



*J & R Industrial
Wiring
&
Plimoth Bay
Controls, LLC*

DCL Demandflex[®] Systems



An overview of the DEMANDflex[®] Ballasts & Plimoth Bay Controls, LLC
DCL Control Systems



Presented by: Jim Killion
Date: April 7, 2011

Aramark

Wearguard-Crest Division

Custom Embroidery Facility

Norwell, Massachusetts

Corporate Offices

Data Center

Manufacturing

Warehouse

Retail Sales

The Problem:

Approximately 1,450 Aging 2-Lamp Fluorescent
Biax Perforated Basket-Type
Direct/Indirect Troff Fixtures
Located in Office Areas

Ballasts > 10 years old

Re-lamp Estimate: \$35,000

Approximately 200 inoperative fixtures

The Challenge:

Replace the existing fixtures with new high efficiency T8 Acrylic Direct/Indirect fixtures

Savings Per Fixture: 19 Watts

Project ROI less than 30 months



Options:

High Efficiency (HE) Ballasts

Up to 25% savings

\$15/yr energy savings per ballast

Controllable Ballasts

Can generate and additional 25-50% over HE

\$40/yr energy savings per ballast



The Solution:

**Demandflex Controllable (Dimming) Ballasts by
Universal Lighting Technologies**

Advantages:

2-Lamp Ballasts starting around \$20

No control wiring

Line carrier dimming control

Eligible for National Grid Incentives



DEMANDflex ballasts are a family of high efficiency program start controllable ballasts that do not require extra control wires for receiving dimming commands.

This significantly reduces their installation cost and makes DEMANDflex ballasts and DCL controls ideal for existing buildings and new construction.

DEMANDflex Ballasts are controllable ballasts designed for use as part of an energy saving lighting system.

DEMANDflex ballasts can be operated with or without controls.

DEMANDflex ballasts can be “tuned” to static power levels with the use of temporary controls.

Or

Combined with **Plimoth Bay Controls’ Sun Sense System** they can be part of a DCL controlled completely automated building management lighting system.

Early Office Hours

Reduce power levels to 70% while there are few occupants.

Cleaning Time

Reducing power levels to 50% still provides substantial light levels for cleaning.

Night Time Setback (Retail)

During night time hours when eyes have adjusted, lighting at full brightness levels is unnecessary and sometimes objectionable. Reduce light levels during these times and save energy.

Scheduled Peak Load Shedding

Reduce lighting an additional 10% during peak hours to reduce peak demand charges.

General Daytime

Many facilities are over-lit and can therefore be tuned down 10% to 20%. Energy efficient task lighting is frequently used which allows for even lower ambient light levels to maximize energy savings.

Interior (Non-DH) Office Schedule

Time	Power Level	Description
12 am to 6 am	0%	Lights Off
6 am to 8 am	70%	Few Occupants at this Time
8 am to 12 pm	90%	Normal Operation
12pm to 1 pm	80%	Lunch Time
1 pm to 2 pm	90%	Normal Operation
2 pm to 4 pm	80%	Moderate Peak Load Shed
4 pm to 6 pm	90%	Normal Operation
6 pm to 7 pm	70%	Few Occupants at this Time
7 pm to 9 pm	50%	Cleaning
9 pm to 12 am	0%	Lights Off

Dimming schedule provides a 35% energy savings compared to a fixed light system operating at 100% and also ensures that all the lights are shut off at the end of the day. Overrides can be installed for system flexibility where applicable.

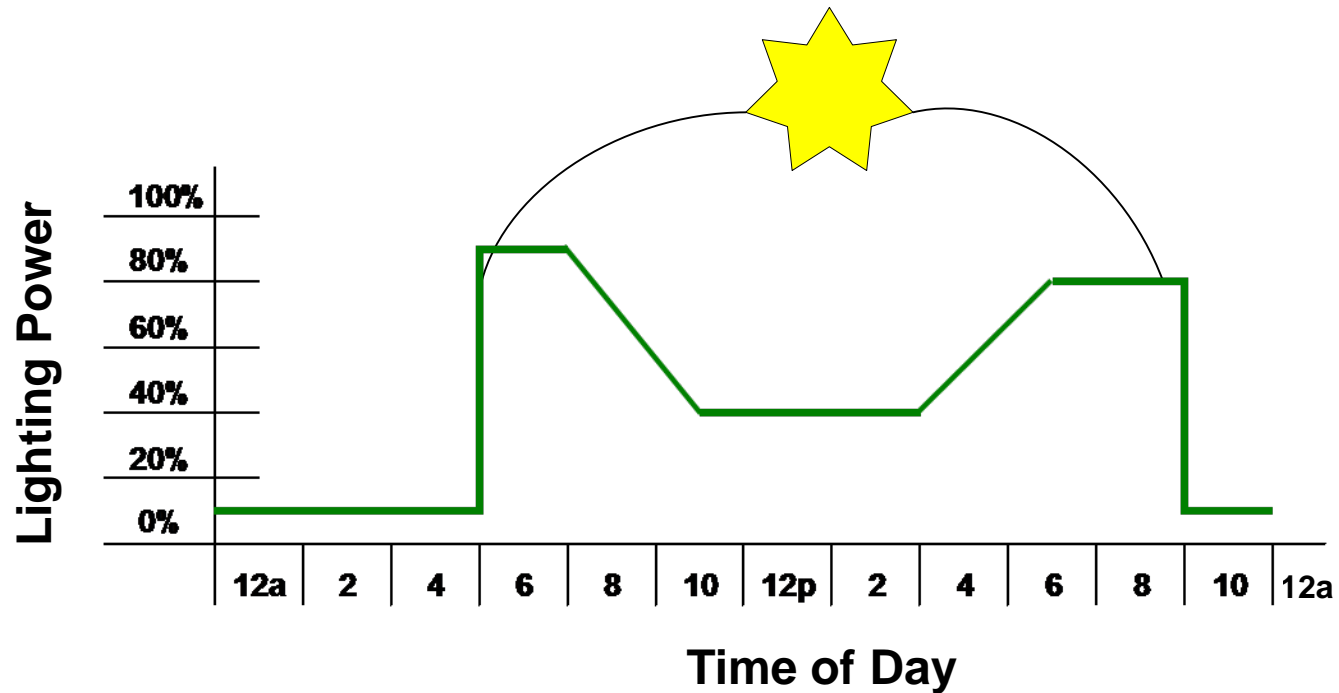
Time	Power Level	Description
12 am to 6 am	0%	Lights Off
6 am to 8 am	70%	Few Occupants at this Time
8 am to 6 pm	35%-90%	Daylight Harvesting
6 pm to 7 pm	70%	Few Occupants at this Time
7 pm to 10 pm	50%	Cleaning
10 pm to 12 am	0%	Lights Off

Dimming schedule provides a 70 % energy savings compared to the existing fixed light system operating at 100% and also ensures that all the lights are shut off at the end of the day. Overrides can be installed for system flexibility where applicable.

