Lighting Control & Design

An AcuityBrands Company

GR 2400 PLANNING GUIDE
[NEW CONSTRUCTION]

Planning Guide Index

Important Note:

This supplement to the Quick Start Guide should be read by the project foreman before any cables are pulled. It should also be read by those who are involved with the submittal process to ensure a successful installation. The Quick Start Guide is a colorful overview of the steps necessary to install and start up the GR 2400 system. Please also refer to our Product Installation Guides for installation and start-up details for each GR 2400 product.

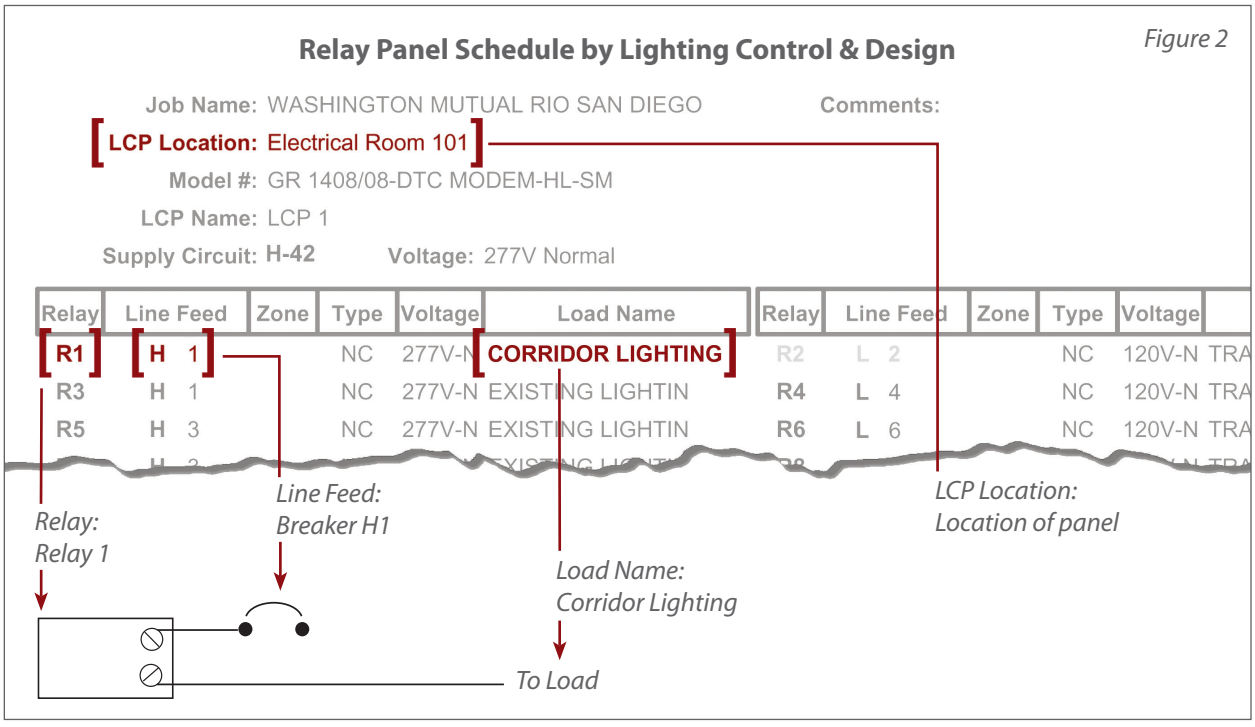
Following the Approved Submittal

Documentation
The documentation specific to your project (excepting systems not factory programmed) consists of the Bus File and the Single Line Drawings—both of which have been carefully engineered for your site. Please adhere carefully to these customer-approved construction documents.

In some cases, the approved submittals don't accurately represent the as-built devices or programming due to requirements per production specification, quality control, and superseding changes by the customer made after the approved submittals. In every case, as-built bus files and single line documentation are provided with every system (located with the door sheets in the main panel). Upon request, the dated record-only drawings can be provided via email or fax.

The Bus File
The Bus File consists of schedules for each control panel and digital device. The device schedule indicates device location, programming details, and the line-feed for each relay or dimmer. Refer to Figure 2. It clearly shows where the panel is located, the line-feed for each relay, and load names.

