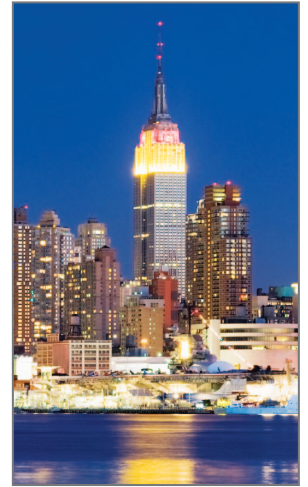




Commercial Lighting Design Guide

24 Volt DC Edition -
EMerge Alliance® Registered Products



Introduction



This design guide is intended to explain how to design a Crestron system using EMerge Alliance® standards. Before understanding how a Crestron system integrates with EMerge, it is important to know how the EMerge Alliance infrastructure differs from today's traditional infrastructure. This guide will touch on the features and benefits that applications of the EMerge Alliance 24 Volt DC standard bring to the table, as well as go into detail on specific Crestron products designed specifically for use with the new EMerge standard.

What is the EMerge Alliance?

The EMerge Alliance is a not-for-profit open industry association leading the rapid adoption of safe DC power distribution in commercial buildings through the development of EMerge Alliance standards. The Alliance was established in 2008 by industry leading corporations including Armstrong World Industries, Johnson Controls, Nextek Power Systems, OSRAM SYLVANIA, and Worthington Armstrong Venture (WAVE). The goals of the Alliance are to create more energy efficient and flexible building spaces while improving overall sustainability.¹

EMerge Technology

The Alliance developed an open standard that integrates interior infrastructures, power, controls and a wide variety of peripheral devices, such as lighting, in a common platform to reduce energy loss associated with powering the many digital DC powered devices found in today's workplaces.¹ Currently, the most common application is a low-voltage ceiling grid, capable of powering lighting fixtures. The benefit is an extremely safe and flexible power distribution system for lighting and other potential future uses. In open-plan office space, rearranging desks doesn't require high costs of rearranging lighting fixtures. Simply relocate an EMerge Alliance Registered fixture to another spot on the grid.

Crestron and the Alliance

Crestron is currently a participating member of the EMerge Alliance. Participating members are key suppliers of products and technology that comply with EMerge standards. As a member, Crestron participates in committee proceedings and plays a role in the development of specifications. Members have total access to all EMerge specifications, which are critical in development of products.

Crestron has already developed a lighting control system for use with the 24 Volt DC EMerge standard, and plans on continued development of sustainable products which will help grow the standard platform.

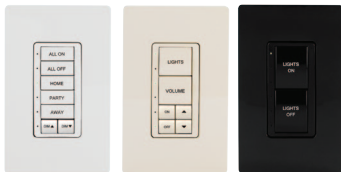
¹. Taken from www.emergealliance.org.

The Crestron 24 Volt DC Lighting Control System

The Crestron 24 Volt DC system is comprised of the following EMerge Alliance Registered products. As with any Crestron system, devices outside of this scope can also be integrated, but for the purposes of controlling a lighting system based on EMerge standards, these are the applicable devices.



Model CLC-1DIMFLV2EX-24V
Type Switch/0-10V dimmer with infiNET EX™ wireless communication
Details Switched 24-Volt power source feed-thru



Model INET-CBDEX
Type Cameo® Wireless Keypad
Details 2-8 button configurable, custom engravable

Model C2N-CBD-P/E
Type Cameo® Wired Keypad
Details 2-8 button configurable, custom engravable



Model GLS-OIR, GLS-ODT
Type Occupancy Sensor, with IR or Dual Technology
Details Models vary per square footage coverage, mount type and technology



Model GLS-LCL, GLS-LOL
Type Photocell
Details Models vary per square footage coverage and technology



Model MC3
Type 3-Series Control System
Details Includes integrated infiNET EX™ gateway and Ethernet

