

Connecting ILC-x00 Controller to Light & Green Monochrome LED Fixtures

Overview:

Converging System's family of ILC-x00 controllers have traditionally been connected to our own FLLA (constant voltage) linear lighting elements (LED ribbons). Although there are numerous alternatives for dimming third-party monochrome (white) LED fixtures, most of these solutions **fail** in three important areas:

- Limited low-end dimming (2% or 5% or 10% typically)
- Flicker present at various lower-end dimming levels
- Rough (bumpy) dimming steps especially at lower levels
- General inability to centrally/remotely control these devices with bi-directional feedback
- High cost for dimming technology for ballasts/drivers typically are located at each fixture (one ballast per each LED lamp)

Of late, manufacturers of LED fixtures (both recessed as well as chandelier and other exposed elements) have adopted Converging Systems ILC-x00 controllers along with our recommended low-cost remote power supplies to take over the job of dimming the latest monochrome fixtures. As a result, dimming results and functionality available is dramatically enhanced.

This Tech Note is designed to detail the specifics of (i) selecting the proper ILC-x00 dimming controller and (ii) interconnecting the targeted third-party LED fixture(s) with our ILC-x00 devices including recommended low-voltage power supplies.

Two cases are presented below:

Case 1. A single monochrome LED fixture connected to a single controller

Case 2. More than one monochrome LED fixtures connected to a single controller

Case 1 Single Monochrome LED fixture connected to a single ILC-x00 Controller

Required Equipment:

You will need the following

1. Third-party monochrome LED fixture
2. ILC-100m or ILC-400 controller (set to monochrome mode)
3. Constant voltage LED power supply (matching the voltage requirement of the LED fixture), or a constant current LED power supply (with the rated output current sufficient to handle the current requirement of the **SINGLE** supported LED fixture **plus** the normal 10% headroom current safety factor and voltage output matching the range of the **SINGLE** LED fixture)
4. CL-2 or CL-3 interconnect cable of sufficient gauge to support current requirement of LED element (see [voltage drop table](#))

Introduction

This is a really simple case. Because most LED fixture utilize LED elements that are constant current, provided that you are simply connecting a single LED fixture to one of our ILC-100m or ILC-400m controllers, it is acceptable to secure a compatible power supply. (There is no requirement for a dimming power supply when used with our ILC-x00 family of controllers which do the dimming.) Please see table below for compatible power supplies.

As an example, for a monochrome LED fixture rated at 36v/250ma, here are the various power supplies that could be compatible:

Power Supply Matrix Grid

Type	Voltage	Current (wattage output)
Constant Voltage 36vdc	Constant voltage of 36Vdc	Rating of at least 250ma (1/4 amp) +25ma (for current headroom safety factor)
Constant Current 250ma	Voltage range in the 34-38v range	Constant current output of 250ma (1/4amp) +25 ma (for current headroom safety factor)
Constant Voltage/Constant Current combo units (dual pots)	Potentiometer to adjust voltage—set to 36Vdc (see Appendix 1)	Potentiometer to adjust current-set to 250ma + 25 ma (for current headroom safety factor)

Wiring Diagram:



Steps:

Step	Tasks	Detail
1-a	Connect LED element to the output channel of the ILC-100m or ILC-400m controller	Make sure you connect the positive LED lead to the "C" terminal of the ILC controller (Common +)
1-b	Connect the DC output from the recommended power supply to the ILC-100m or ILC-400m input power connector	Connect the DC output from the power supply to the power input terminals on the ILC-100m or ILC-400m controller. Note: Obey proper polarity.
1-c	Connect the Ground pin (on the 3-pin power input connector) on the ILC-100m or ILC-400 controller to a suitable ground	It is often easiest to connect the ground pin to the incoming earth ground of the power supply. Note: this ground insures low-end dimming without flicker and accuracy in bus communication.
1-C	Connect communication wire (CAT5) using	The CS-Bus is a daisy-chain format bus. If connecting



