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1. **What is the Distributed Low-Voltage Power (DLVP) System?**
Distributed Low-Voltage Power (DLVP) is a system which embraces an AC line voltage backbone for transmission and low-voltage DC for connectivity in a space. The DLVP architecture allows for a fast and simple installation and configuration without sacrificing electrical efficiencies of line voltage LED fixtures.

2. **What value does the Distributed Low-Voltage Power (DLVP) System provide?**
Distributed Low-Voltage Power (DLVP) blends the benefits of both AC and DC power distribution to reduce the total installed cost of a lighting project by up to 20% while providing a completely flexible and electrically efficient solution.

3. **How does the Distributed Low-Voltage Power (DLVP) system communicate to devices?**
DLVP bi-directionally communicates via a standard-based digital lighting protocol over the same cables that power the system devices.

4. **What are Low-Voltage Power Modules and how much power do they provide?**
Low-Voltage Power Modules convert Class 1 AC line voltage into Class 2 low-voltage electric power. Power modules are available in two model configurations – 300W (3 circuits of up to 100W) and 600W (6 circuits of up to 100W). The power modules only differ in the available class 2 power available, otherwise offering the same functionality.

5. **What cables are used with the Distributed Low-Voltage Power (DLVP) system?**
DLVP low-voltage lighting cables are standard pre-terminated twisted-pair cables designed specifically to function properly up to the full Class 2 power limits. The low-voltage lighting cables are efficient, provide noise immunity, and offer plenum (CMP) ratings.

6. **Are Distributed Low-Voltage Power (DLVP) lighting cables plenum rated?**
Yes, DLVP low-voltage lighting cables are plenum (CMP) rated.

7. **What lengths are low-voltage cables available?**
DLVP low-voltage cables are available, pre-terminated, in 8, 15, and 30-foot lengths.

8. **Why use pre-terminated lighting cables?**
Pre-terminated cables offer factory quality to eliminate wiring errors and expedite connection of system components.

9. **Can I make my own cables or pull my own wire?**
Yes, there is an available low-voltage terminated pigtail that allows for the connection to unterminated standard cable. For proper system performance, specific cables must be used. Consult Eaton Lighting Systems for approved cable manufacturers and part numbers.
10. **What are the benefits of the Distributed Low-Voltage Power (DLVP) system?**
When properly installed, the DLVP system delivers up to a 20% reduction of total installed system cost and up to 40% reduction in man-hours for installation. DLVP also offers the contractor the opportunity to control system configuration. The addressable system may be easily reconfigured at any time without any rewiring required. Additionally, DLVP can maintain system electrical efficiency similar to line voltage AC installations.

11. **What is the maximum low-voltage lighting cable distance possible with the Distributed Low-Voltage Power (DLVP) system?**
Similar to most low-voltage systems, the maximum cable distance from the power module to the last device on a circuit (regardless of the number of devices on that circuit) cannot exceed 100-m (328-ft).

12. **What makes an LED light fixture compatible with the Distributed Low-Voltage Power (DLVP) system?**
A low-voltage controller installed in the light fixture in place of a typical Class 1 LED driver allows for connection to the DLVP system. When selecting fixture configurations, many LED fixtures will have a low-voltage option available for DLVP integration. An integrated low-voltage emergency battery pack (EBP) and fixture models with integrated daylight and occupancy sensors are an option as well.

13. **What are the components of the Distributed Low-Voltage Power (DLVP) system?**
The components of a DLVP system include Power Modules, low-voltage pre-terminated cables and couplings, low-voltage LED light fixtures (which may have integrated sensors), sensors and control devices, and remote controls.

14. **How does low-voltage cable length affect efficiency?**
As is typical of electricity, the longer distance, the greater the loss and the lower the electrical efficiency. Shorter cable runs are more electrically efficient than longer runs – especially when considering Class 2 low-voltage electrical power.

<table>
<thead>
<tr>
<th>Low-Voltage Cable Power Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVC-8P</td>
</tr>
<tr>
<td>LVC-15P</td>
</tr>
<tr>
<td>LVC-30P</td>
</tr>
</tbody>
</table>

15. **How does the efficacy (lumens per watt) of a low-voltage LED fixture compare with the comparable line voltage model?**
The Low-Voltage Controller used in DLVP fixtures is a DC-DC device that can be as much as 95% electrically efficient compared to typical AC LED drivers that are typically 85-87% efficient. For the same lumen package, DLVP light fixtures consume less power than the comparable line-voltage model because of that efficiency difference.