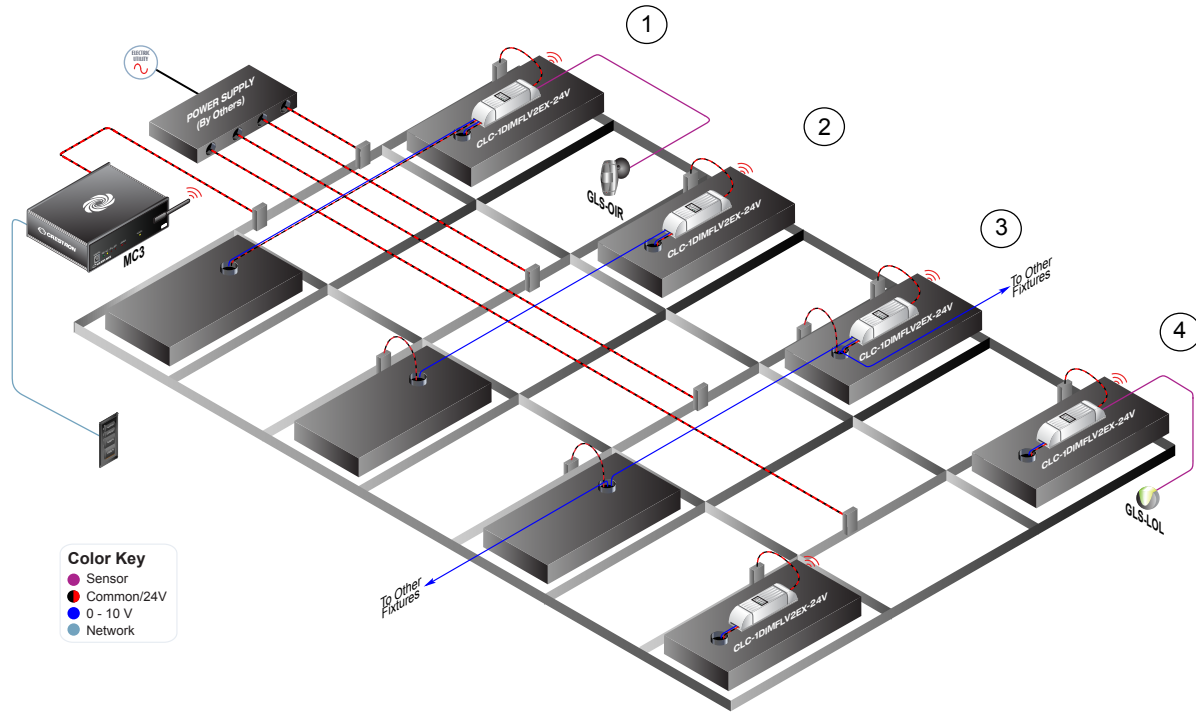


Model DIN-AP2
Type 2-Series Control System
Details Ethernet based, DIN rail form factor



Model CEN-RFGW-EX
Type infiNET EX™ Wireless Gateway
Details Use with DIN-AP2, or to expand coverage

Implementation Overview



This diagram illustrates multiple ways of applying the CLC-1DIMFLV2EX-24V. Each row of lighting, identified by its number, is configured differently:

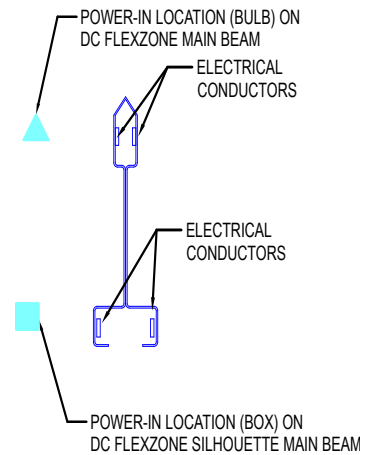
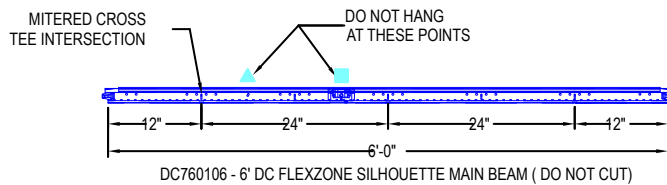
1. A single CLC is powered by the Armstrong® DC FlexZone™ grid. The CLC then passes 0-10V dimming as well as 24VDC power to each lighting fixture.
2. A single CLC is powered by the Armstrong DC FlexZone grid. The CLC then passes 0-10V dimming to each fixture, but only passes 24VDC to one fixture. The second fixture is independently powered directly by the grid.
3. Each lighting fixture and the CLC are independently powered directly from the grid. The CLC passes 0-10V dimming to each fixture attached. This 0-10V signal is daisy-chained across multiple fixtures.
4. Each fixture is independently powered and controlled by a single CLC.

Note that in a typical system, photocells and occupancy sensors can be connected to the nearest CLC-1DIMFLV2EX-24V.

How EMerge Works

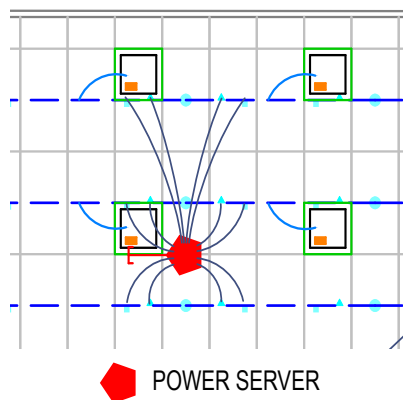
Before taking a closer look at the Crestron devices that integrate with EMerge, let's explore the basics of the EMerge system.