Custom Embroidery Dept. Schedule

Time	Power Level	Description
12 am to 6 am	60%	Cleaning
6 am to 8 am	70%	Set Up
8 am to 12 pm	90%	Normal Operation
12pm to 1 pm	60%	Lunch Time
1 pm to 2 pm	90%	Normal Operation
2 pm to 4 pm	80%	Moderate Peak Load Shed
4 pm to 6 pm	90%	Normal Operation
6 pm to 7 pm	60%	Dinner
7 pm to 9 pm	90%	Normal Operation
9 pm to 12 am	70%	Restock

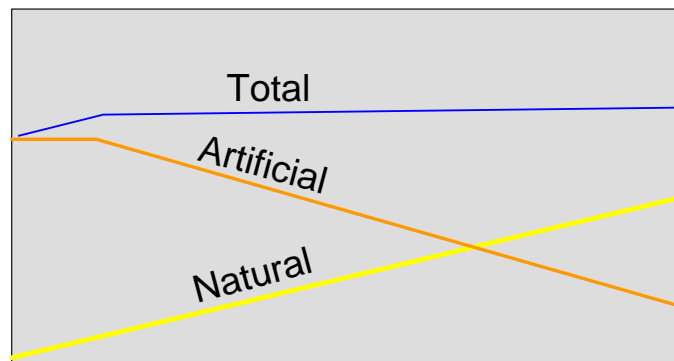
Dimming schedule provides a 50% energy savings compared to the existing fixed light system operating at 100% and also ensures that all the lights are shut off at holiday & weekend periods. Overrides can be installed for system flexibility where applicable.



When natural light is available through windows and skylights, savings from reducing the artificial light is significant. Daylight harvesting can also be included as part of the complete lighting schedule.

- **Use of skylights and windows allows for natural light to be incorporated as a lighting source**
 - Combine natural and artificial light sources for total lighting package.
- **Incorporate natural light and reduce artificial light**
 - Reduction of fluorescent lighting by 60% yields approximately a 50% energy savings.

Daylight Harvesting Light Levels



Total of approximately 2,500 ballast installed
New fixtures and Retrofit

Total Project Cost : \$480,000

National Grid Incentive: \$212,000

Annual Energy Savings: 540,000 KWH

Value of Energy Savings: \$83,000

Year 1 Savings & Avoided Cost: \$160,000

Payback Period: 24 Months

A large number of fluorescent lamp applications are now covered by the DEMANDflex family of ballasts.

T8 Ballasts

T8 Ballast Factor Options			
	Low (.71)	Normal (.87)	High (1.15)
1-Lamp	B232PUNVDRL-A	B232PUNVDR-A	B232PUNVDRH-A
2-Lamp	B232PUNVDRL-A	B232PUNVDR-A	B232PUNVDRH-A
3-Lamp	B332PUNVDRL-A	B332PUNVDR-A	B332PUNVDRH-A
4-Lamp	B432PUNVDRL-E	B432PUNVDR-E	

T5 Ballasts

		Ballast Factor
2-Lamp T5	B228PUNVDRH-D	1.15
2-Lamp T5HO	B254PUNVDR-D	1.00

Detailed information on all the secondary applications that these ballasts will also run such as F17T8, F25T8, F14T5, etc. can be found on their specification sheets located on the Universal website – www.unvlt.com

Circuit Controllers

LP12DCLUNV-03	3 Circuit Controllers
LP12DCLUNV-04	4 Circuit Controllers
LP12DCLUNV-05	5 Circuit Controllers
LP12DCLUNV-06	6 Circuit Controllers
LP12DCLUNV-07	7 Circuit Controllers
LP12DCLUNV-08	8 Circuit Controllers
LP12DCLUNV-09	9 Circuit Controllers
LP12DCLUNV-10	10 Circuit Controllers
LP12DCLUNV-11	11 Circuit Controllers
LP12DCLUNV-12	12 Circuit Controllers
SC20DCLUNV	Single Circuit Controller



LP12DCLUNV-xx



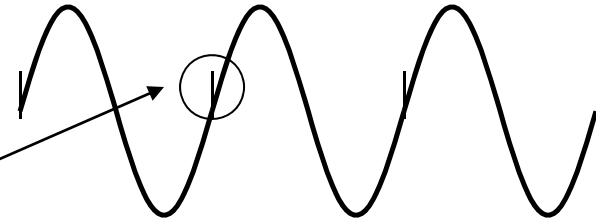
SC20DCLUNV

Multiple panels are combined together for installations with more than 12 circuits.

How Does Demandflex Work?

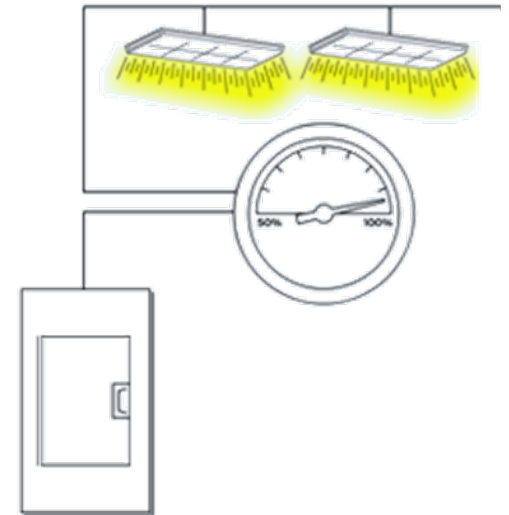


Signal sent on the powerline
(size exaggerated for demonstration)