16. **Is the Distributed Low-Voltage Power (DLVP) system UL Listed?**
The DLVP system is UL Listed (US and Canada) under UL2108 – Standard for Low-Voltage Lighting Systems.
17. **Can I use the DLVP system in only part of a building?**
Yes, due to the flexibility of the DLVP system it is possible to use in as few or many areas of a building as preferred. Using the DLVP system in one space does not mean that it must be used everywhere in the building.

18. **What color are Distributed Low-Voltage Power (DLVP) system components?**
DLVP power modules are dark gray and lighting cables are black for installation in silent ceiling applications. All other components (light fixtures, sensors and control devices) are standard from within the Eaton Lighting Systems family of products.

19. **Is there a method to connect multiple low-voltage lighting cables?**
Each DLVP lighting fixture has two connectors for daisy chain wiring and the architecture design lends itself to installing power modules in relatively close proximity to the lighting fixtures. However, if you need to connect two cables together there is an available cable coupling to extend cable length when necessary.

20. **Why is a low-voltage controller required in Distributed Low-Voltage Power (DLVP) light fixtures?**
The DLVP system was designed to allow multiple light fixture types to exist on a single circuit in a daisy-chain configuration. To do this, a low-voltage controller is used in place of the typical Class 1 LED driver. This controller also allows for addressability, dimming, emergency battery pack (EBP) connection, and enables integrated sensor connections (in certain models).

21. **Where should Low-Voltage Power Modules be installed?**
Power modules are passively cooled and plenum rated for installation in dry interior locations above ceilings, in open ceiling areas, or in electrical closets. Power modules are intended to be distributed throughout a space and are not designed for rack mounting as in the case with many systems employing a centralized architecture.

22. **Does the Distributed Low-Voltage Power (DLVP) system consume power when light fixtures are OFF?**
Yes, a trivial amount of power is consumed when the LED light fixtures are OFF as the DLVP system is a non-switched digital lighting and control system. This small off-state power consumption may be quickly offset by the digital control the system offers.

23. **Do Distributed Low-Voltage Power (DLVP) lighting cables require mechanical protection?**
Because DLVP is considered Class 2 low-voltage by Underwriters Laboratory (UL) and the National Electrical Code (NEC), mechanical protection (conduit, flex, raceway, etc.) is not required by most local jurisdictions - consult your local authorities.
24. **Is the Distributed Low-Voltage Power (DLVP) system an energy efficient approach for lighting and control?**

Addressable systems, like DLVP, offer great energy savings as only required lighting fixtures are powered as needed. The DLVP system was designed specifically to comply with energy codes by maintaining system electrical efficiency comparable to line voltage AC systems.

25. **Why is the Distributed Low-Voltage Power (DLVP) system not completely centralized like some other architectures?**

The DLVP design is distributed for multiple reasons:

- To maximize electrical efficiency, the DLVP system utilizes Class 1 AC for transmission and Class 2 low-voltage for safe, simple connectivity.
- Completely centralized solutions rely on racks to install power equipment which may not be practical in many applications. Centralized solutions also frequently utilize long homeruns of inefficient low-voltage wiring.
- Multi-tenant facilities may require some separation of lighting and control systems from space to space which means a standalone distributed system is desired.
- Configuring spaces may be much easier than the commissioning of an entire building, especially if there is space duplication.

26. **What control devices are part of the Distributed Low-Voltage Power (DLVP) system?**

The DLVP system is compatible with integrated sensor LED fixtures or with Greengate low-voltage controls including occupancy (or vacancy mode) and daylight sensors, receptacle switchpacks, manual zone wallstations and scene controllers.

27. **Is code compliance possible with the Distributed Low-Voltage Power (DLVP) system?**

Yes, when properly utilized, the DLVP system was designed to comply with all energy code (ASHRAE, IECC, and CAT24) standards.

