

What is the Difference between Constant Current & Constant Voltage ?

LED luminaires and their drivers may be either **constant current** or **constant voltage**.

Constant voltage luminaires require a steady voltage to be supplied from the driver eg 12 or 24 Volts. For these lights the voltage is fixed by the driver but the current may vary.

Constant voltage lights are ALWAYS wired in parallel.

Although the voltage stays constant, the current required from the driver goes up with the number of lights. Two lights need twice as much current as one, etc.

Constant current luminaires require a constant current to be supplied from the driver eg 350mA or 700mA (milli-amps). For these lights the current is fixed by the driver but the voltage may vary.

Constant current lights are ALWAYS wired in series (ie like a daisy chain).

Although the current stays constant, the voltage required from the driver goes up with the number of lights. Two lights need twice as much voltage as one, etc.

Let's consider some examples:

Constant Voltage Example SL41:

This little light is a constant voltage 12 Volt light, therefore we must use a CONSTANT VOLTAGE 12 Volt driver.

We need to wire the lights in PARALLEL.

Each light draws approx 130mA (milli-amps) from the driver.

If we connect 10 lights the current required will be $10 \times 130 = 1300\text{mA}$ (ie 1.3Amps)

Select Switch Lighting driver: Q4-12V-20W (which can deliver up to 1.7Amps at 12 Volts)

Constant Current Example SL201:

This little light is a constant current light which requires 350mA from a CONSTANT CURRENT 350mA driver.

We need to wire each light in SERIES.

Each light will have roughly 3Volts across it when its running at 350mA.

If we connect 5 lights in series we will need $5 \times 3 = 15$ Volts (approx. from the driver).

Note: we are only calculating the approximate voltage to make sure we don't exceed the capability of the driver.

We select the L05020 350mA/700mA driver, which has maximum output voltage of 32 Volts, more than adequate to supply the 15 volts we calculated. The current is of course fixed at 350mA by the driver. Because this driver can be connected to supply either 350mA OR 700mA we take care to make the right connections for 350mA operation.

(If we required 230V dimming we would have chosen the L05021 driver instead)

So why do we have both Constant Current and Constant Voltage Luminaires?

Constant Voltage Pro's & Con's:

- ✓ Fault tolerant (one light failing will not result in all lights failing.)
- ✗ May require quite large cable CSA for long runs with lots of lights
(be sure to check cable size guides)
- ✗ The total current required may be quite high if a large number of lights are used.

Constant Current Pro's & Con's:

- ✓ Requires smaller cable CSA on long cable runs or when many lights are used.
- ✗ Because the lights are connected in a series "daisy chain" any single light which fails may cause all the lights to go out. Therefore, as fault tolerant as Constant voltage operation.
- ✗ If a large number of lights are required, beware that the maximum voltage that can be legally used to drive the constant current is 60 Volts. In this case the lights are usually split into several series strings each driven by a separate driver.