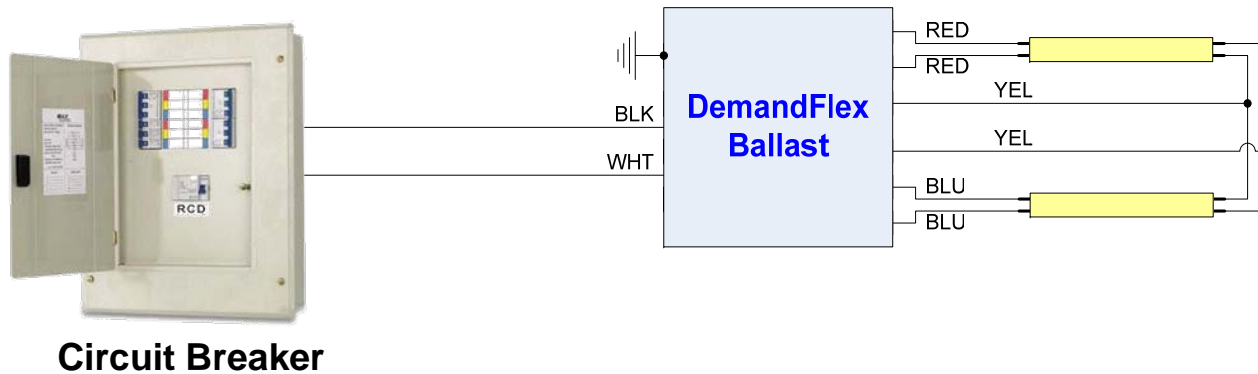


- DCL circuit controllers inject a continuous, low-level, non-distorting signal on the lighting circuit. DEMANDflex ballasts receive, detect, and interpret this signal as the commanded operating level. Absence of signal is interpreted as a command for maximum light intensity. Continuous signal delivery and a unique error checking scheme employed by the ballast minimize the risk of improper ballast response due to line noise or signal distortion.

- DEMANDflex ballasts can be “tuned” so that their operating power level is anywhere in the range of 50% to 100% of its full rating.
 - This tuning process can be done during installation or any time afterwards.
 - The tuning process can be repeated if power and light level adjustments are necessary.
- Tuning down the lighting power 15% to 20% saves a significant amount of energy and is barely noticeable to the occupants.

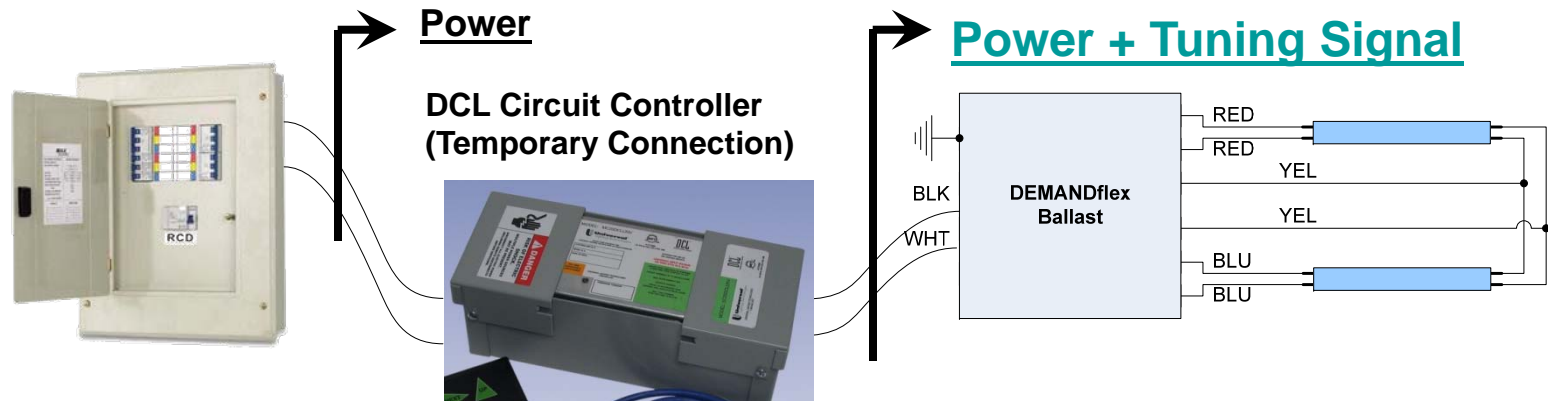


How is tuning accomplished?