1. **Ceiling Grid** – A special ceiling grid is required for distribution of 24 Volts DC to all fixtures. A powered rail within the grid structure interconnects with the light fixture for power. The below example is of the Armstrong DC FlexZone Silhouette grid, an EMerge Alliance Registered product:



Crestron is proud to be an Armstrong DC FlexZone Compatible Partner. For more info on DC FlexZone go to www.armstrong.com/dcflexzone.

2. **Power Supply** – A 24 Volt DC power supply is wired into AC line voltage. The power supply outputs 24 Volts to different sections on the ceiling grid.



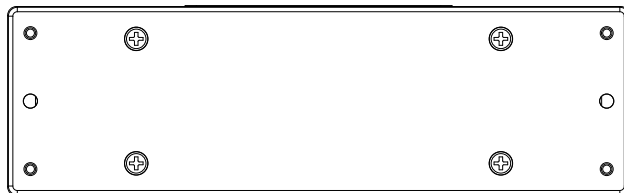
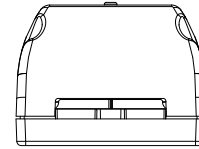
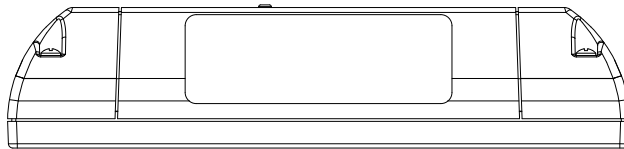
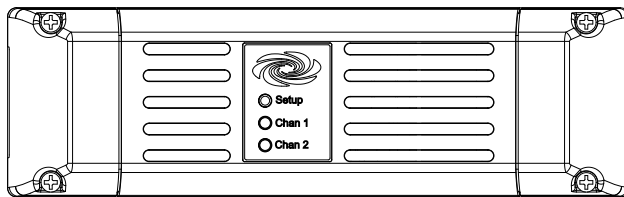
Example: Nextek Power Server Module

3. **Cabling** – Registered cables are available for making interconnects between the power supply, grid and fixtures.
4. **Light Fixture** – An EMerge Registered light fixture sits in the ceiling grid like any other typical lighting fixture. Instead of wiring to high voltage, a low voltage “power tap” connects the grid to the fixture to energize it. Most fixtures use 0-10 Volt dimming ballasts.

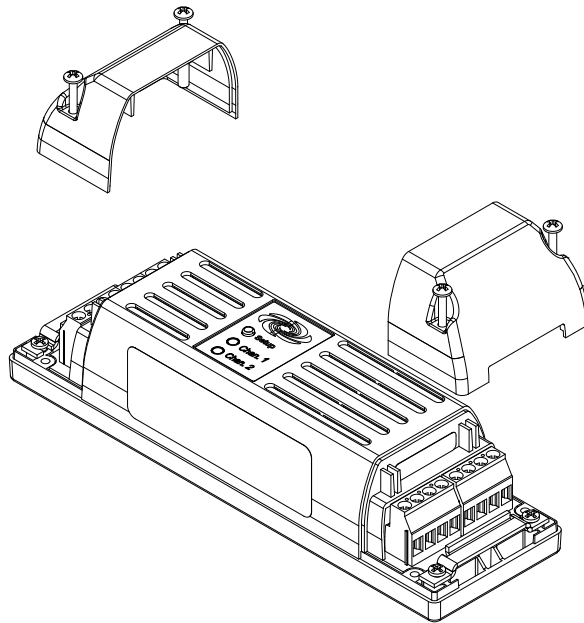
Crestron Integration

Crestron 24 Volt Dimmer (CLC-1DIMFLV2EX-24V)

The Crestron 24 Volt DC dimmer is a compact device that installs on or near the lighting fixture(s) it is controlling. The CLC-1DIMFLV2EX-24V uses infinNET EX™ wireless technology to communicate to the control system. Let's take a closer look:

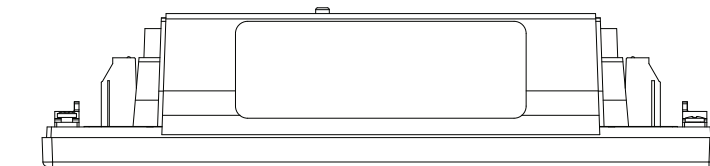
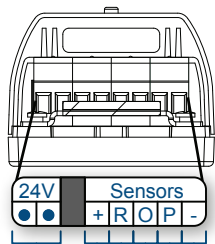