The approved submittal amends any relay numbering indicated on the original plans. Varying from the approved submittal, by swapping relays or loads, will result in unnecessary re-programming in the field and may violate NEC or UL requirements particularly if controlling both normal and emergency power loads. If you consider it absolutely necessary to vary from the schedules, please try to address this during the submittal phase, or if during the installation phase, notify Tech Support prior to making changes.



Following the Approved Submittal

Single Line Drawings
Devices may be connected in any order on the same bus. The single line drawing shows all digital devices on one bus. Though devices are usually shown on the bus in an order similar to the physical location, it is not necessary to wire them in the order shown. Devices may be placed in any order on the bus.

Single-Bus Systems
A single-bus system only has one DTC clock located on the bus.

Multi-Bus Systems
When a system exceeds the length of a single bus, it becomes a multi-bus system. The multiple buses are connected by a "back bone bus" headed by an "UpLink" Card. Moving a device to a bus other than the bus indicated for that item on the single line drawing can result in the device not being able to control the circuits it was specified for.

Figure 3.1

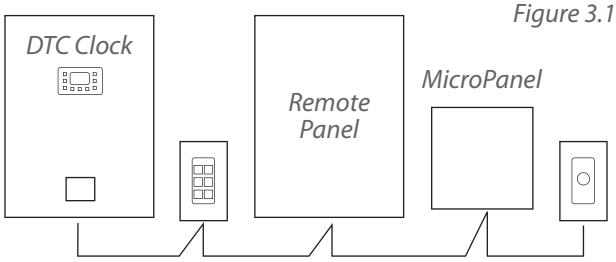
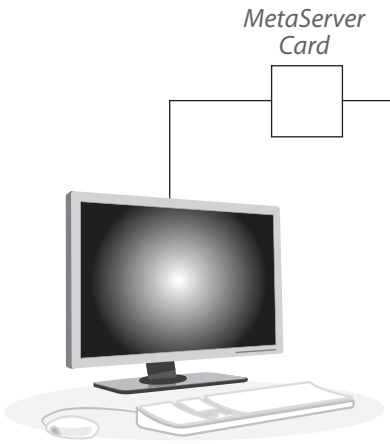


Figure 3.2



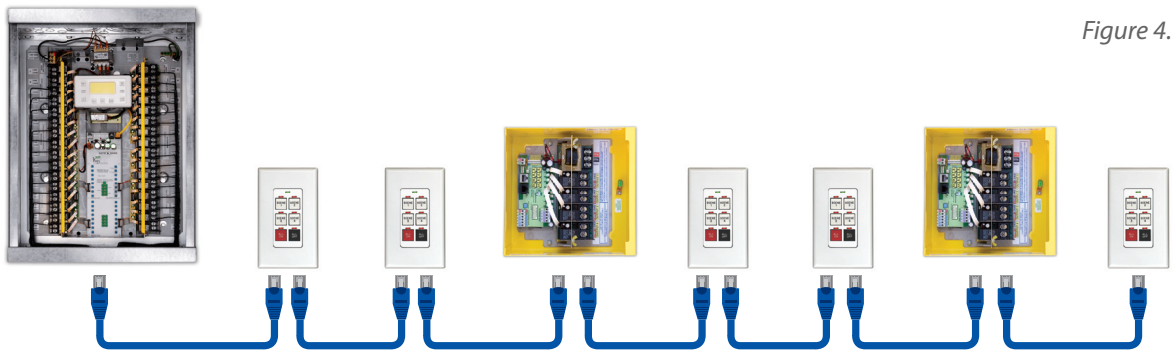
The UpLink Card is used to link multiple buses. Digital devices can be daisy-chained in any order but may not be moved to another bus, otherwise they might not control the correct circuits.

Digital Cabling Basics

Digital Cabling Basics

With a few exceptions, GR 2400 System devices are digital and therefore can be daisy-chained using Cat. 5 cable with RJ45 connectors. Do not "home run" any of the digital devices on the bus back to a panel. When cabling digital devices, no spurs or T-Taps are allowed. Cabling for photosensors and the peripherals are covered in their respective manuals.