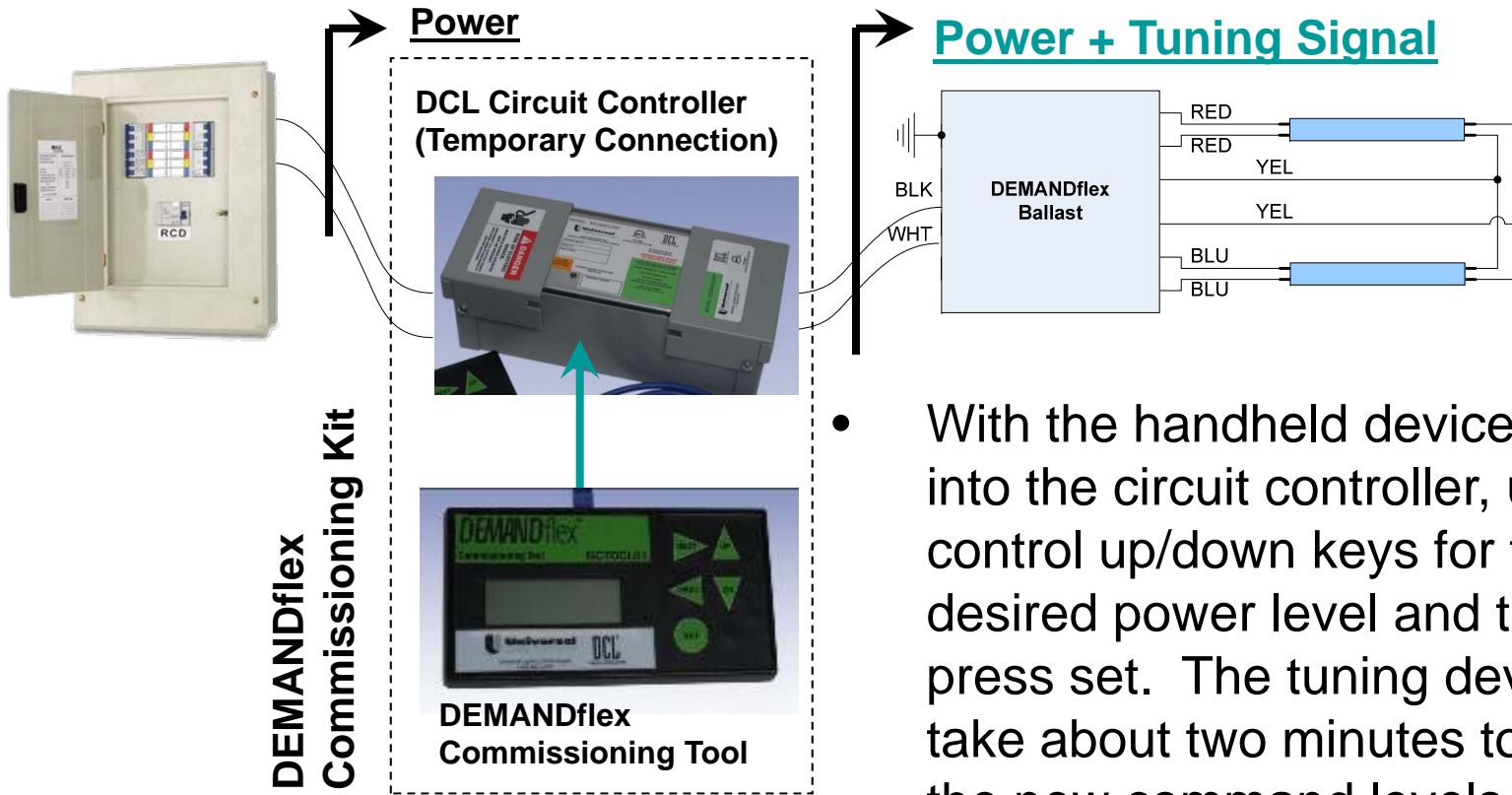


- The first step in the tuning process is to install the ballasts in the fixtures. Since they install like program start ballasts, it is important to make sure that program start or rapid start sockets are used. Using instant start lamp sockets (shunted), will prevent the ballast from operating properly.

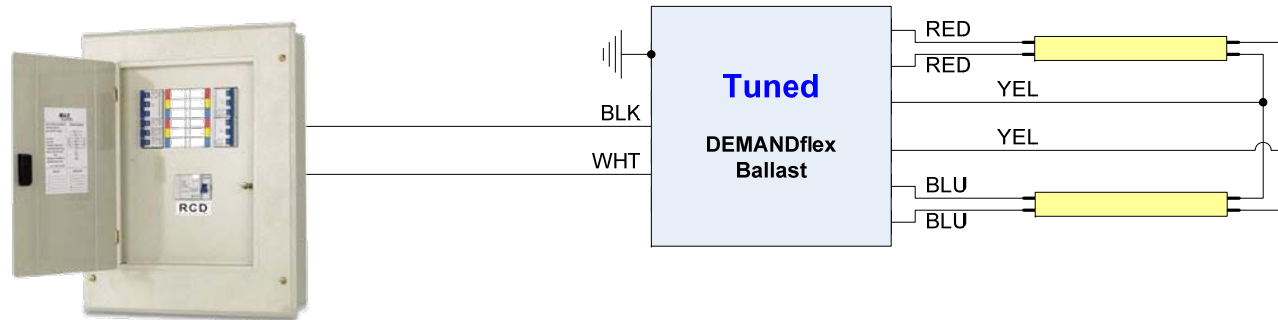
Connecting the Tuning Equipment



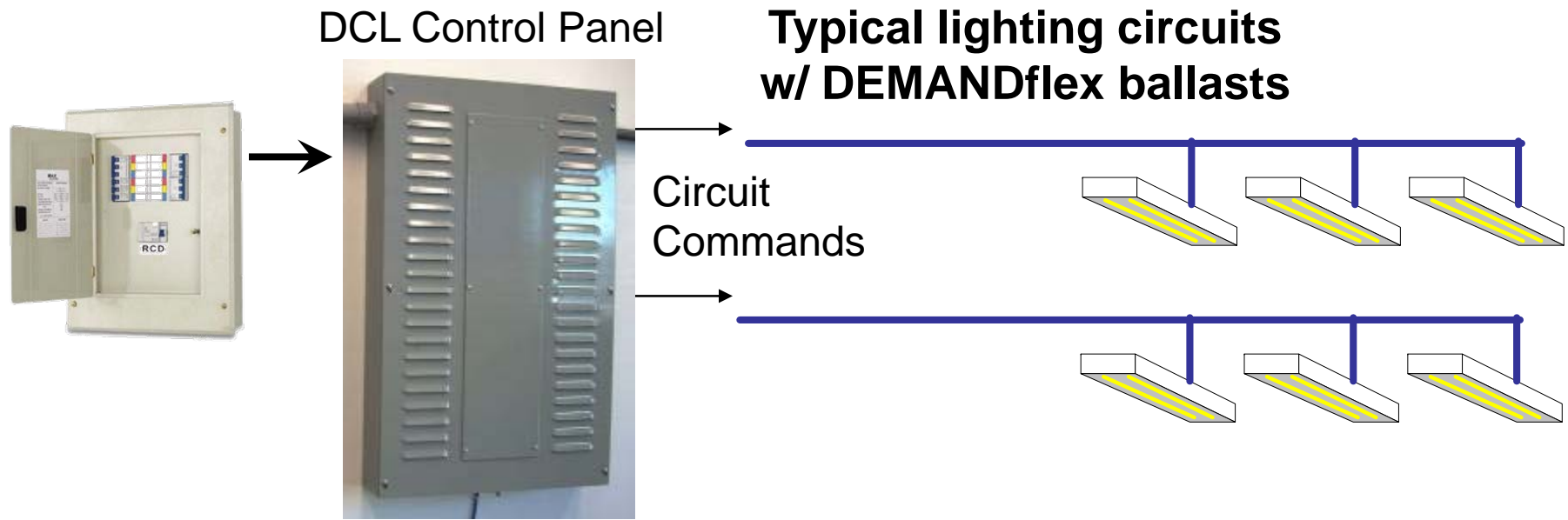
- Next, connect a DCL circuit controller to the powerline between the circuit breaker and the ballasts to be tuned. A whole circuit of ballasts can be tuned at the same time with this process. Before starting the tuning commands, make sure that all ballasts to be tuned are powered on.