28. **How is emergency lighting accomplished with the Distributed Low-Voltage Power (DLVP) system?**

Emergency lighting with the DLVP system is possible through two approaches. At the fixture level, when ordering DLVP compatible LED fixtures, choose one of two (7W and 14W) integrated low-voltage emergency battery pack (EBP) options. At the building level, pair a Power Module with a Relay Interface Module (RIM) connected to an emergency circuit to provide power to the light fixtures and ignore all control inputs.

29. **What are ideal applications for DLVP systems?**

The DLVP system can be utilized in most LED lighting and controls applications. The applications that recognize the greatest benefit from DLVP systems are those that do not require mechanical protection (raceway, conduit, flex) for Class 2 wiring, require energy code compliance, prefer a basic system configuration, and appreciate simplified maintenance from a lighting, control, and power system. These applications may include office, education, and healthcare.
30. How many light fixtures can the Distributed Low-Voltage Power (DLVP) system support?
Because the DLVP system is based on available Class 2 power circuits and offers daisy chain wiring, the number of fixtures depends on the power consumption per fixture chosen. Based on available LED fixtures today below is a reference based on a single power module.

<table>
<thead>
<tr>
<th>300W (3 Circuit) Power Module</th>
<th>600W (6 Circuit) Power Module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixture Type</strong></td>
<td><strong>Typical QTY per PM</strong></td>
</tr>
<tr>
<td>2 x 2 Troffer</td>
<td>12</td>
</tr>
<tr>
<td>2 x 4 Troffer</td>
<td>6</td>
</tr>
</tbody>
</table>

31. How secure is a DLVP system?
To segment lighting control data from other data, the DLVP system used for lighting control and data acquisition may be separated from data networks. The DLVP system may accept time clock and demand response inputs and provides occupancy (BMS) output to higher level systems.

32. Does a DLVP system require a dedicated server?
The DLVP system requires no software, so a server is not needed.

33. Who can install and maintain the Distributed Low-Voltage Power (DLVP) system?
A trained contractor with electricians and low-voltage capabilities can easily install and configure all components of the system. A DLVP system does not require outsourcing of IT/data and commissioning functions, which offers the full service contractor the benefit of control over the entire process.

34. What maintenance is required on the Distributed Low-Voltage Power (DLVP) system?
There is no periodic maintenance required for DLVP components specifically. Lighting fixtures and control devices should follow normal recommended maintenance routines as specified. Because DLVP components have firmware, it is important to monitor and update as needed.

35. Does the Distributed Low-Voltage Power (DLVP) system require software for control?
No, outside of embedded firmware in the DLVP system components, there is no software needed to operate the system. Manual control of the DLVP system is through scene or zone wallstations.

36. How is the Distributed Low-Voltage Power (DLVP) system commissioned?
The DLVP system was designed so that configuration basically means assigning light fixtures to available zones. The contractor may configure the system through manual switches or through an IR interface as the installation is being completed. Additionally, the DLVP system may be reconfigured at any time without rewiring the system.
37. Who can commission the Distributed Low-Voltage Power (DLVP) system?
The DLVP system was designed to be so simple that the contractor or owner may configure the system through manual switches or through an IR interface as the installation is being completed.

38. How is the Distributed Low-Voltage Power (DLVP) system positioned for the future?
The DLVP system is positioned for the future in multiple ways.

- Flexible – once the system is installed, reconfiguration or replacement of lighting fixtures is easy and safe
- Scalable – as power consumption of LED light fixtures decreases over time, the system’s footprint gets larger as more LED fixtures can be connected to the same power modules
- Configurable – the system may be configured and re-configured simply and easily at any time without re-wiring

39. How fast is the DLVP system compared to other systems / technologies?
The DLVP system is faster than most addressable lighting control systems, such as DALI.

40. What happens if system communication fails?
If a communications failure occurs, the light fixtures go immediately to ON for safety.

41. What happens if a Low-Voltage Power Module fails?
Using proven Eaton power distribution techniques, DLVP system components are designed for a reliable long life in their intended applications. DLVP Power Modules are constructed of multiple individual power circuits of up to 100W each so that if there is a failure, it will only affect a portion of the connected light fixtures (not more than 100W).

42. How do I repair or replace a failed Low-Voltage Power Module?
The DLVP system components are designed to be reliable over an extended period of operation and are not field serviceable. In the event of a Power Module failure, it should be replaced with a new one. The DIP switch settings on the new Power Module should replicate those on the failed one so that system performance is maintained.

