CONVERGING SYSTEMS

TechNotes

Revision 4/25/2024

Converging Systems Lighting Controller

Power Distribution & DIN Rail Chassis Mounting

Backgrounder

It is important to remember that although Converging Systems' products are safety rated, their installation is dependent upon building codes and their enforcement/approval by local building officials. The purpose of this document is to summarize key assumption that are useful when designing and securing approval for the specifics of the intended installation (before installation begins).

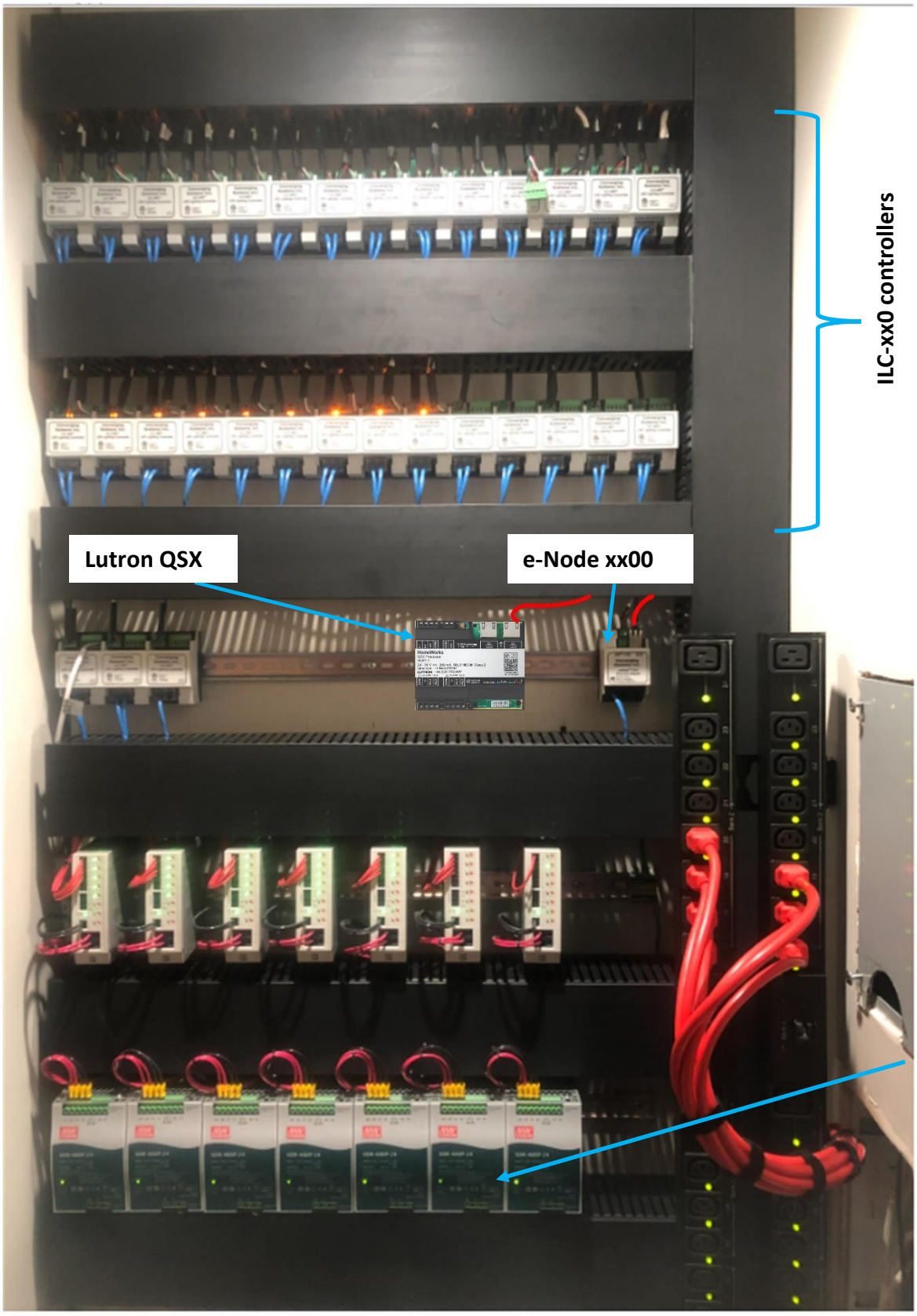
Facts

- Converging Systems manufactures a range of lighting controllers (ILC-xx0 controllers—hereinafter referred to as Controllers) that are enclosed in attractive DIN-rail enclosures.
- Controllers are rated to operate only with Class 2 power supplies (12v @60 watts or 24~60 vDC@100 watts maximum). See the ratings on each Controller for its voltage requirements.
- At minimum, any Class 2 Listed power supply as well as a collection of specified Class 2 Recognized power supplies are suitable to drive Controllers.
- Power supplies are typically mounted either close or the Controller/load or remotely in one or more approved mounting enclosures.
- If power supplies are to be integrated within a UL- approved enclosure, attention must be given to the Input amp ratings of each power supply and the number of said supplies installed within each enclosure. In addition, attention must be given to the (i) heat dissipation (air vents) of the included components and (ii) the connection of said power supplies to field- installed Class 1 power cables to connect to the AC Live/Neutral and Ground connections.
- Wiring of Class 1 power to the power supplies, and wiring of Class 2 power from the output side of the power supplies to the ILC-xx0 controllers must be considered both with respect to approvals (CL2, etc.) and gauge of wire required.

Installation Example

Converging Systems controllers can be found in the largest installations driving hundreds of unique zones and lighting elements as well as smaller installations where there might be single controller driving a single lighting element. Small installations rarely merit the attention of building inspectors while larger installations in commercial venues are often scrutinized thoroughly by local building inspectors.