- With the handheld device plugged into the circuit controller, use the control up/down keys for the desired power level and then press set. The tuning device will take about two minutes to send the new command levels to the ballasts and lock them into memory.



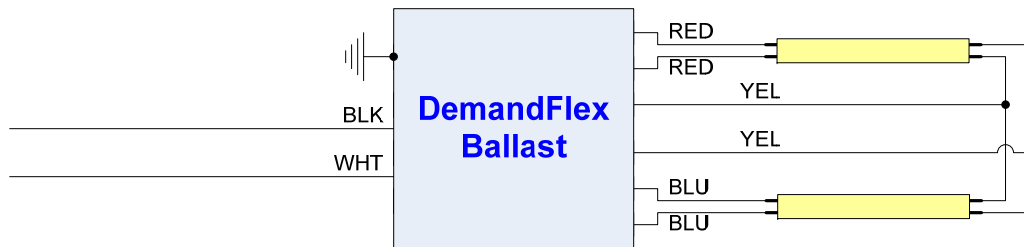
- After the programming, remove the tuning controls. The ballasts will operate at their new power levels. This level will stay programmed in the ballast memory forever, or until the tuning process is repeated and the ballast is re-programmed.



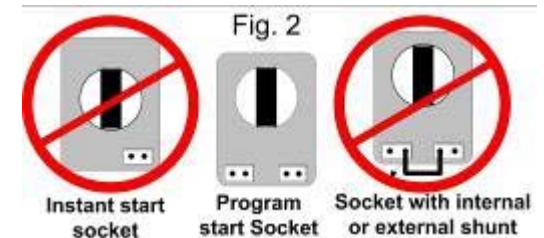
- DEMANDflex ballasts are controlled with DCL controls. DCL circuit control modules send commands over the lighting circuit's powerline to the ballasts. These commands control the power level of the DEMANDflex ballasts with a range of 50% to 100%. Circuits can also be controlled independently of each for additional application flexibility.

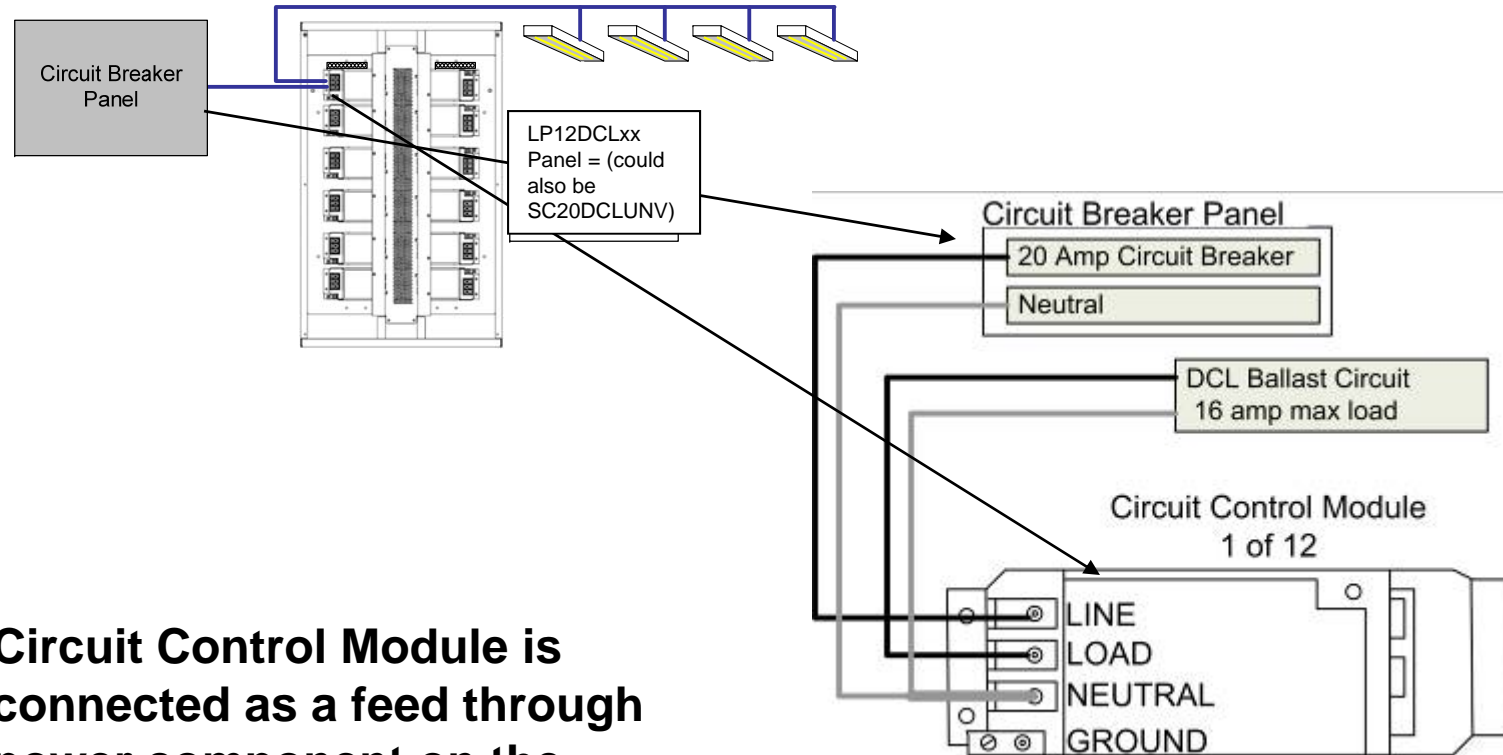
- **When DCL controls are going to be used to maximize energy savings, the first step is to identify the circuit controller requirements.**
 - How many lighting circuits will be controlled?
 - Can any of these circuits be combined together to reduce circuit count if they are lightly loaded?
 - In how many electrical closets are these circuits located?
 - Based upon the answers to these questions, the circuit controllers can be defined.

- DEMANDflex ballasts are installed like standard program start ballasts. Follow the wiring diagram shown on the product label or specification sheets for proper wiring connections.
- NOTE: Rapid Start, Non-Shunted sockets must be used. Shunted sockets (or instant start sockets) will prevent the ballast from operating properly and may cause damage to the ballast.