CLC-1DIMFLV2EX-24V Caps Removed

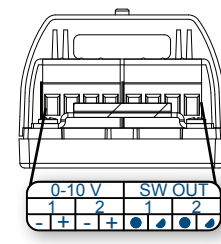


CLC-1DIMFLV2EX-24V Connector Detail

Input Side



Output Side



- Sensor Ground
- Photo Sensor Input
- Occupancy Sensor Input
- Remote Switch Input
- Sensor/Switch Power Feed
- Unpolarized Power Input (from Armstrong® DC FlexZone™ grid)

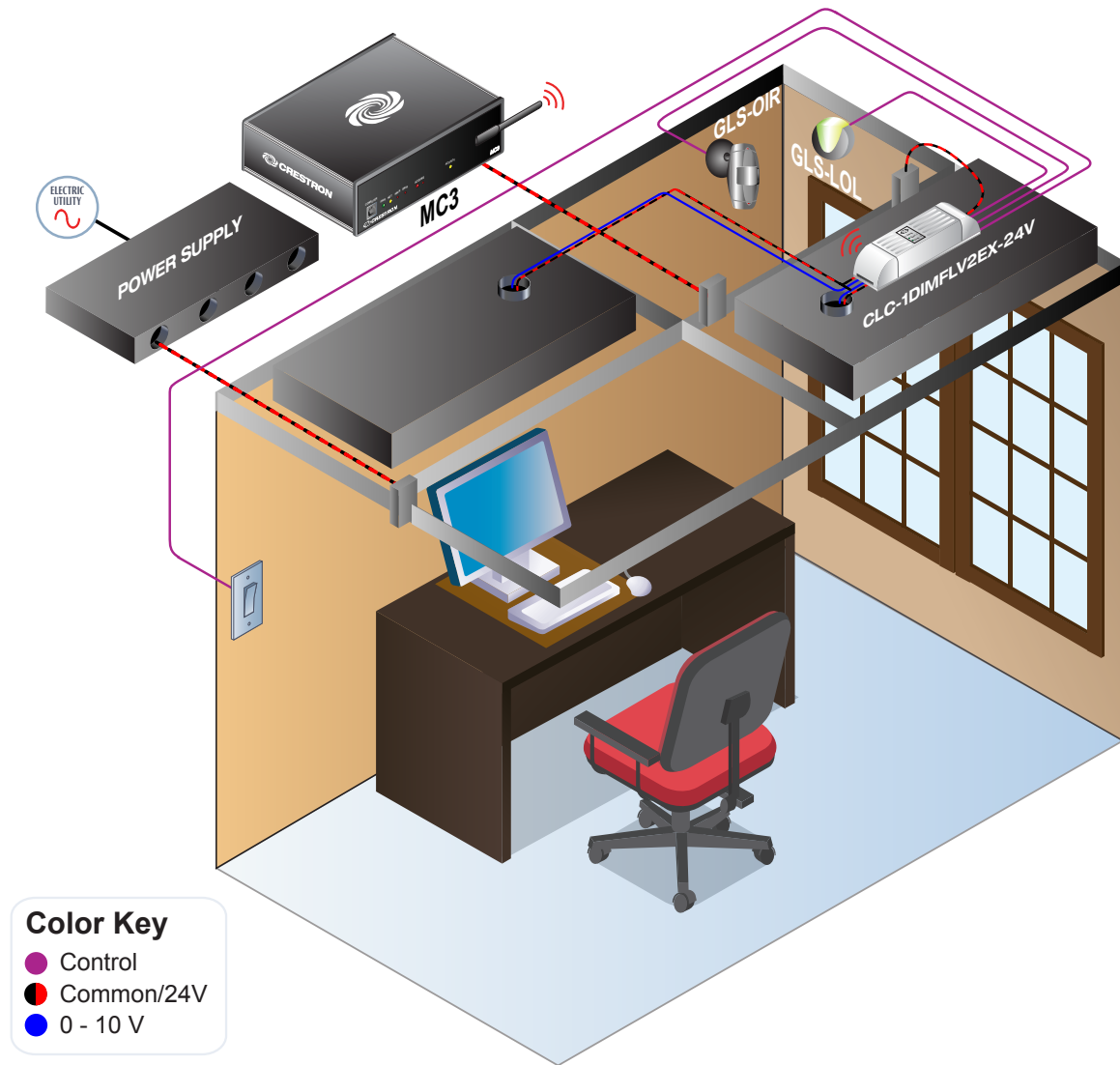
- 0-10V Output
- *Switched Output
- *Half moon indicates the switched leg*

As you can see, the CLC-1DIMFLV2EX-24V has an unpolarized 24VDC input for powering itself as well as fixtures that are attached to it. The output side connects switched 24VDC and 0-10VDC dimming signal to attached light fixtures. What may strike you as different are the other ports on the input side for photocell and occupancy sensor.

