



P.L. LIGHT SYSTEMS

# Installing Your Luminaires

— A PRACTICAL GUIDE —



# Everything you need to know about installing your luminaires.

Don't know where to start when it comes to choosing luminaires (grow lights) for your facility or figuring out what your electrical needs are?

In this guide, our team of lighting experts will outline what voltage you need to power your luminaires, along with answering questions about power supply, wiring and what to know when retrofitting with LEDs.

## ABOUT P.L. LIGHT SYSTEMS

**P.L. Light Systems** has been operating since 1981, when it first opened the doors of its Canadian office as the North American division of Poot Lichtenergie B.V. — servicing both the North and South American markets. As one of the original pioneers in horticultural lighting, Poot Lichtenergie first began producing horticultural lighting systems in the Netherlands in 1977. Today the company remains privately owned, and is a leader in both HID (high intensity discharge) and LED (light-emitting diode) horticultural lighting solutions.

The company distributes products across Canada, the USA, and South America from its manufacturing facility in Hamilton, Ontario, Canada. This is the base for the company's team of passionate and experienced professionals which helps drive their growth. Since P.L. Light Systems manufactures and sells both HID and LED luminaires, we are not biased towards any one technology.



# What Voltage do I have in my building?

Since there are so many field combinations of voltages, an experienced electrician is needed to evaluate your particular site/facility to determine what you have available. The most common voltages will be:

## Single phase:

- 120/240V

## 3 Phase:

- 208/120V
- 480/277V (most common in the United States)
- 600/347V (most common in Canada)
- 400V (special applications)



With the power supplies listed above, what voltage can I use to run my luminaires?

Once you know what voltage you have in your building, you can move forward with deciding what voltage to use to power your luminaires. If you want a specific voltage installed, transformers can be used to supply voltages that are not currently installed in your facility. We always recommend speaking with an electrician before deciding what voltage to use to run your luminaires.

With the help of an electrician, and depending on the voltage you have available at your facility, you can use the following voltages to power your luminaires:

- 120V/240V
- 120V/208V
- 277V
- 347V
- 400V

Please note that not all luminaire models are available in all voltages. Please refer to luminaire data sheets for further information or speak with one of our lighting professionals. Also, just because you have a 3-phase service does not mean you have access to voltages that can be used with our luminaires—please consult a local electrician for more information.

Never assume what voltage you have and always consult with an experienced electrician who can help you make decisions about what voltage to use.

# What voltage is the best to go with for my application?

We suggest going with the highest voltage available at your facility, which will also be the most efficient. By using a higher voltage for your application, you can lower driver and conductor losses and increase efficiencies.

Refer to our luminaire data sheets for the relationship between voltage, wattage and amperage. Below, for example, we show the voltages and amperages from the ParFX™ Ultra spec data sheet.

| TECHNICAL SPECIFICATIONS |            |          |       |       |       |       |       |       |       |
|--------------------------|------------|----------|-------|-------|-------|-------|-------|-------|-------|
| Rated Phase Voltage      |            | 277-480V |       |       |       |       |       |       |       |
| Amperage (max)           |            | 277V     |       | 347V  |       | 400V  |       | 480V  |       |
| SINGLE-CHANNEL           | SPH        | 2.70     |       | 2.16  |       | 1.88  |       |       |       |
|                          | Ultra Plus | 3.75     |       | 3.00  |       | 2.60  |       |       |       |
| DUAL-CHANNEL             | SPH        | 2.61     |       | 2.10  |       | 1.82  |       |       |       |
|                          | Ultra Plus | 2.99     |       | 2.30  |       | 2.02  |       |       |       |
| Power                    |            | 80W      | 80W   | 80W   | 80W   | 80W   | 80W   | 80W   | 80W   |
|                          | Ultra Plus | 1040W    | 1040W | 1040W | 1040W | 1040W | 1040W | 1040W | 1040W |

## I have 120V or 480V, why aren't there many options with this voltage and what are my options if I want to retrofit my application?