Figure 4.1



If the above illustration was converted to a single line drawing, similar to those supplied with your project, it would look like this. The saw-tooth pattern is a drawing standard which indicates a daisy-chain style network (RS-485).

Figure 4.2

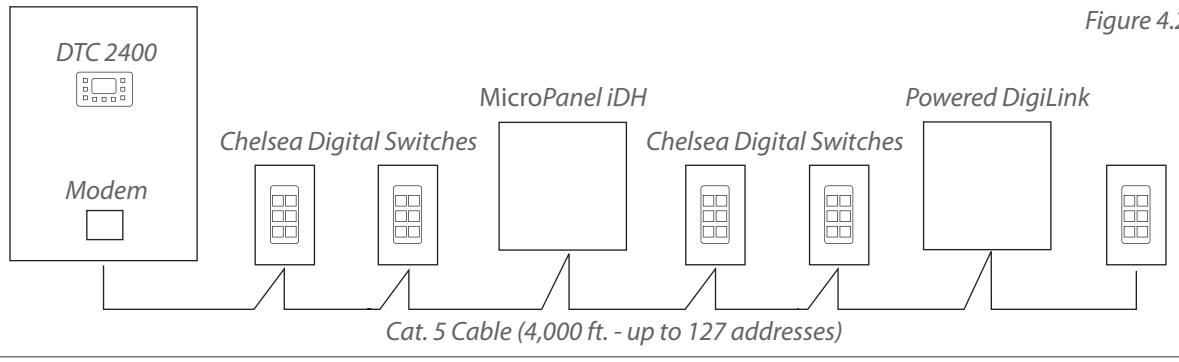
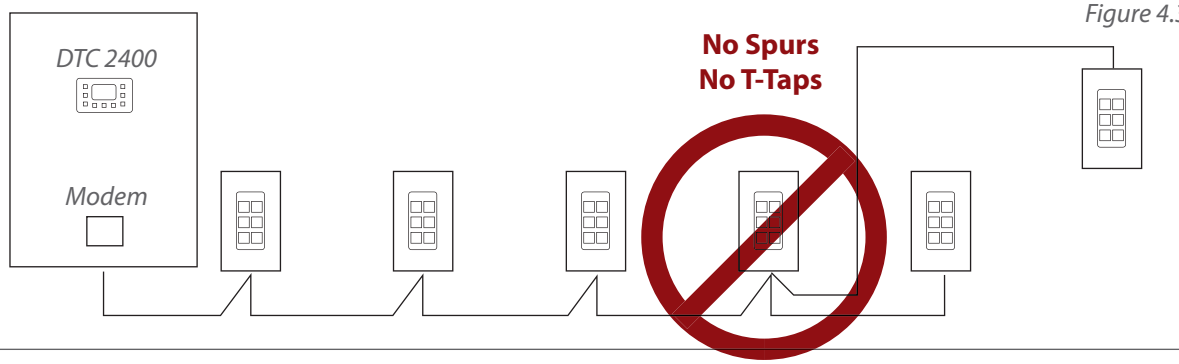


Figure 4.3

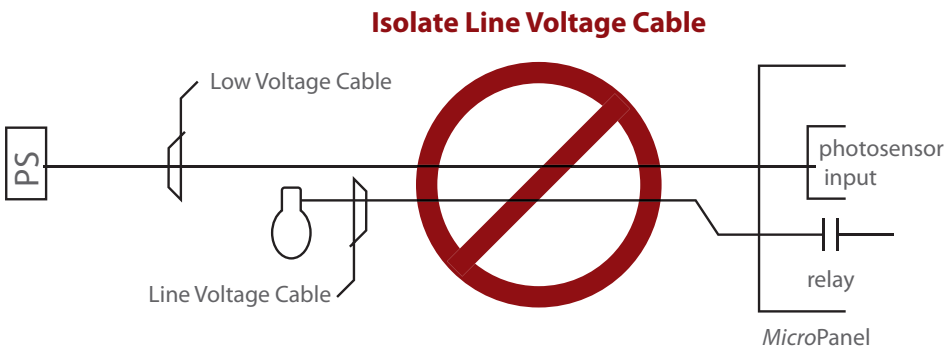


Eliminating Low Voltage Interference

Eliminate Low Voltage Interference
Cat. 5 cable must be at least 12 inches from all line voltage conductors except to cross or make terminations. Cat. 5 cable must be kept away from all EMF devices such as ballasts or transformers.