The CLC dimmer allows you to connect sensors directly to it, making wiring a whole lot easier (and in some cases eliminating extra or new wiring altogether).

Individual Office

Lets take a look at a basic, practical application using the CLC-1DIMFLV2EX-24V.



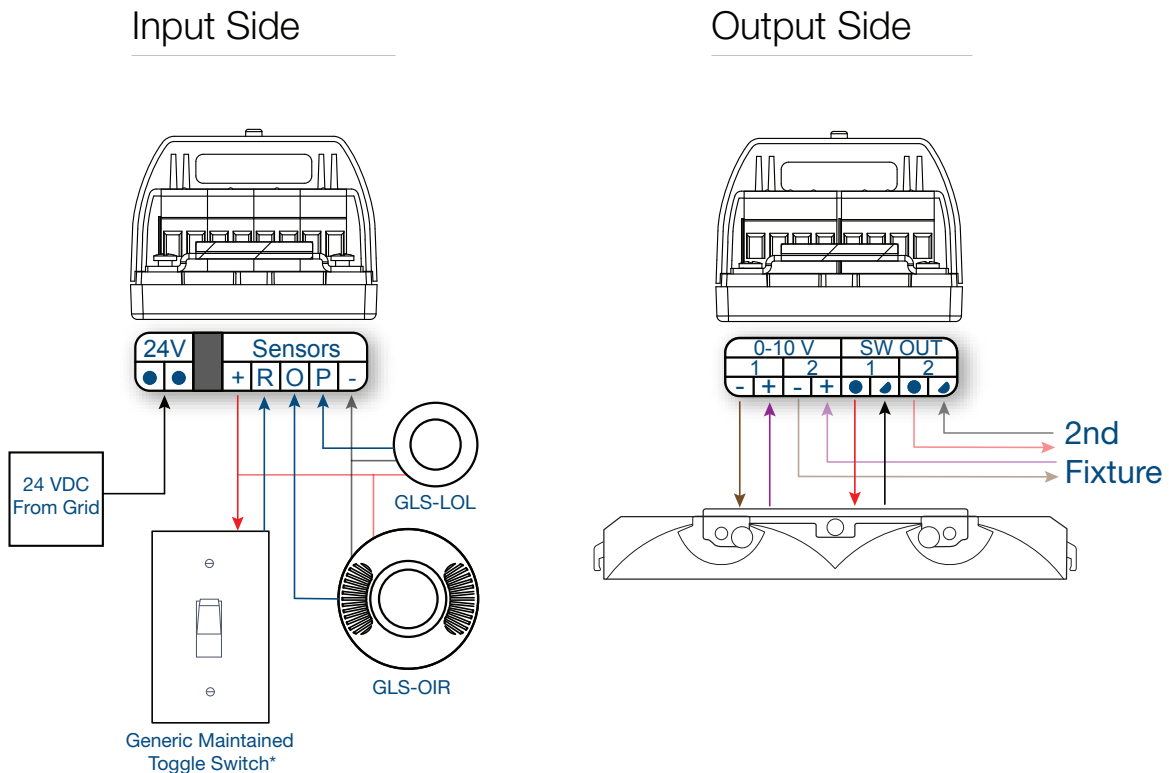
By controlling the lighting fixtures with the CLC-1DIMFLV2EX-24V, you also get daylight harvesting and room occupancy sensing simply by adding the sensors. In this example, the fixture closer to the window will be dimmed lower than the one further from the window based on the amount of natural light. The GLS-LOL occupancy sensor measures the outdoor light while the GLS-OIR senses room occupancy.

In some cases a fully-automated room is acceptable (and desired), but in most cases a user will want the ability to adjust the lights manually. Another time and cost saving feature of the CLC dimmer is its ability to interface with a standard light switch. The remote switch input (R) on the CLC dimmer can be connected to a toggle (maintained) or momentary

switch for basic on/off control. If more granular control is desired, a Crestron keypad can be installed in place of a traditional switch. Depending on the keypad however, it may need to be wired to the control system.

The value of this lighting system lies in the wireless communication and flexibility of the CLC-1DIMFLV2EX-24V.

Detailed Wiring of CLC for Individual Office



*As an alternate to the maintained toggle switch, a momentary switch may be used. The behavior with a momentary switch is as follows:

- Press to toggle on/off
- Press and hold to toggle dim up/dn

Entire Building Designs

Crestron EMerge systems can be deployed across entire buildings without much extra work, mostly due to the power and flexibility of infiNET EX.