RJ-25 (6P6C) from ILC-100m or ILC-400m controller to e-Node or IBT-100 gateway	additional CS-Bus controllers, connect Port 1 of one controller to Port 0 of the next controller.
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Case 2 Multiple Monochrome LED fixture connected to a single ILC-x00 Controller

Required Equipment:

You will need the following

1. Multiple third-party monochrome LED fixture (of the same voltage and current requirements)
2. ILC-100m or ILC-400 controller (set to monochrome mode)
3. Constant voltage LED power supply (matching the voltage requirement of the LED fixture), or a constant current LED power supply (with the rated output current sufficient to handle the **AGGREGATE** current requirement of **ALL** the supported LED fixture Plus the normal 10% headroom safety factor with voltage output matching the range of the LED fixture)
4. CL-2 or CL-3 interconnect cable of sufficient gauge to support current requirement of LED element (see [voltage drop table](#))

Introduction

This is an interesting case. Here potentially one power supply and one ILC-100m or ILC-400 controller are remotely located and ganged to support 2 to “n” LED fixtures. In this case because you want to anticipate the eventuality that if one or more LED fixtures in the chain eventually fails, you must insure that the maximum allowable voltage provided to the remaining units is never exceeded. In this case you need a constant voltage power supply rated or set at a voltage **no higher than that permitted by any one fixture** in the chain . (There is no requirement for a dimming power supply when used with our ILC-x00 family of controllers which do the dimming). See the table below for recommended choices.

As an example, for 10 monochrome LED fixtures connected in parallel, each rated at 36v/250ma, here are the various power supplies that could be compatible:

Power Supply Matrix Grid

Type	Voltage	Current (wattage output)
Constant Voltage 36vdc	Constant voltage of 36Vdc	Rating of at least 250ma (1/4 amp) times 10 units or 2.5amps minimum (without consideration of the 10% current safety factor-see below).
Constant Voltage/Constant Current combo units (dual pots)	Potentiometer to adjust voltage—set to 36Vdc (See Appendix 1)	Potentiometer to adjust current-set to 2.5 amps (250ma x 10) (without consideration of the 10% current safety factor-see below).

The following table indicates the maximum number of similar LED fixtures at various voltage ratings that can be driven by a single ILC-100m or ILC-400 (in monochrome mode) using a CLASS 2 UL rated power



supply. Two tables are provided—one for LED Fixtures above 20Vdcs where the maximum wattage requirement is capped at 100 watts, and the second table for LED Fixtures at 12Vdcs where the maximum wattage limitation is capped at 60 watts. Both tables assume an additional 10% current safety factor for the targeted power supply. Look for the wattage requirement of your LED fixture and read the maximum number of LED fixtures that can be ganged together with a single controller at various voltages.

Table 1

Ganged Wattage Requirement for “n” qty of 24v to 36v LED fixtures

Number of LED fixtures	Watts per LED fixture (assuming 24 v to 35 v LED fixtures)							
	5	9	13	17	21	27	35	44
1	5	9	13	17	21	27	35	44
2	10	18	26	34	42	54	70	88
3	14	27	39	51	63	81		
4	20	36	52	68	84			
5	25	45	65	85				
6	30	54	78					
7	35	63	91					
8	40	72						
9	45	81						
10	50	90						
11	55							
12	60							
13	65							
14	70							
15	75							
16	80							
17	85							
18	90							