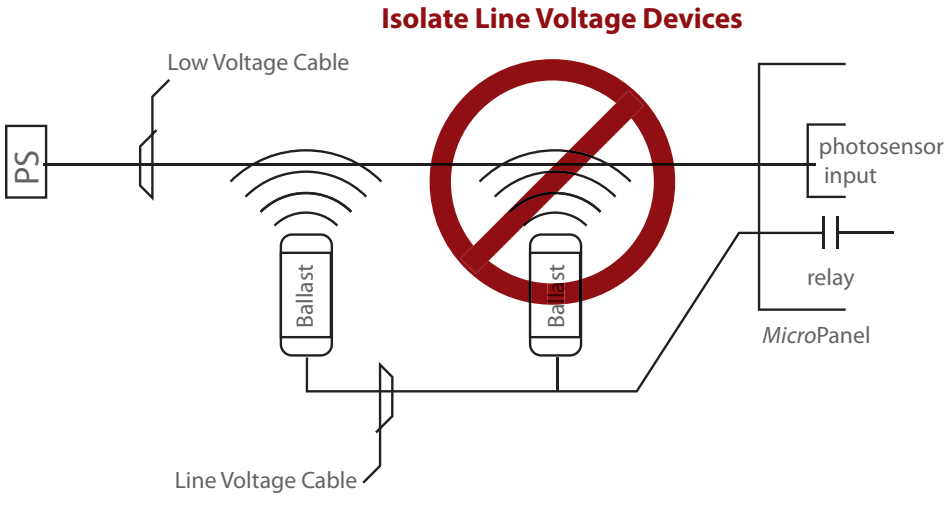
Low voltage cabling must not be run in parallel with line voltage cable, and must not share the same conduit, whether digital cable (Cat. 5) or just low voltage cable (3#18 from a photosensor).

Figure 5.1



Low voltage cabling must avoid EMF or RF from ballasts or other "noisy" loads. EMF or RF interference can create an unstable bus and can eventually ruin digital devices.

Figure 5.2



Planning Your Cabling Route

Plan Your Cabling Route

As already stated, you may vary from the single line drawing as long as the devices remain within a specific bus.

There are two extremely important issues to think about when planning your low voltage cabling route: voltage drop and the current-draw of bus-powered devices. If too many bus-powered devices are added contiguously, particularly over long cabling lengths, they may not receive enough current to operate from the active devices.