- Up to 100 CLC-1DIMFLV2EX-24V devices can connect to a single control system (MC3)
- Each CLC device acts as a wireless expander, effectively increasing range whenever more infiNET EX devices are added to the wireless network
- The wireless indoor range is 100 feet from CLC device to CLC device

Optimizing Device Placement

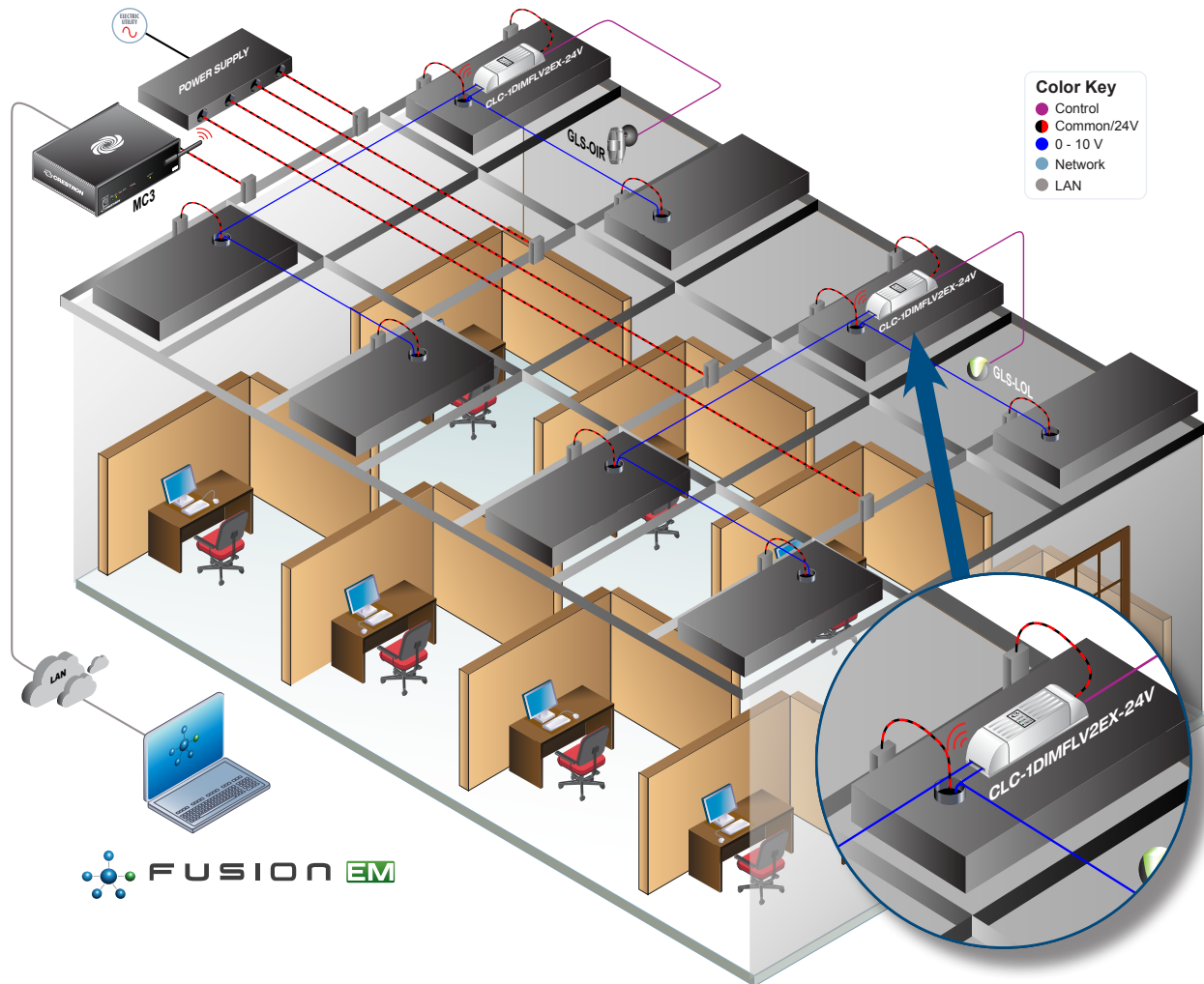
- Each CLC-1DIMFLV2EX-24V is capable of controlling 1 or more fixtures. Since it has 2 channels, it can control 2 lighting groups independently.
- You can connect as many fixtures to each channel that you would like, as long as you do not exceed the maximum switch load rating of the CLC.