Check the wiring diagram





- **Circuit Control Module is connected as a feed through power component on the lighting circuit.**



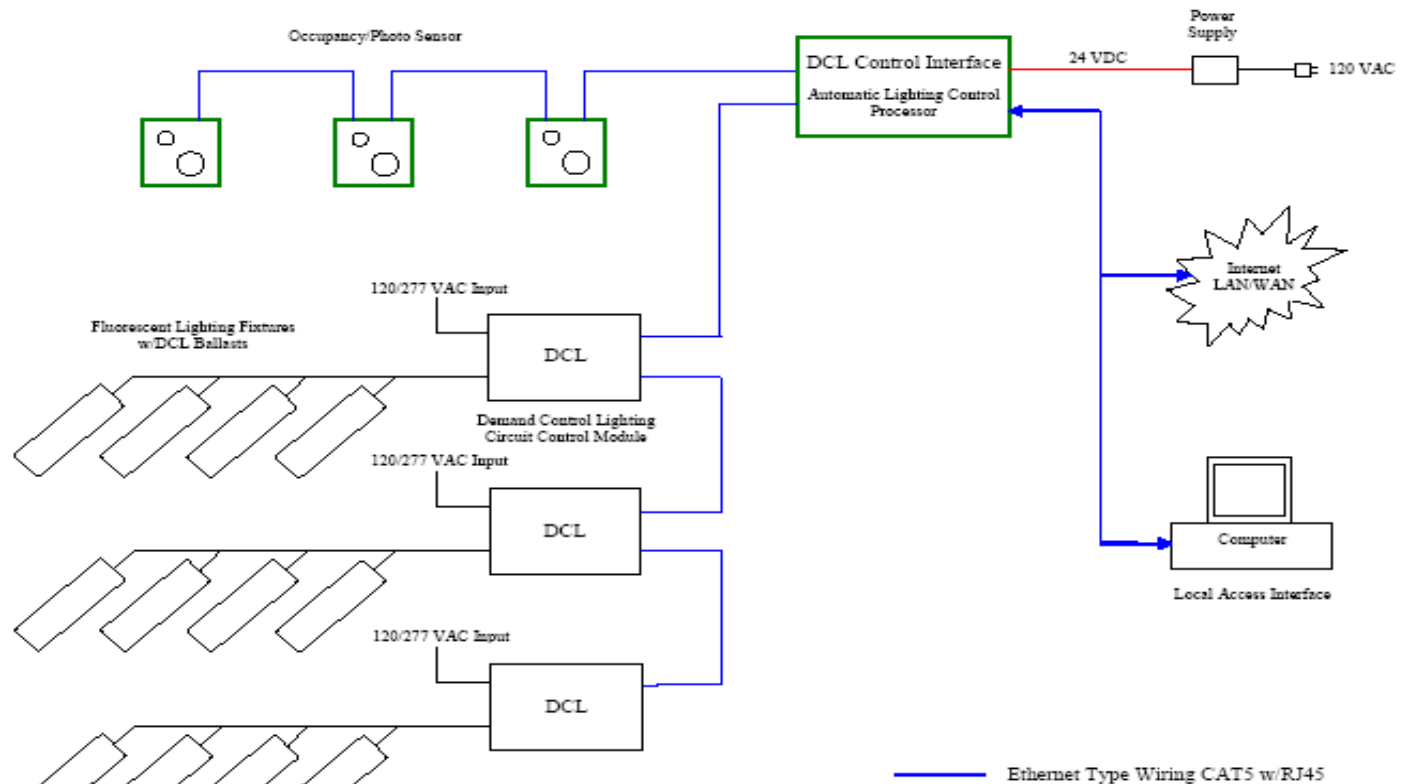
DR Ballasts: Addressable to the Circuit Level

All ballasts on the circuit set to the same level

DY Ballasts: Configurable as “A”, “B” or “C”

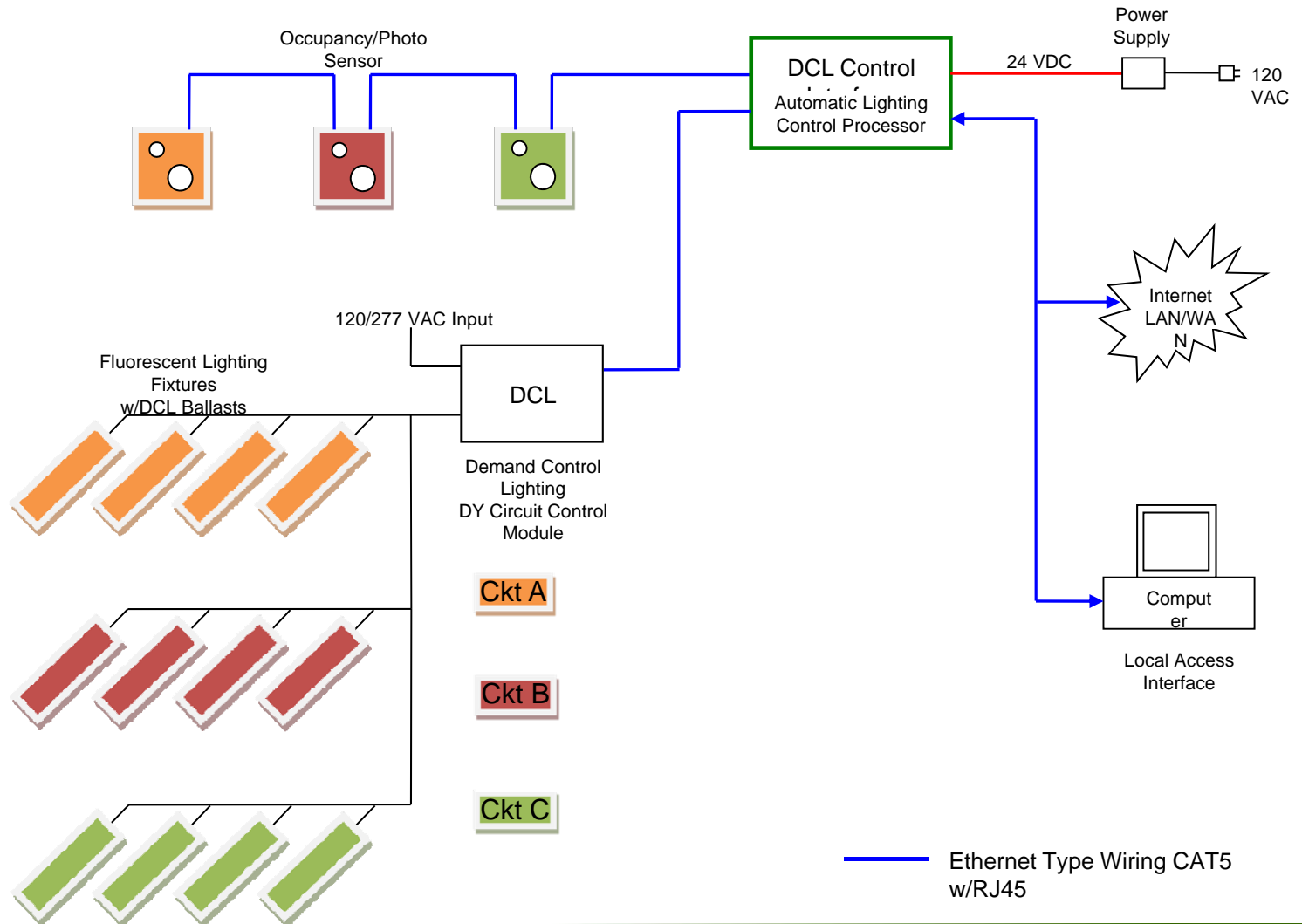
Ballasts can be set to 3 different levels per circuit