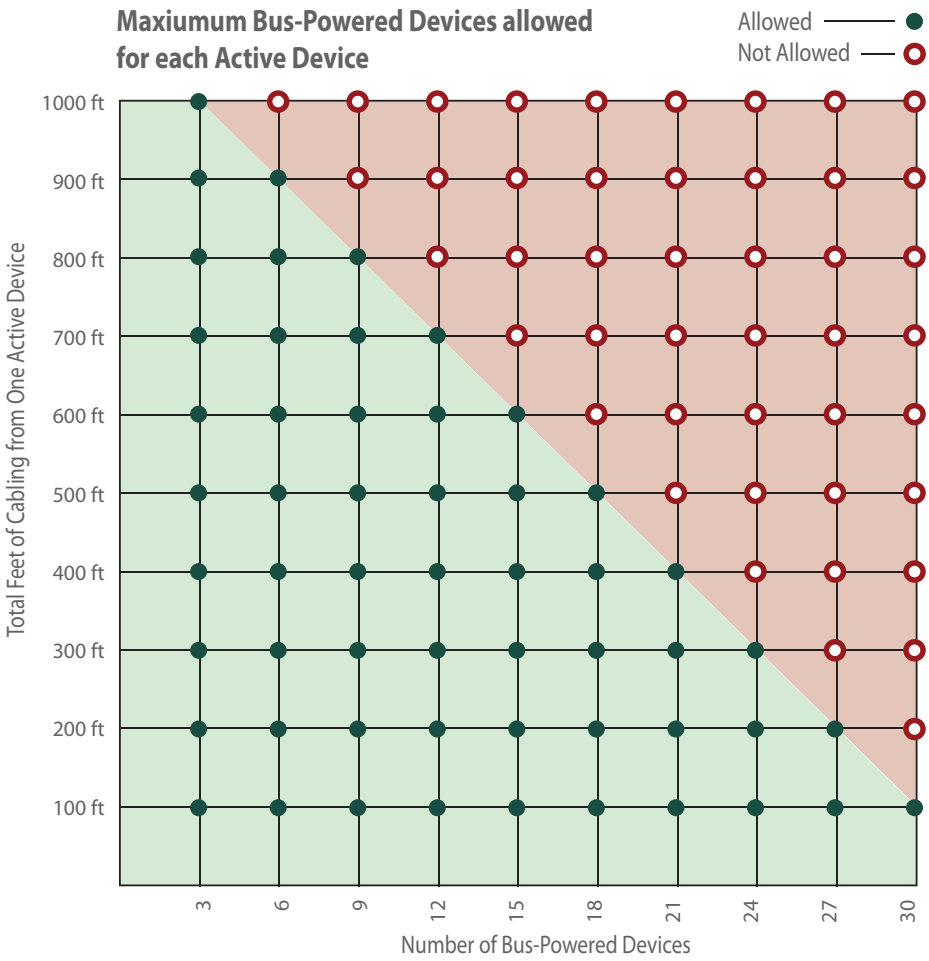
Use the Bus-Powered Devices chart (Figure 6) to help plan your cabling route by avoiding too many contiguous bus-powered devices. The active devices shipped with your order will supply enough current for all the bus-powered devices if cabled properly. Never try to support more than 21 items on the bus from a large relay panel (such as a GR 2400 or The Blue Box LT), or nine items from a *Micro*Panel.

Definitions:

Active Device: Any device with a power supply (a transformer). It acts as a source of electrical energy for the GR 2400 bus. Examples: Control Panels, powered DigiLinks and Bus Boosters.

Bus-Powered Device: Any device that relies on the 12V supplied by the GR 2400 bus for its power. Example: digital switches and photosensor cards.

Figure 6

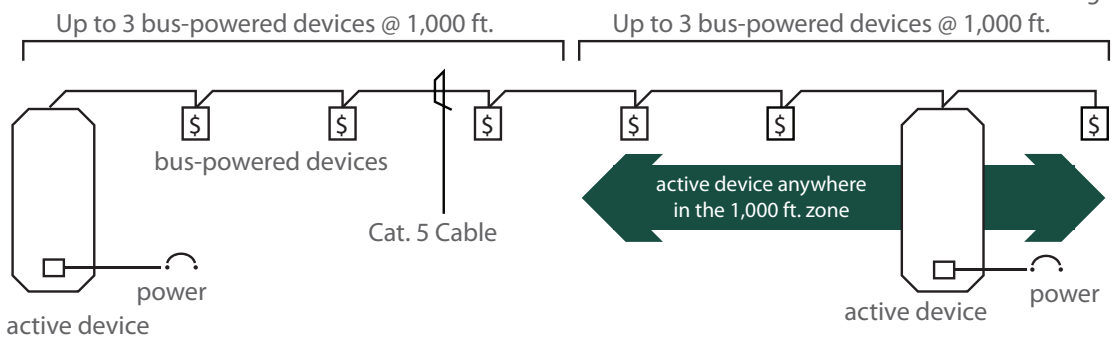


Eliminating Voltage Drops

Eliminate Voltage Drops

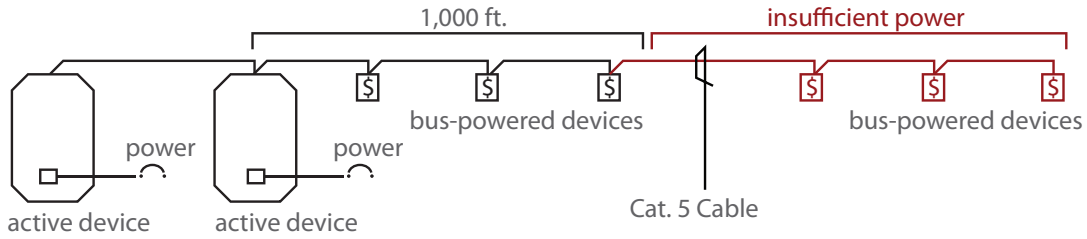
Per the Bus-Powered Devices chart (Figure 6), up to 3 bus-powered devices may be powered across 1,000 feet of Cat. 5 cable. The active device may be located anywhere within the 1,000 foot region.