Crestron Model	Load Rating (per channel)
CLC-1DIMFLV2EX-24V	2.5A @ 24VDC (60W) 65mA max current sink (0-10V output)

Example Applications

Open Office

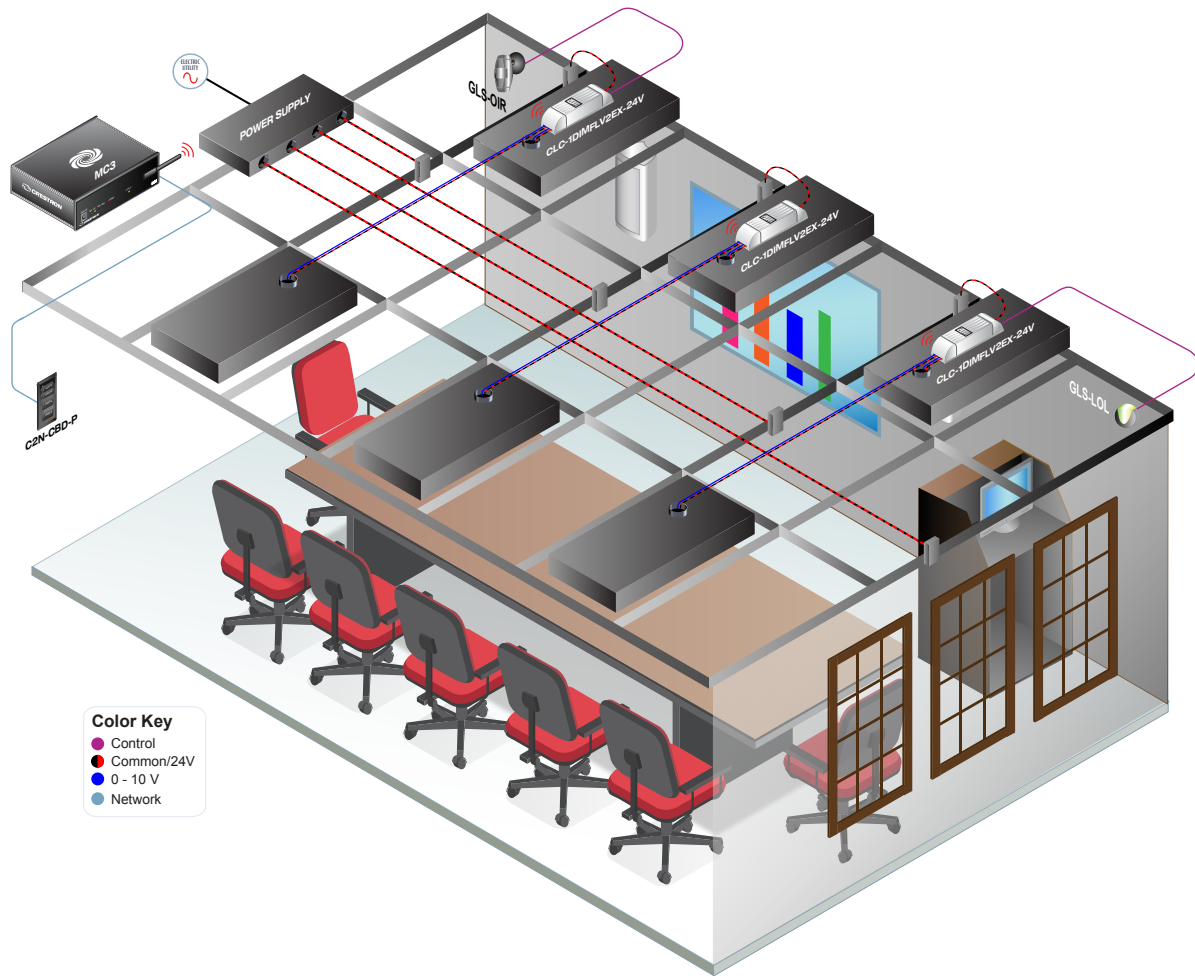
Economies of scale really start to take hold when installing EMerge systems with Crestron in larger office spaces. Easier wiring across multiple units decreases installation time; the ability to move light fixtures around the grid without needing to re-run wire becomes invaluable.



In this example fixtures are controlled in groups of two. One CLC-1DIMFLV2EX-24V connects to four different light fixtures.

- Each light fixture is powered directly from the grid.
- In lieu of a keypad, Fusion EM™ Energy Management Software controls all lights according to a preset schedule. Building managers can make changes in real time from any web browser.