Please see the picture below for a well-organized installation that may or may not be acceptable in your locality.


ROW 1
ROW 2
ROW 3
ROW 4
ROW 5
ILC-xx0 controllers
Lutron QSX
e-Node xx00
ILC-x00 PSU

Detail for devices located in DIN RAIL chassis:

Row	Contents	Notes
1	ILC-xxx Controllers	-The **CS-Bus** wires (Cat 5 or better communication wires that connect each ILC-4xx controller in a daisy-chained manner to the e-Node located on the top of Column 3—in this picture these wires are all blue). **Note**: The CS-Bus wires are unique. They use 3 of the 4 normally provided color pairs (with Browns snipped) and preserve same color pairs on Pins1&2, Pins3&4, and Pins5&6). The pins outs are a 1-1 configuration (1-1, 2-2, 3-3, 4-4, 5-5, 6-6 with no crossovers for 568A or 568B type configuration). -For **incoming DC power**, a 3-pin connector connected to Class 2 wires are used to route power to each ILC-4xx controller (+, - and Ground) from each Controller's (required) external power supply. The Ground (which is the case of our Controllers) is only a ***signal ground*** is intended to eliminate floating grounds within a complete system where the power feeds may have different origins (and therefore have different ground differentials). **Note**: Depending upon the length of wire running to each power supply from the connected power supply, the type of wire and its gauge should be selected based upon voltage drop and current draw. -For LED element connections, various types of Phoenix-type connectors are configured (2-pin for Monochrome, 3-pin for Bi-White, 4-pin for RGB, and 5-pin for RGBW) on the Controllers which are designed to accommodate 12awg to 20 awg solid or stranded wire to connect to each Controller's targeted LED load. **Reference**: Converging Systems has voltage drop table that is useful here to size the wire. It is important to select the correct gauge of wire to avoid voltage drop and color shifts. http://www.convergingsystems.com/bin/doc/cable_length_DD.pdf
2	14 ILC-4xx Controllers	Same comments as for Column 1
3	Right-most object is e-Node (communication	-The -**e-Node** is a Class 2 device which can be powered from an optional wall-wart (12vDC to 24vDC @90ma). **Model Differences**. T