Typically, 120V is a residential voltage. It is used for some HID and LED luminaires, but when a lower voltage is used, the current draw is increased—so the higher the voltage the better.

480V is not a typical voltage (although is used) for lighting because that is a high voltage phase to phase connection in the US. At a 480V 3-phase operation, using the neutral form, that system will give 277V, which is the most common voltage in the US.

As mentioned, it is best to always use the highest voltage available. Remember to refer to a professional electrician to fully understand your site and your existing power capacity. It's not just lights in a greenhouse or indoor grow that use electricity. Components such as compressors, pumps, offices, etc. all need to be accounted for when thinking about electrical.





## What is the difference between single-phase and 3-phase power supply?

### 3-Phase Supply:

- Has three live wires (or lines), and possibly one neutral wire needed for phase to neutral voltages
- Generally supplied to commercial and industrial facilities
- It will typically be 480/277V or 600/347V
- This is also depending on your facility design and transformers used

### Single Phase Supply:

- Has two live wires (or lines), with one neutral wire
- Generally supplied to residential or small commercial facilities
- Is typically 120/240V in North America



## What is the difference between a single-phase load and 3-phase load?

### 3-Phase Load:

- Some equipment such as motors or fans require connections to all three lines from a 3-Phase supply.
- This equipment would be classified as a '3-Phase Load'
- This equipment requires a 3-Phase supply to operate.

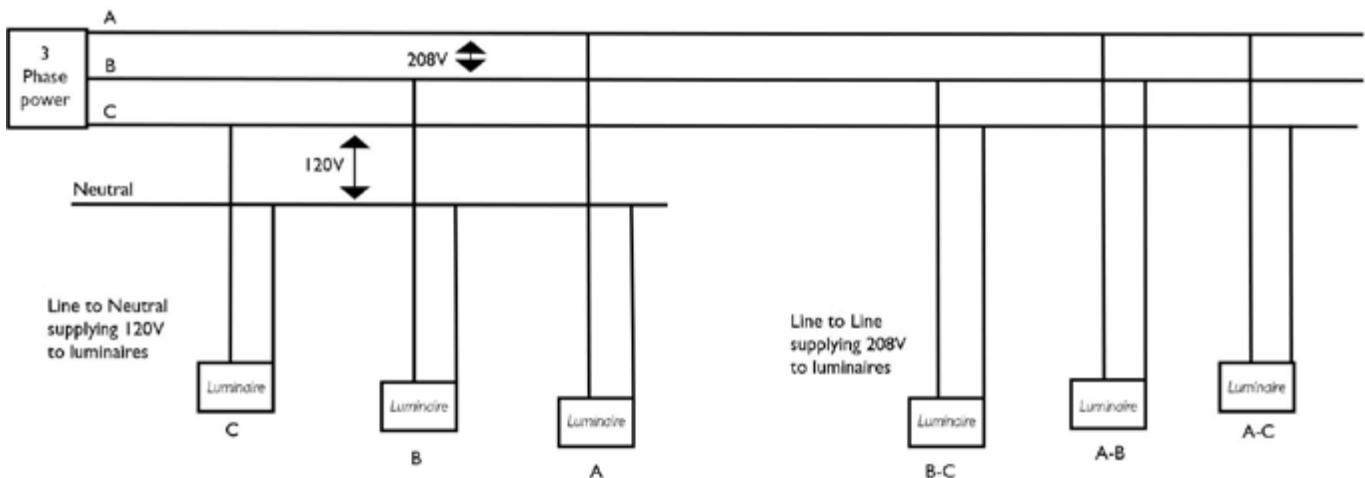
### Single-Phase Load:

- Other equipment, such as luminaires, only require connection to either two lines or one line and neutral.
- This equipment would be classified as a 'Single-Phase Load'
- This equipment can be powered by either a 'Single-Phase Supply' or a 3-Phase supply

# What is the difference between 'Line to Neutral Voltage', and 'Line to Line Voltage'?

In a **Single-Phase Supply** system, the lower voltage (typically 120V) will be the 'Line to Neutral Voltage' which is the voltage between one of the lines and the neutral. The higher voltage (typically 240V) will be the 'Line to Line Voltage'. It will typically be twice the 'Line to Neutral Voltage', and is the voltage measured between the two lines.