43. What is the cost of the Distributed Low-Voltage Power (DLVP) lighting and control system?
The total installed cost of a DLVP system for lighting and control can be 10-20% less expensive than a comparable Class 1 overlay controls system.

44. Can AC overlay systems be converted to Distributed Low-Voltage Power (DLVP) systems?
Converting a Class 1 LED light fixture to a DLVP (DLVP) enabled fixture may be complicated. However, existing AC overlay systems may be replaced with DLVP systems in renovation scenarios.
45. **Are DLVP LED fixtures addressable?**
Yes, DLVP light fixtures are addressable which allows them to be assigned to one of three available manual control zones during installation or any time thereafter. When integrated sensors are used, these control zones are independent from daylighting zones.

46. **Can I run two cables to provide power to a device that exceeds Distributed Low-Voltage Power (DLVP) system limits?**
Combining the power available from multiple power module circuits is not feasible for light fixtures in excess of Class 2 and DLVP power limits.

47. **Is the Distributed Low-Voltage Power (DLVP) compatible with other lighting technologies?**
The DLVP system is ideal for digital low-voltage devices like LED light fixtures. If controlling other technologies, the DLVP system does integrate with the Greengate Room Controller to harmoniously control those other technologies which utilize Class 1 line voltage power.

48. **Is the Distributed Low-Voltage Power (DLVP) system compatible with light fixtures that have LED lamps (bulbs) installed?**
Today, DLVP is not compatible with LED lamps (light bulbs) as those products usually are designed to operate on Class 1 alternating current, and are not designed to operate on Class 2 low-voltage systems like DLVP. If controlling fixtures with LED lamps, the DLVP system does integrate with the Room Controller to harmoniously control those other technologies which utilize line voltage power.

49. **Can existing LED light fixtures be retrofitted to the DLVP system?**
While it could be possible to retrofit existing LED light fixtures to the DLVP system, the complexities of this approach may not be practical. It is recommended that only new low-voltage light fixtures be used for the DLVP system be used.

50. **If prefabrication is used, can’t Class 1 overlay systems be as fast to install as the Distributed Low-Voltage Power (DLVP) system?**
It is possible to expedite the actual installation time of Class 1 overlay systems with prefabrication and the use of Class 1 power and Class 2 control wiring inside single flexible conduits. However, if you consider the labor involved with prefabrication, the specialized labor involved with the full Class 1 installation, and the extraneous Class 1 materials required for this type of installation, the DLVP system still results in a lower total installed system cost in most situations.

51. **Can fixture integrated sensors connected to one power module control fixtures connected to other power modules?**
Fixture integrated sensors provide occupancy and daylight information about a space. Daylighting only affects the co-located fixture. Occupancy information is shared only with the power module that provides it power.
52. **What are the benefits of using fixture integrated sensors?**

Fixture integrated sensors with the Distributed Low-Voltage Power system provide several benefits:

- eliminate the time and cost required to install additional occupancy and daylight sensors in a space
- provide for a uniform and granular occupancy detection throughout a space
- save energy by daylighting each fixture individually to maintain the target illuminance of the space
- offer an infrared (IR) interface allowing fixtures to be assigned to manual control zones with a handheld remote
- separate the daylight zone control from the manual zone control

53. **Can fixture integrated sensors cause light fixtures to appear at different light intensities?**

Fixture integrated sensors offer closed-loop daylighting control of their co-located light fixture. Based on the local illuminance, fixtures slowly transition to maintain target illuminance levels. This transition is slow and usually unperceivable, but the result can be noticeable differences in the light output from each light fixture in a space. This is intentionally done to create equal illuminance and energy savings in the space.

54. **What fixtures are available with the Distributed Low-Voltage Power (DLVP) system?**

The DLVP system is available initially with ambient fixture models from the Metalux and Corelite brand. New fixtures will be incorporated into the system as time progresses. Please check the Eaton website for exact models available.

55. **What are the lead times for Distributed Low-Voltage Power (DLVP) system components?**

- DLVP light fixtures are available as made to order (MTO) with a 2-4 week lead time. All other components are typically available from stock.