	device to outside network) Middle object is Lutron QSX/Athena or other Lutron processor (optional with Lutron in the system)	▪ The e-Node 2x00 requires Class 2 power (12vdc~24dc 90 ma) that can obtained from either (i) a 12v external (optional) power supply available from Converging Systems or (ii) alternative power supplied elsewhere within the enclosure provided the output power/wattage of a dealer-supplied power supply falls within the above acceptable range) and available current is available (90 ma). ▪ The e-Node 4x000 gateways have a built- in Class 0 POE circuitry that can be utilized if a POE switch is available (that support low-wattage POE Class 0 devices). If POE is not available for POE cabling is quite long then the standard 12v options specified above can still be used. -An incoming **CAT5** or better ethernet wire is routed form the e-Node to the external network switch to enable communication to all Controllers through the e-Node. -A **CS-Bus** wire is connected from Port 0 of the e-Node to the first ILC-xx0 controller shown in Column 1 -**Lutron QSX/RadioRA3 or Athena processor**—for installations with Lutron in the system
4	These are current limiting devices that cap the current to each connected ILC-xx0 controller to 4 amps which is the NEC limit for Class 2 wiring	**Note**: this custom installation may not be acceptable in all jurisdictions and has been used here to share non-Class 2 power supplies among a number of ILC-x00 controllers.
5	DIN-Rail power supplies	DIN rail power supplies have been selected here for space considerations. Alternatively, non-DIN-Rail power supplies are often used instead. Please note that **5** m of horizontal spacing is required between PSU and **40**mm spacing is required above each supply and 20mm spacing is required below each supply for proper air flow (this picture shows the power supplies mounted next to each other to dramatize what should not be done.)

DIN Rail Enclosures

Converging Systems' customer have utilized DIN RAIL enclosures from:

-Lutron

-Crestron

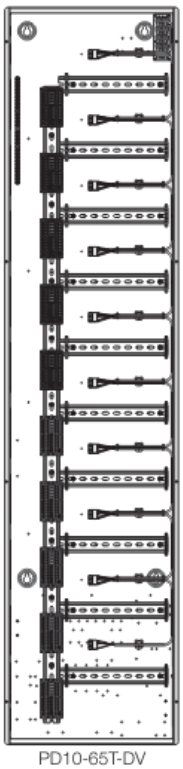
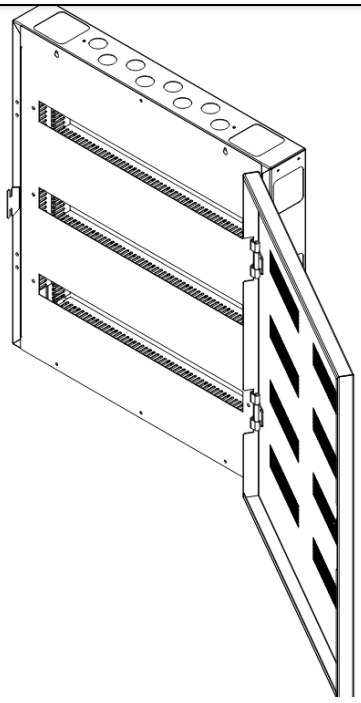
-Future Automation

Note: many other panels exist but for brevity these are not documented here.

