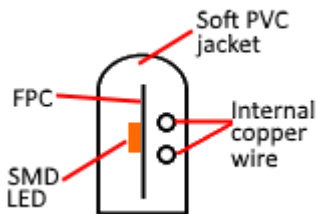


INTERNAL STRUCTURE

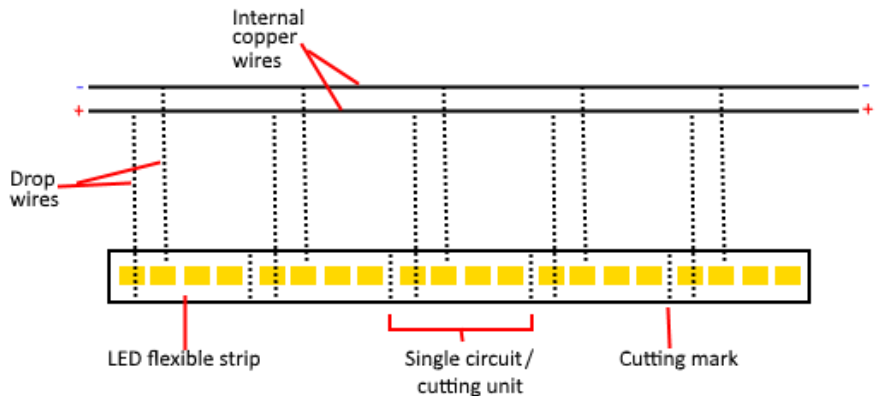
LED Neon Flex consists of an LED flexible strip with an outer jacket made from extruded soft PVC or silicone. The jacket is extruded over the LED flexible strip so that the LED light shines through the jacket which acts as an effective diffuser. There are two primary designs for LED Neon Flex: with internal copper wires and without.

LED Neon Flex with internal wires

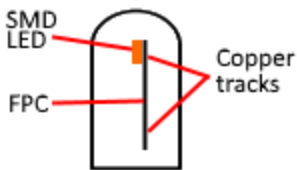


When the LED Neon Flex contains the two copper wires, they carry the primary current through the length of LED Neon Flex, with drop wires from the primary wires to the flexible strip FPC creating parallel circuits. Each drop to the FPC corresponds with a circuit. These wires allow the FPC to be thinner (and cheaper), and more flexible however they require extensive manual labour. This translates to a higher cost for an LED Neon Flex with a short cutting unit.

The LED circuits are in parallel. It is recommended to cut on the cutting marks, however if the LED Neon Flex is cut through a circuit only that circuit will fail : all other circuits will remain lit and will pass some residual light to the jacket over the dead circuit..



LED Neon Flex without internal wires



When the LED Neon Flex does not contain the two copper internal wires, it will only have the LED Flexible Strip which carries all the current, just like a regular LED Flexible Strip would. Without the supporting copper wires, a good quality LED Neon Flex would have a relatively thick and broad FPC, and because there are no drop wires, there is less manual labour required, fewer points of failure.

LUMUL offers different types of LED Neon Flex, some with internal wires and some without :

LUMUL PVC LED Neon Flex	Internal copper wires
LUMUL silicone LED Neon Flex	No internal copper wires



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POWER FEEDS

All LED Neon Flex operates internally on a DC voltage – either 12V, 24V or 220V. 12V and 24V LED Neon Flex requires an external constant voltage power supply whereas 220V LED Neon Flex requires a rectifier. In the case of the latter, the rectifier can our standard rectifier / power converter or it can be a standalone controller such as a dimming controller or RGB controller which contain a built-in rectifier.

When LUMUL PVC LED Neon Flex is being connected to power, connector pins are inserted into the two copper wires. When LUMUL silicone LED Neon Flex is being connected to power, a large connector pin is inserted directly onto the FPC copper tracks, or wire is soldered directly onto the FPC copper tracks.

There are two types of power connections available:

- A soft PVC-moulded connector with a moulded wire, requiring a connector pin between the LED Neon Flex and the connector. The connector is bulky.
- A mini wired connector pin : a copper pin with a clear wire pre-soldered onto the pin. The mini wired connector pin can be used on the generation 1 and generation 2 12V and 24V PVC LED Neon Flex.

VERTICAL OR HORIZONTAL FPC

Inside the LED Neon Flex is always an LED Flexible Strip (on an FPC) which can either be sitting vertically or horizontally. If the FPC is sitting vertically you would be able to bend the LED Neon Flex laterally i.e. left and right whereas if the FPC is sitting horizontally you would be able to bend the LED Neon Flex vertically i.e. up and down.

There is no LED Neon Flex which you can bend both vertically and laterally.

You need to decide which LED Neon Flex is required for your installation. If you need the LED Neon Flex for façade lighting, to go around a round building, then you'll require a horizontal FPC. If you need the LED Neon Flex for signage, then generally you'll require a vertical FPC.



Getting Started Guide

CUTTING UNIT

LED Neon Flex consists of a number of light circuits wired in parallel to each other. If one circuit fails, the other circuits are usually unaffected. LED Neon Flex can safely be cut in specific places in-between each circuit, without damaging any circuit. The places where you can safely cut are demarcated by cutting marks. The distance between cutting marks is called the cutting unit.

If you cut anywhere other than on a cutting mark, you will damage one circuit and it will be unlit.