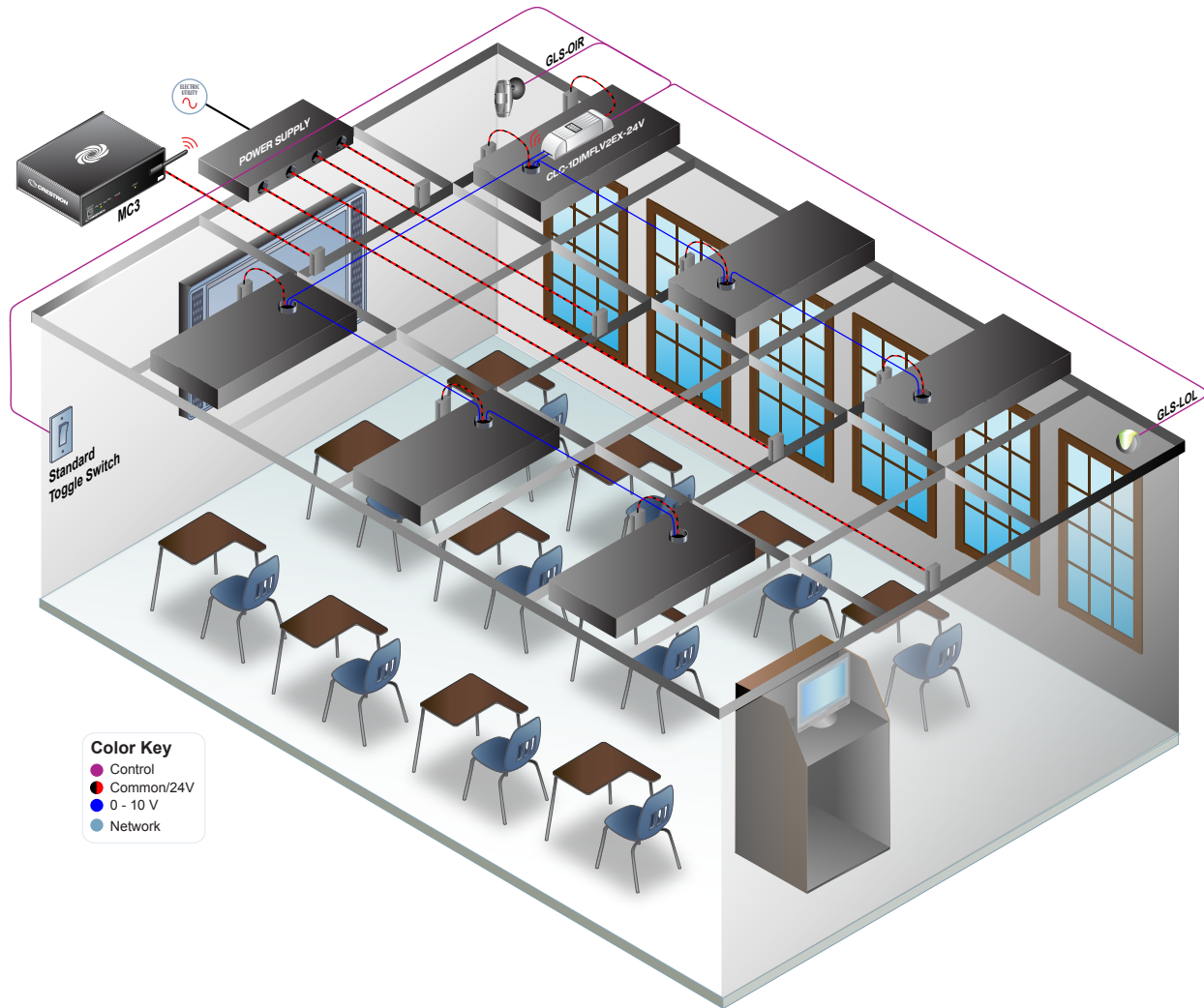
Conference Room



This example uses one CLC-1DIMFLV2EX-24V per every 2 light fixtures to provide individual control of each light in the boardroom.

- Each light fixture is powered through the CLC. (Fixtures can also be powered directly from the grid, as long as 0-10V control lines are connected to the CLC).
- A photocell and occupancy sensor are incorporated into the system, placed in ideal locations requiring minimum wiring. (A sensor may be connected to the nearest available CLC).
- A Cameo® Keypad (C2N-CBD-P) is used to provide user control of preset lighting scenes and dim up/down control.

Classroom



This example uses just a single CLC-1DIMFLV2EX-24V to control all the lights in the classroom.

- Each light fixture is powered directly from the grid.
- Each row of lights is controlled by a separate channel on the CLC. One channel dims the row closest to the windows, while the second channel dims the other row.
- Both a photocell and occupancy sensor are connected to the CLC for energy savings.
- A standard toggle switch provides user control of basic on/off operation.

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