Figure 7.1



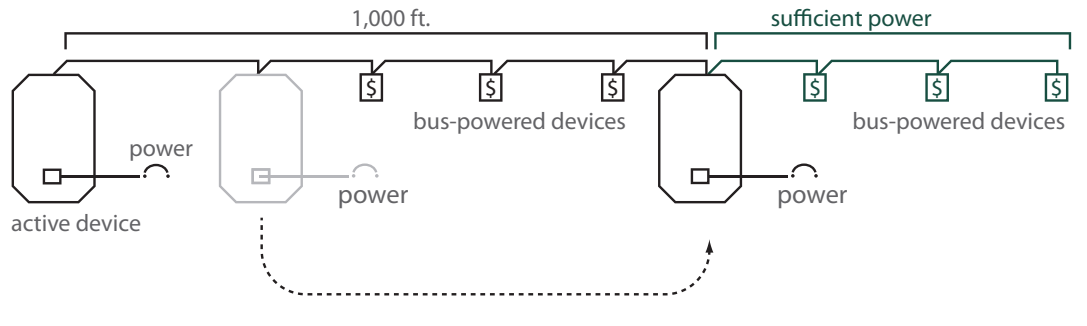
A second panel does not help.

Figure 7.2



Multiple panels do not increase the distance. For the above scenario, the correct solution would be to route the Cat. 5 properly so as to spread the active devices out. This is shown below:

Figure 7.3



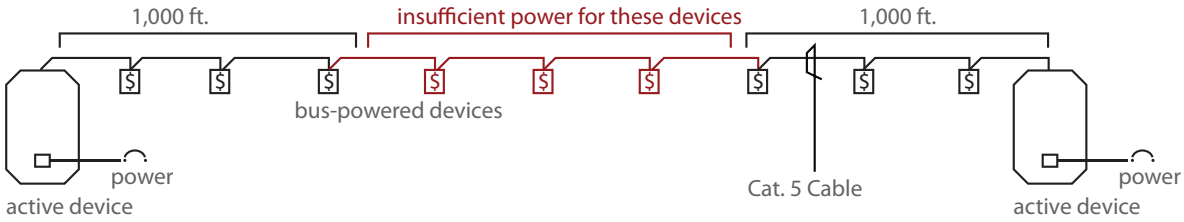
Boosting the Bus

The Bus Booster

In instances where there are simply not enough regular active devices to supply power to the passive devices, use a Bus Booster (1 amp @ 12V).

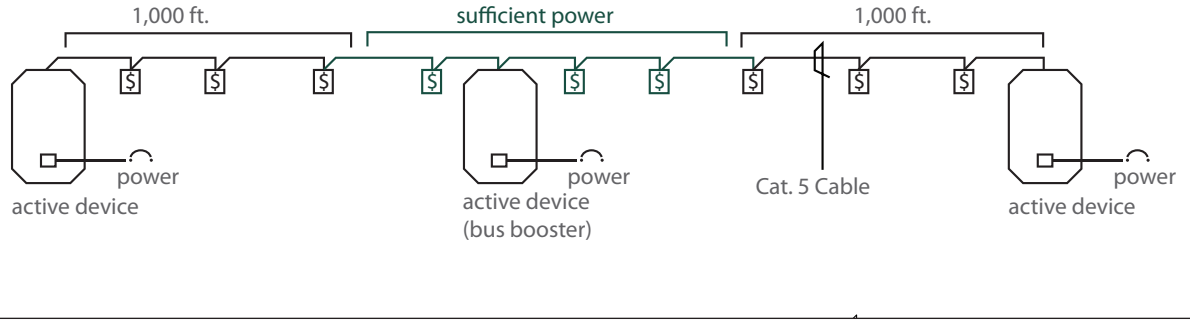
LC&D may have determined during the submittal phase that a bus booster was required, which then would have been included with the shipment and mentioned on the submittal documents.