In a **3-Phase Supply** system, the lower voltage (typically 277V or 347V) will be the 'Line to Neutral Voltage' which is the measured voltage between one of the three lines and the neutral. The higher voltage (typically 480V or 600V) will be the 'Line to Line Voltage.' which will be 1.73x the 'Line to Neutral Voltage' and is the voltage between any two line of the three lines. Note that some sites may have multiple voltages, so work with your electrician to get to know your site.



## Can I use single-phase luminaires if I have 3-phase supply?

In a 3-phase supply you have the capability of using all three phases for loads such as motors, fans and other industrial equipment. Since our luminaires operate on single-phase, you can take advantage of a 3-phase supply using one leg of the supply to provide a single-phase line to neutral connection or a single-phase line to line connection.

The image above helps to demonstrate how you can use a single-phase power supply through a 3-phase power supply to power your luminaires configured using a line-to-neutral voltage and a line-to-line voltage.



## What is the importance of a stable power source and what are the detrimental results of brown outs and black outs?

A **brown out** is a low voltage condition when the voltage drops. Drivers/Ballasts have a voltage range where they can tolerate a certain percentage of brown outs. Operating the driver outside of this range can be detrimental to the driver/ballasts and reduce its lifetime. It is important to consider having your power monitored in your facility. Monitoring your power quality and voltage variation allows corrective measures to be taken to improve the power quality.



**Black outs** are when power is turned off then on again, either momentarily or for prolonged periods of time. This could potentially be an issue. Re-striking HID (high intensity discharge) lamps more than two times a day can also be detrimental to the driver. If blackouts are a frequent occurrence at your facility, consider contacting your utility to resolve the issue (or consider installing an uninterrupted power supply [UPS] or generator system).

Are there any situations where I would need to upgrade my electrical to be able to install LEDs or electronic ballast HPS luminaires?

Firstly, you should review your facility and electrical infrastructure with your electrical designer. You will likely find that LEDs draw less power than HID's, so an existing infrastructure with 1000W HPS lights should accommodate LED luminaires.

However, if you are currently operating a 400W or other lower wattage HID systems, that infrastructure may not be sufficient to power higher output LED luminaires. Likewise, if you're contemplating retrofitting your existing lighting with super high output LED luminaires, which actually draw more power than 1000W HPS luminaires, then you also need to consider your current electrical supply capacity. Will you, for example, need to add a transformer to expand your electrical supply?

Are there any specific wiring instructions for LEDs?

LED luminaires can be wired in the same way as traditional HID luminaires, based on the voltage required by the luminaire (i.e. 120, 208, 240, 277, 347, 400). Some LED luminaires can accommodate multiple voltages, whereas others are voltage specific.

The voltage range will be noted on the product label. A luminaire with a product label stating "120V-240V" will accept any one of these 3 voltages 120, 208 or 240 and will automatically sense the supplied voltage to ensure the same output to the LED's regardless of the input voltage. A luminaire with a product label stating "277V" will only accept a voltage of 277V. LED Luminaires that have dimming capability may require separate control wires in order to control the output of the luminaire.





## Do I need to compensate for inrush currents on LED or HID luminaires when I'm wiring my facility?

Inrush current is one of many characteristics that an Electrical Engineer will consider when designing an electrical installation.

## Is there an inrush current I need to be aware of when providing circuit breakers for my luminaires?

Inrush current occurs in all electronic devices due to their electrical characteristics. The magnitude of the inrush current is based on the design of the electronics and the load. This inrush value needs to be provided by the manufacturer of the luminaire for an engineer to determine the correct electrical equipment to use in the installation.

