Panel Enclosure is 15.08" H x 16.5" W x 4.50" D



LIGHTING CONTROL PANELS

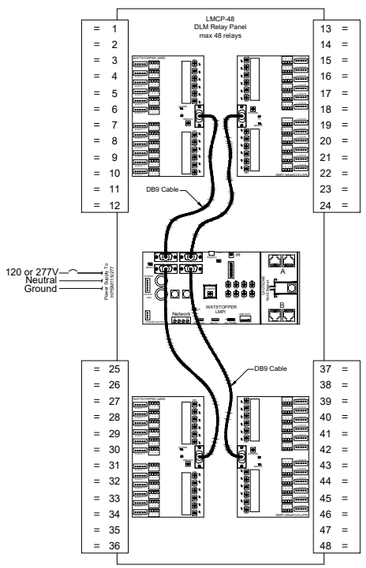
24 Relay Control Panel

LMCP-24 units have up to 24 SPST Plug Load rated WattStopper HDR relays. Each HDR can control a 20A, 120/277/347V, 50/60 Hz circuit. Panel has 4 Cat 5e DLM ports (via 2 separate networks that each provide 250mA 24VDC) to power DLM Cat 5e devices. Panel Enclosure is 31.38" H x 23.88" W x 4.5" D



48 Relay Control Panel

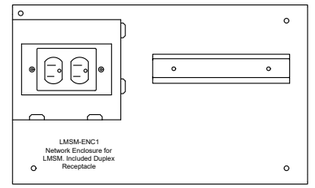
LMCP-48 units have up to 48 SPST Plug Load rated WattStopper HDR relays. Each HDR can control a 20A, 120/277/347V, 50/60 Hz circuit. Panel has 4 Cat 5e DLM ports (via 2 separate networks that each provide 250mA 24VDC) to power DLM Cat 5e devices. Panel Enclosure is 43.88" H x 23.88" W x 4.5" D



ACCESSORY ENCLOSURES

SegMan Enclosure

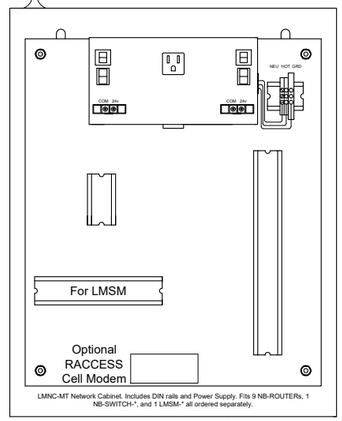
LMSM-ENC1 enclosure is for a LMSM unit. A duplex receptacle is included - one outlet to power the LMSM unit, one for convenence. LMSM must be ordered separately. Enclosure is 8.5" H x 14" W x 4.5" D



Network Cabinet

LMNC-* cabinet includes a power supply and DIN rails for typical DLM Network devices. The LMNC is available with no networking devices (-MT), or with anywhere from 3 to 9 NB-ROUTERS installed and pre-wired to the power supply (-3 to -9). Power supply includes 2 120V outlets - one for SegMan adaptor, and one for convenience. LMNC-3 & -4 include a NB-SWITCH-8, -5 to -9 units include a NB-SWITCH-16. LMSM must be ordered separately. Cabinet is 20" H x 16" W x 8.62" D

Optional RACCESS Cell Antenna

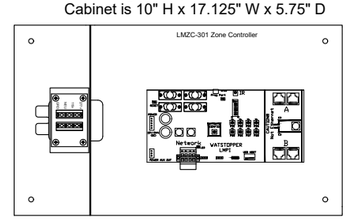


Remote Access Service

RACCESS is a combination hardware, software and cellular solution that can be added to projects with a LMSM-3E or -6E. A cellular modem and 12" magnetic antenna is provided to enable remote site communication and services for 1 year.

Zone Controller

LMZC-301 enclosure houses a LMPI intelligence card for 2 separate Cat 5e IRB networks (A&B) to connect to remote DLM devices needing power, Time of Day or Astro functions. Cabinet is 10" H x 17.125" W x 5.75" D



Revised: June 19, 2017. Support available at 800 879-8585
CAD@wattstopper.com or charles.knuffke@legrand.us
Note: Not all DLM Devices are drawn to exact scale.

Wattstopper Digital Lighting Management (DLM) Typical Wiring Details

Based on a visionary drawing by Tom Herlihy of OCS, San Diego