Figure 8.1



The Bus Booster adds current to the bus; it does not amplify the digital signal.

Figure 8.2



If you need to order a Bus Booster, contact Customer Support: 800-345-4448.

Making Up Cat. 5 Cable

Crimping Kits
Factory crimping kits and RJ45 connectors are available for purchase from LC&D. Please contact your local distributor/supplier to purchase.

This kit contains an approved crimper, bus checker and Cat. 5 tester. More importantly, it contains a manual that goes over all the ways that a crimp can be badly made and cause failure. The RJ45 connectors are not included inthe kit, but can be purchased separately.

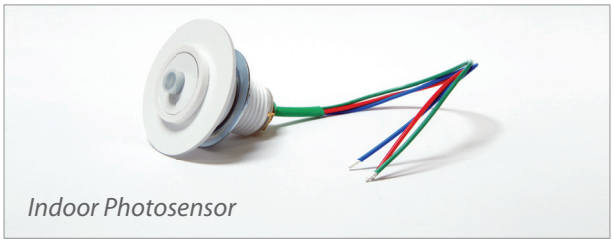
Since 90% of failed system start ups are due to bad Cat. 5 connections or crimping, it can save a lot of time and money. Please read and apply the data in this kit.

Pre-Made Cables
In some applications where the cable lengths are standard, it is well worth ordering pre-made factory cables. One website that has very attractive prices is: https://www.cablesforless.com.

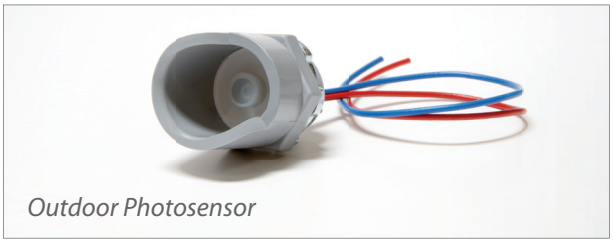
Photosensor Basics

Photosensors

Indoor or outdoor photosensors can be wired to a photocell card (PCC1 or PCC3), The Blue Box LT, or any *Micro*Panel. Refer to the photosensor card schedule in your bus file or the single line drawing to determine where the specified photosensors are mounted and the location of the device they are cabled to. You are strongly urged to review LC&D's Photosensor Placement Guide for applications with daylight harvesting. Photosensors may be located up to 1,000 feet away from the device they are cabled to using 3#18 AWG.



Indoor Photosensor



Outdoor Photosensor

NOTE: Some GR 2400 components are not run with Cat. 5 cable. This overview of those devices should assist you in planning your cabling.

Figure 10.1

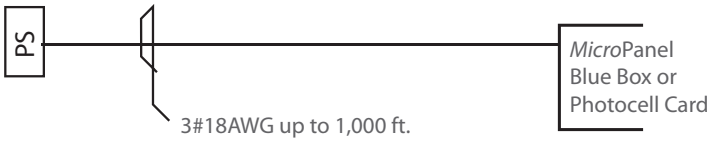


Figure 10.2

Photocell Schedule by Lighting Control & Design

Job Name: Central Library Warehouse **Model #:** PCC-3

[Inp.Card Location: LCP 1]

Trigger #	Function	Zones or Relays Controlled	Trigger Name	Input	Time Delay	Triggering when light level falls below	rises above
1	Maintain		TRIGGER 1	Analog1	03 min.	0001	0002
2	Maintain		TRIGGER 2	Analog1	03 min.	0001	0002
3	Maintain		TRIGGER 3	Analog1	03 min.	0001	0002
4	Maintain		TRIGGER 4	Analog1	03 min.	0001	0002
5	Maintain		TRIGGER 5	Analog1	03 min.	0001	0002
6	Maintain		TRIGGER 6	Analog1	03 min.	0001	0002
7	Maintain		TRIGGER 7	Analog1	03 min.	0001	0002
8	Maintain		TRIGGER 8	Analog1	03 min.	0001	0002
9	Maintain		TRIGGER 9	Analog1	03 min.	0001	0002
10	Maintain		TRIGGER 10	Analog1	03 min.	0001	0002
11	Maintain		TRIGGER 11	Analog1	03 min.	0001	0002
12	Maintain		TRIGGER 12	Analog1	03 min.	0001	0002
13	Maintain		TRIGGER 13	Analog1	03 min.	0001	0002
14	Maintain		TRIGGER 14	Analog1	03 min.	0001	0002

