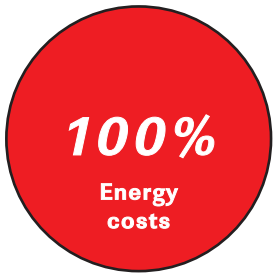
It is a matter of fact

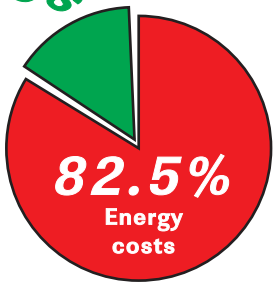
Series connection is the most effective mode of operation for LEDs.
The LEDs in the Hansen LED Tube are always connected in series to the converter.

If the energy expense using a 12 V system with LEDs in **parallel connection** is 100% ...



17,5% Savings

... you will receive the same light output with a **series connection** and use only 82.5% of the energy!



A comparison between the LED Tube and a 12 V LED circuit board clearly shows:

The energy consumption (operating costs) of the LED Tube is at least 17.5% lower.

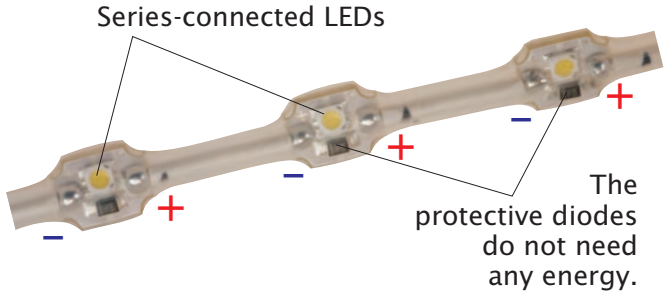
This pays off ...

... and helps to protect the environment!

Why is that?

If a number of LEDs are connected to a voltage source along a single path (i.e. in daisy chain fashion), this is called a **series connection**.
In the LED Tube the current along this path is kept constant by the converter.

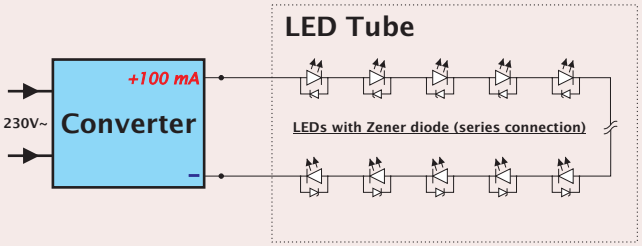
The series connection does *not* contain any additional elements which consume energy.
Thus, the entire energy can be fed to the LEDs.



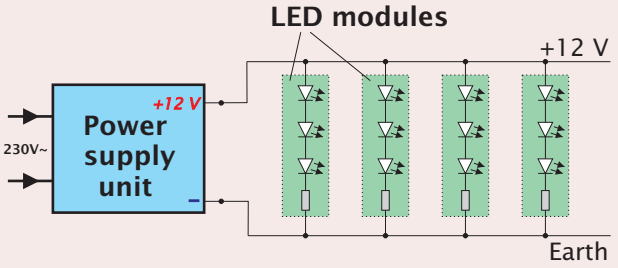
In a 12 V system, an LED module usually consists of three LEDs and an electronic stabilizer (or a resistor). The modules are connected to a power supply unit **in parallel**.

The electronic stabilizer (or resistor) on each module is necessary to control and limit the LED current. The disadvantage is, however, that a power loss is generated.

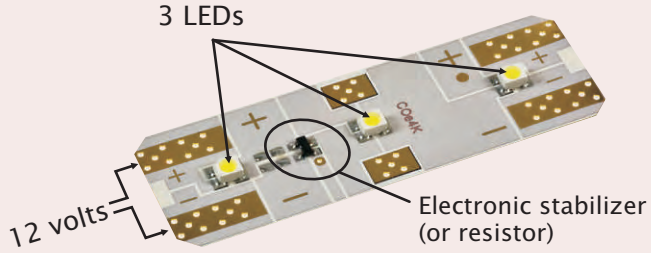
The parallel connection of LED modules in a 12 V system requires some means of current stabilization to keep the current constant, which in turn is associated with an energy loss of at least 17.5%.

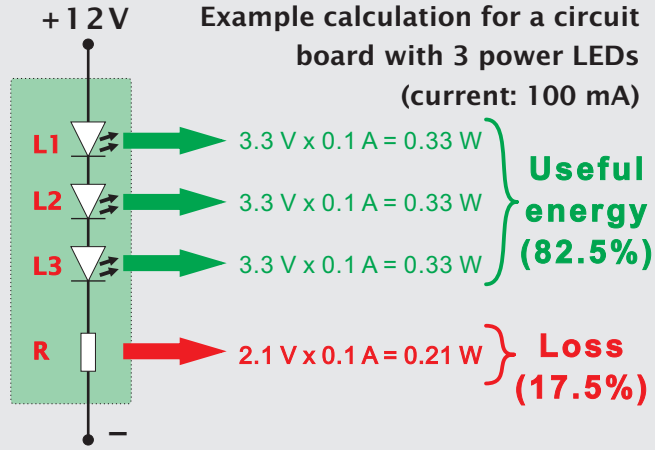


Series connection



Parallel connection





Example calculation for a circuit board with 3 power LEDs (current: 100 mA)