Electrical engineers will select breakers and other electrical devices, using inrush as one of many variables to design an electrical system that will function correctly. If inrush is not considered when selecting and sequencing the installation of breakers, nuisance tripping can occur and, in some cases, fusing of contacts on contactors. It is always recommended to consult an electrical engineering company when designing a crop cultivation facility.



# Can you use the same cables or connectors between LED and HPS luminaires?

This will likely be manufacturer dependent. For many LED luminaires, a direct swap out may not be that straight forward. Due to several reasons (including the varying form factor / dimensions of the luminaires), different connectors would potentially need to be used between the two technologies. There are, however, some manufacturers that have already addressed this issue for ease of retrofit. P.L. Light Systems has done this with all their product lines.

The majority of our LED products feature an RST device connector, while the rest offer RST connector cables—allowing for them to be plugged into previously hardwired RST power cords. This allows for true plug and play retrofit installations where our NXT RST luminaires have previously been installed.

## When installing luminaires, should you go hard-wired in or with plugs?

Whenever possible use a connection that is easily disconnected, like with a Wieland connector. This is very important, especially when it comes to maintenance, repair, cleaning, or anything else having to do with the lighting system.

Having the ability to easily disconnect is a massive advantage. Also, any hard-wired luminaires will need an electrician to come in and disconnect, which will be costly and require more skilled labour.





## What should you know about dimming protocols to ensure your luminaires can be controlled by your control system ?

Most HID luminaires are not dimmable but are instead hardwired in a 'checkerboard' pattern that allows for a reduced light level when groups of lights are turned off. This has widespread use and is broadly accepted in the industry.

LED luminaires are, however, dimmable—providing growers with greater control and flexibility over their lighting and, ultimately, how their plants will grow and develop under supplemental or sole source lighting. Dimming enables growers to choose how much light to give their crops, which can change day-by-day, and can help to mimic nature such as imitating a sunrise and/or sunset.

Although Europe has been using DALI and similar digital dimming protocols for some time, 0-10V dimming, is currently still the most common control protocol in North America. That being said, many North American climate control companies are beginning to integrate the new Modbus based Horticultural Lighting Protocol (HLP) into their climate computers. Digital dimming will also become far more commonplace in the near term.

A plug-and-play style of LED, with daisy-chainable control (and power) is important for ease and cost of installation.

Always refer to the manufacturer's dimming control specifications for the luminaire you're installing and consult with your electrician and control solution provider in advance to ensure the smooth setup and functionality of your lighting control.





## What do these markings means? UL, CSA, DLC?

These are all recognized bodies that ensure a luminaire's safety compliance. It is important that whatever luminaire you buy have one or more of these certifications. Never use uncertified units, as you will not be able to get insurance and non-certified units will not pass a local electrical inspection, which will mean delays in growing.



UL (Underwriters Laboratories) and CSA (Canadian Standards Association) are the benchmark standards in North America, and ensure safety and security, as well as certifying that products meet quality and performance expectations, and achieve regulatory compliance. Others are also used but those are most common.



DLC stands for Design Lights Consortium and is a group that Independently validates LED performance claims. Once LEDs are listed, they become eligible for most state and provincial rebate programs. It is important to note, that almost all rebate programs in North America require DLC certification for luminaires to qualify. If an LED does not have a DLC certification, it is likely that it does not meet specific criteria when it comes to efficiency, efficacy and/or performance.



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# CONTACT US

Our **sales team** is dedicated to supporting our customers throughout the project and beyond.  
Contact **your regional sales manager** to find out how P.L. Light Systems can help you grow.

Our friendly, North American based **customer service team** are available Monday – Friday  
between 8:00am and 4:30pm (EST) to assist with product-specific inquiries and general  
technical guidance to ensure an experience that is as seamless as possible for all our customers.

Our **website** is also a hub of product information that can be accessed 24/7.



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