These panels are recommended by Converging Systems to accommodate

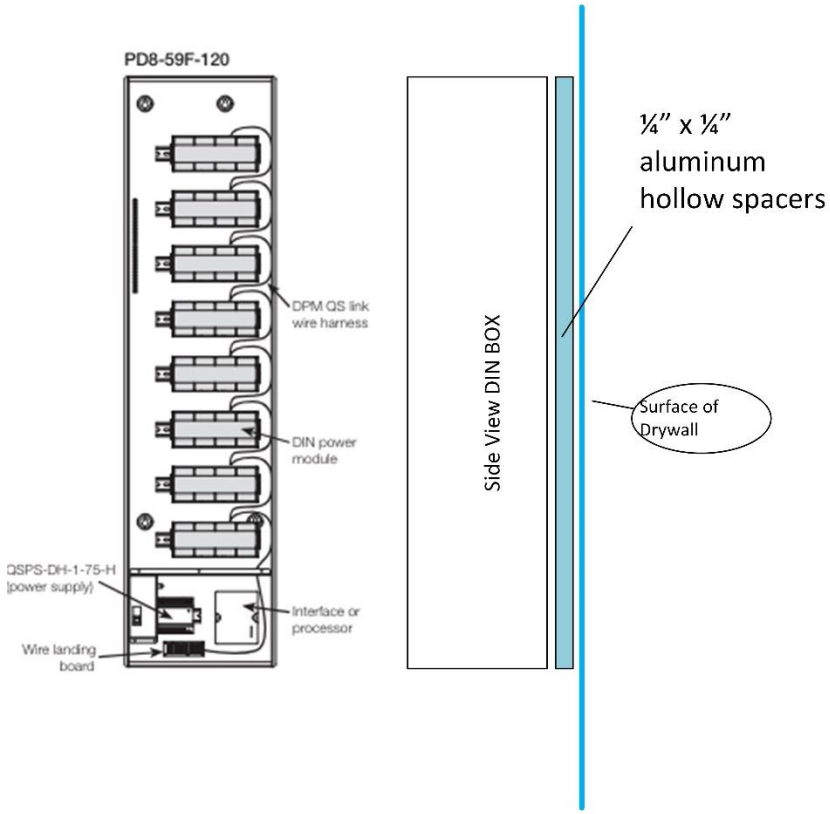
- DIN Rail controllers and gateways from Converging Systems
- Meanwell DIN rail power supplies
- Other controller DIN rail equipment (i.e., Lutron QSX and others)

DIN Rail Enclosures from these partner vendors look like this:

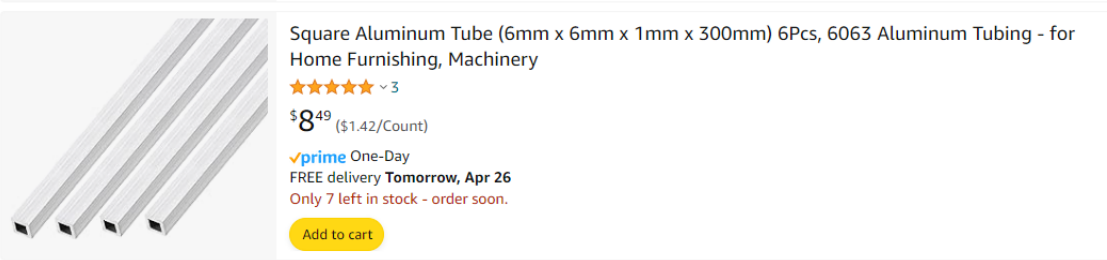
Lutron	Crestron	Future Automation
 PD10-65T-DV		

Depth Issues. Standard DIN Rail power supplies combined with their low-profile mating DIN Rails (to which the DIN Rail component simply snaps into place) requires 4.17” inside depth (ID) within the DIN Rail enclosure. The Lutron and Crestron boxes specified above only have 4.00” of inside depth-while the Future Automation panels are much deeper. To remedy the situation that might be encountered with 4” deep boxes, we suggest simply mounting the DIN box recessed from the finished drywall by ~0.25” and “filling” the gap with some inexpensive ¼” x ¼” x 12” or longer Square Aluminum Tube stock (see sourcing information below) and affix those “fillers” to the DIN boxes with sheet metal screws. This formula for extended the ID of 4” DIN rail boxes can typically satisfy requirement of local building codes (but check with your local jurisdiction for acceptability).

This imager clarifies the concept described above:



Details for aluminum stock. The aluminum square tubes can be easily acquired from Amazon.



Note: Search on the above item or click here for a potential match Amazon link