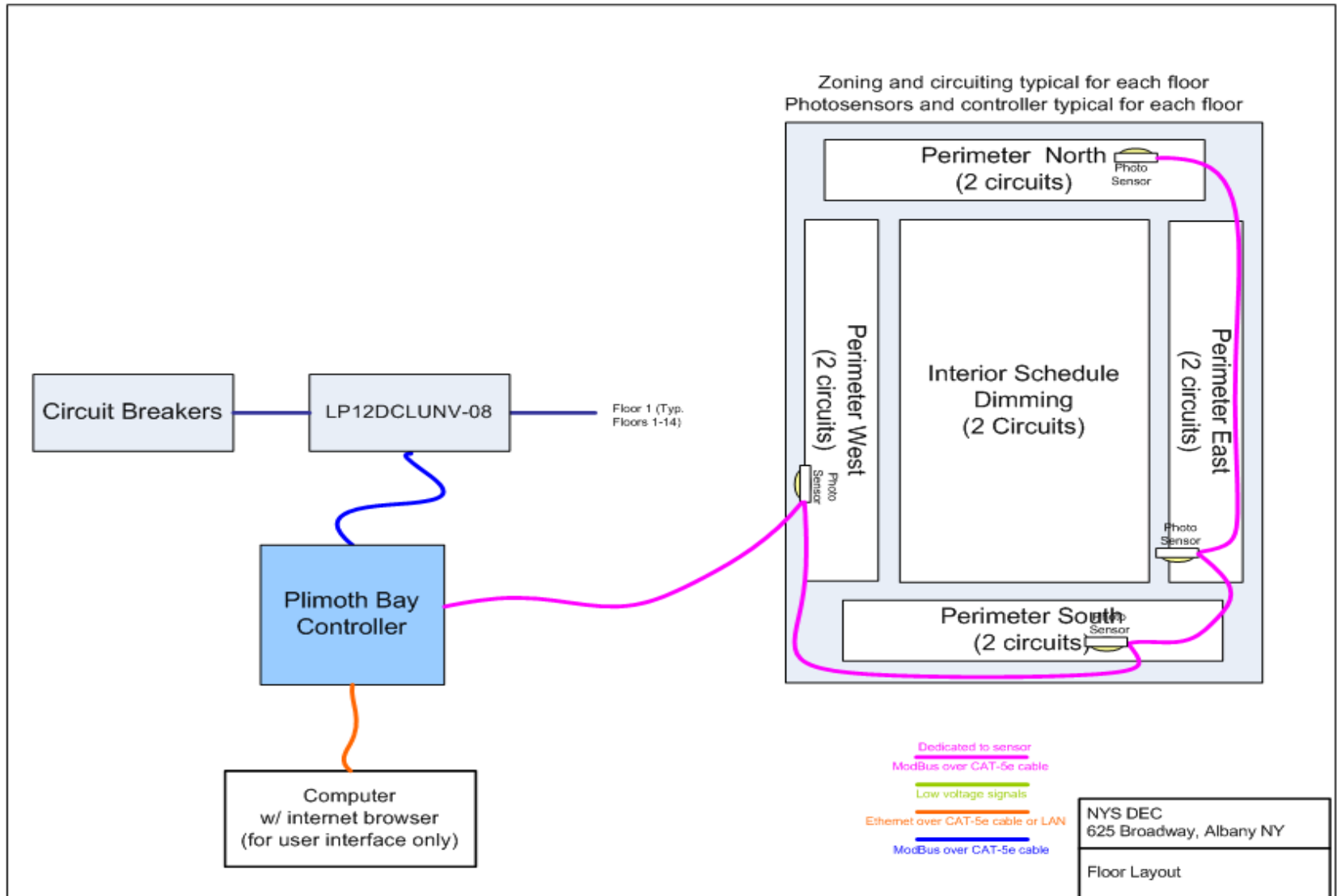
BASIC WIRING DIAGRAM

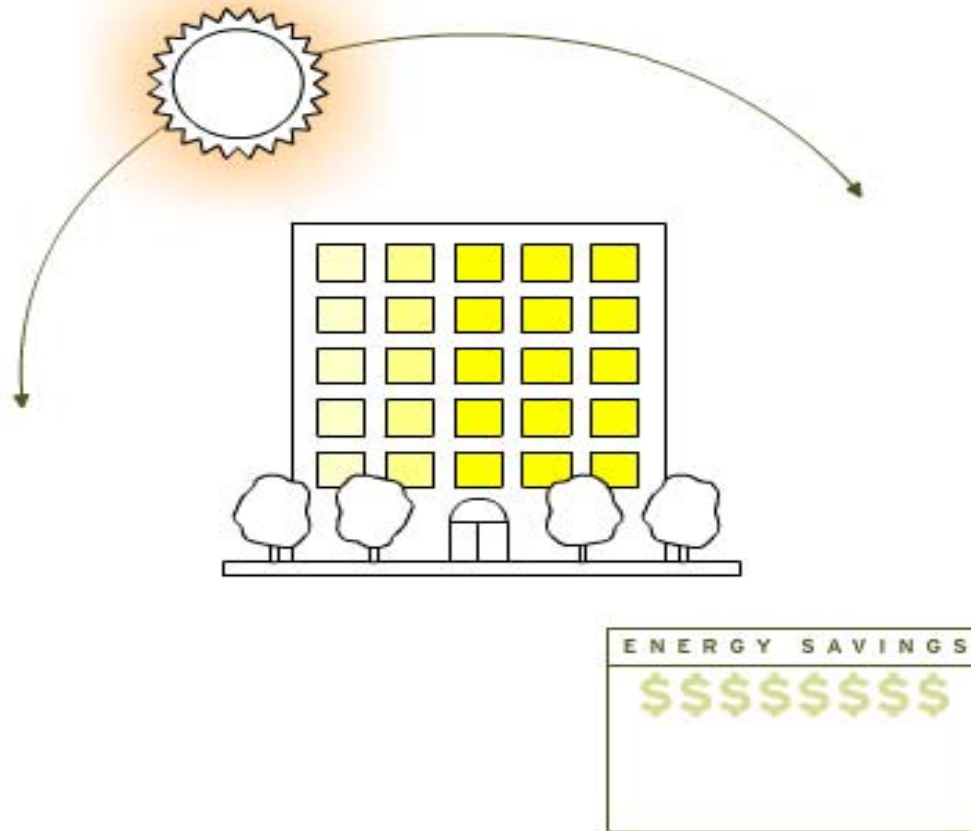


Plimoth Bay Controls
130 Camelot Drive Unit #8
Plymouth, MA 02360
<http://plimothbaycontrols.com>

Wiring Configurations DY







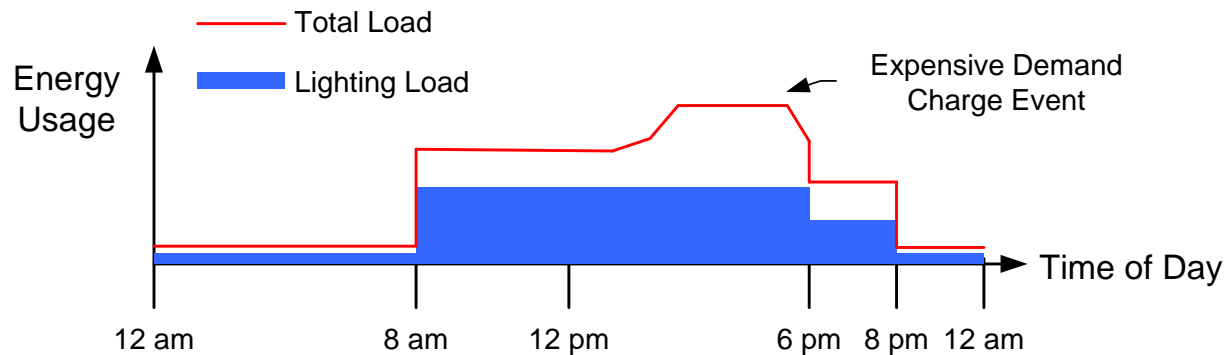
There are a number of strategies that can be implemented to save significant energy and reduce utility bills with the DCL lighting system.

- These strategies vary based on the specifics of the application and include:
 - Scheduling
 - Daylight Harvesting
 - Occupancy Dimming
 - Peak Load Shedding
 - Automated or Manual Demand Response Programs

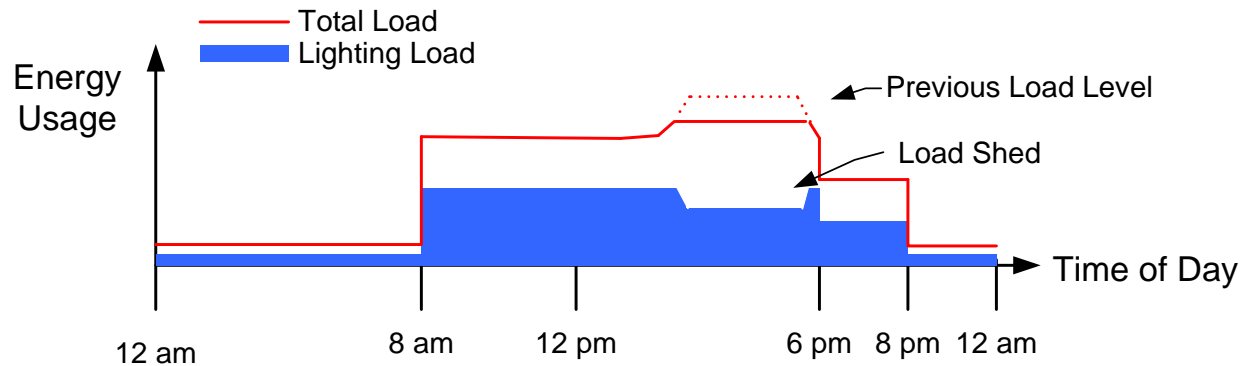


- DCL provides the ability to schedule lighting throughout the day. The internal relay in the circuit control modules shuts circuits on and off based on a programmed schedule.
- While standard ballasts can only operate at full power, the DCL system allows for different power levels to be scheduled throughout the day.
- Schedule the lighting power level for the application and do not waste energy by over lighting.

Strategies: Peak Load Shedding



- **Lighting may be 40% of a building's total load and a key contributor to the peak load demand charges**



During times when peak loads are excessive due to air conditioning or other equipment, the lighting load can be reduced to prevent excessive demand charges.

- The increasing demand for energy has resulted with some utilities implementing Demand Response (DR) programs.
- DR Programs allow utilities to shed the power load of some of their customers in times of crisis when the total Demand load for their service area is near its limits. Since lighting makes up a significant portion of a building's load, it is an ideal candidate for load shedding. DCL can perform this by reducing power levels while still providing light adequate light levels.
- These programs have terms and conditions mutually agreed upon between the utility and the participants. These terms include the amount of load to be reduced, the number of events or the hours per year this can be done, and in return, the incentive for the customer.

Look for DR Programs to increase in popularity in the future.

- As of November 2010, Universal has recognized that Plimoth Bay Control's proprietary programmable logic controller is fully compatible with DCL Lighting Products.



**Thank you for your time today.
We look forward to working with you!**

Jim Killion
J & R Industrial Wiring
Plimoth Bay Controls, LLC
508-559-3117
plimothbaycontrols@verizon.net