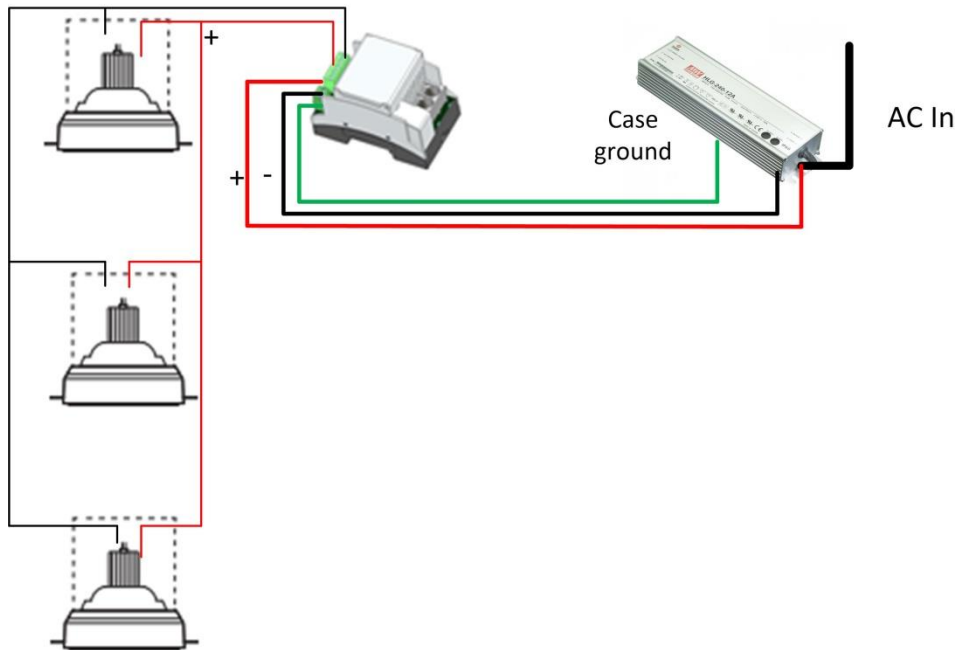
Table 2

Ganged Wattage Requirement for “n” qty of 12v LED fixtures

Number of LED fixtures	Watts per LED fixture (assuming 12 v LED fixtures)							
	5	9	13	17	21	27	35	44
1	5	9	13	17	21	27	35	44
2	10	18	26	34	42	54		
3	14	27	39	51				
4	20	36	52					
5	25	45						

6	30	54						
7	35							
8	40							
9	45							
10	50							

Wiring Diagram:



Steps:

Step	Tasks	Detail
1-a	Connect LED element to the Output channel of the ILC-100m or ILC-400m controller	Make sure you connect the positive LED lead to the "C" terminal of the ILC controller (Common +) Note: Use the voltage drop tab
1-b	Connect second LED elements to the input leads of the first LED element	Make sure you connect the positive LED lead to the "C" terminal of the ILC controller (Common +)
1-c	Connect the DC output from the power supply to the ILC-100m or ILC-400m controller	Connect the DC output from the power supply to the power input terminals on the ILC-100m or ILC-400m controller. Obey proper polarity
1-d	Connect the Grn pin on the ILC-100m or ILC-400 controller to a suitable ground	It is often easiest to connect the ground pin to the incoming earth ground of the power supply.



		Note: this ground insures low-end dimming without flicker and accuracy in bus communication.
1-e	Connect communication wire (CAT5) using RJ-25 (6P6C) from ILC-100m or ILC-400m controller to e-Node or IBT-100 gateway	The CS-Bus is a daisy-chain format bus. If connecting additional CS-Bus controllers, connect Port 1 of one controller to Port 0 of the next controller.



APPENDIX 1 ADJUSTING Potentiometers on Adjustable Power Supplies

IMPORTANT FINAL STEP

It is important that LED fixtures never receive more voltage than their manufactured rating. There it is imperative to check the voltage rating of the LED fixture and set that exact voltage on any adjustable power supply selected. This is easy but very critical.

Follow these steps

Steps	Tasks	Detail
A-1	Turn on power supply and set output voltage to rated level of LED Fixture ¹	-Turn on power supply and without any loads attach, measure the output voltage with a digital voltage meter. Adjust the power-supply's on-board pot to the voltage requirement of the LED.

1. In the Case of Light & Green standard CREE LED offerings, the rated input voltage is 36 volts.Their maximum current requirement of 250 ma.