Photocell-1 Name: North Warehouse [Photocell-1 Type: PCO] [Photocell-1 Location: Roof Mounted Facing North]

Photocell Card Location: Inside LCP 1

Photocell Type: PCO - Outdoor Photocell

Photocell Location: Roof Mounted Facing North

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Cabling Non-Digital Devices

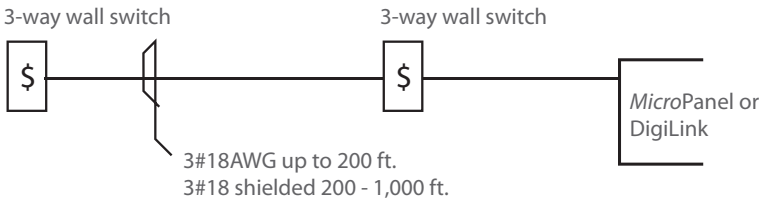
Contact Closure Devices

Many manufacturers offer contact-closure based devices to provide external control of the GR 2400 system, including: Building Automation, Security, wall switches, or momentary push button switches. See below for general information on running cables. Refer to specific product guide for hook-up details. Switches must be rated for low voltage use (made with gold-flashed contacts.)

Three-Way Switches

Three-way low-voltage switches may be used with the MicroPanel for local and override controls.

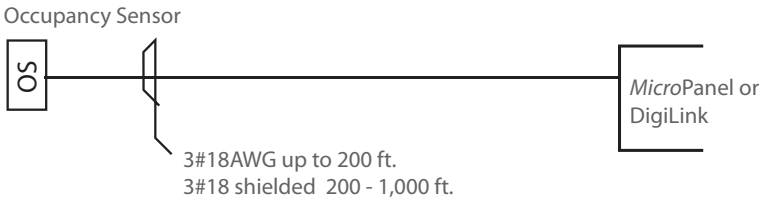
Figure 11.1



Occupancy Sensors

LC&D can interface with most low voltage occupancy sensors with dry contact outputs. In most cases the Micro*Panel replaces the power pack. Download hook-up diagrams for approved sensors at www.lightingcontrols.com if not already included with your construction documents.*

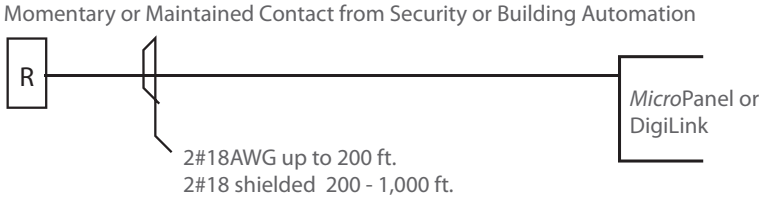
Figure 11.2



Dry Contact Relays

Use shielded cable if the dry contact output device exceeds 200 ft. in distance from the DigiLink, MicroPanel, or any contact closure input. Proper termination of shielded cable requires that the drain wire be landed on the ground input of the MicroPanel, DigiLink or The Blue Box LT—ground the shield at only one end of the cable!

Figure 11.3



With You Every Step

Unity GX Programming
If we are developing Unity GX graphical pages, please ensure that the Unity GX preparation package is completed and forwarded to your project manager in Tech Support.

On-Site Training and Commissioning
To schedule on-site start-ups or on-site training, contact your project manager in Technical Support.

Once Equipment is Received
1. Once you receive your shipment, call us to schedule over the phone training with your installation team.
2. We will also perform diagnostics once you have completed each low voltage bus to ensure that everything is working properly.
3. We will also dial into your system just prior to owner-occupation for any final programming.
4. Two months after owner-occupation, we will contact the owner's rep and verify that everything with the programming is OK.

The Ideal Installation
Our goal is your success. Call us if you have questions or need assistance during the submittal phase.

Technical Support: **800-345-4448**

Lighting Control & Design
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www.lightingcontrols.com