The different cutting units for the LUMUL LED Neon Flex product ranges are:

	Cutting unit
LUMUL 220V Generation 1 PVC LED Neon Flex	1m
LUMUL 12V Generation 1 PVC LED Neon Flex	5cm
LUMUL 12V Generation 2 PVC LED Neon Flex	3.6cm
LUMUL 24V Silicone LED Neon Flex (Vertical FPC)	5cm
LUMUL 24V Silicone LED Neon Flex (Horizontal FPC)	6.3cm

MINIMUM ORDER QUANTITY (MOQ)

LUMUL does not stock all shapes, sizes, colours and voltages of LED Neon Flex even though they are all offered. Where they are not held in stock, a minimum order quantity will apply for LUMUL to have the factory manufacture the LED Neon Flex.

	When in stock	Custom order
LUMUL 220V Generation 1 PVC LED Neon Flex	1m	100m
LUMUL 12V Generation 1 PVC LED Neon Flex	1m	100m
LUMUL 12V Generation 2 PVC LED Neon Flex	1m	50m
LUMUL 24V Silicone LED Neon Flex (Vertical FPC)	1m	200-500m
LUMUL 24V Silicone LED Neon Flex (Horizontal FPC)	Not stocked	200-500m



Getting Started Guide

MAXIMUM RUNNING LENGTH

The operating voltage determines the maximum running length of any single section of LED Neon Flex. The lower the voltage, the higher the current, where the LED Neon Flex internals can only support a particular maximum current. The other factor is voltage drop : the lower the voltage the quicker you experience voltage drop, and the shorter your LED Neon Flex can be.

To increase the running length of your LED Neon Flex, you could power the Neon Flex from both ends thereby doubling the running length, however this is only possible with low voltage Neon Flex.

The maximum running lengths for LUMUL LED Neon Flex are:

	1 power feed	2 power feeds
LUMUL 220V Generation 1 PVC LED Neon Flex	50m	
LUMUL 12V Generation 1 PVC LED Neon Flex	5m	10m
LUMUL 12V Generation 2 PVC LED Neon Flex	5m	10m
LUMUL 24V Silicone LED Neon Flex (Vertical FPC)	15m	30m
LUMUL 24V Silicone LED Neon Flex (Vertical FPC)	15m	30m

ELECTRICAL SPIKE TOLERANCE

220V LED Neon Flex operates at 220V DC internally – with a rectifier converting the alternating current to direct current. These rectifiers provide no protection from electrical spikes or surges – meaning that if there is an electrical spike to 300V it will pass straight through to your Neon Flex. LED Neon Flex cannot limit the incoming voltage but it does have a tolerance. If this tolerance is exceeded there will be irreversible damage to the LED Neon Flex internals.

Given the challenges which we're experiencing with Eskom, the risk of electrical spikes is extremely high. As such we recommend clients only install 220V LED Neon Flex with a double conversion UPS i.e. on clean power so that the UPS can provide the necessary protection from power spikes.

Surge protectors "kick in" at what we call a clamping voltage, and most on the market have a clamping voltage of 300V and above. At this point your 220V LED Neon Flex may already be damaged.



Getting Started Guide

WARRANTY

LUMUL offers different warranties on the various LED Neon Flex product ranges. The higher the warranty, the higher the quality of the product and by inference the lower the possibility of maintenance being required within that warranty period.

The different warranty periods available are:

	Warranty period
LUMUL 220V Generation 1 PVC LED Neon Flex	6 months
LUMUL 12V Generation 1 PVC LED Neon Flex	1 year
LUMUL 12V Generation 2 PVC LED Neon Flex	1 year
LUMUL 24V Silicone LED Neon Flex	5 years Optional 2 years

BENDING DIAMETER

Whilst LED Neon Flex can be bent, the minimum bending diameter of each range of LED Neon Flex which LUMUL offers differs. The bending diameter is a factor of many things: silicone LED Neon Flex can be bent tighter than PVC Neon Flex, a hollow jacket can be bent tighter than a solid jacket, a thinner LED Neon Flex jacket can be bent tighter than a thicker jacket, plus the thickness of the FPC and type and number of LED chips makes a difference.

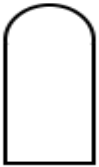
The minimum bending diameter of each range of LUMUL LED Neon Flex are :

	Minimum bending diameter
LUMUL 220V Generation 1 PVC LED Neon Flex	5 cm
LUMUL 12V Generation 1 PVC LED Neon Flex	4 cm
LUMUL 12V Generation 2 PVC LED Neon Flex	2 cm
LUMUL 24V Silicone LED Neon Flex (Vertical FPC)	2.5 cm
LUMUL 24V Silicone LED Neon Flex (Horizontal FPC)	3 cm

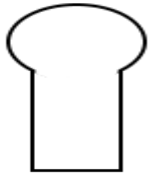
Getting Started Guide

JACKET SHAPE AND SIZE

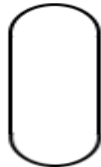
Whilst LED Neon Flex is offered in a few jacket shapes and sizes, not all are stocked or sold by LUMUL. Below are some of the jacket shapes available in the market :



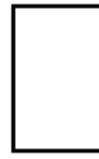
Dome



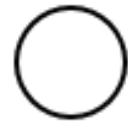
Mushroom dome



Double dome



Flat top



Round

LUMUL does not offer all the above shapes. Below are the jacket shapes and sizes LUMUL offers:

	Jacket shape	Size
LUMUL 220V Generation 1 PVC LED Neon Flex	Solid dome	14mm * 26mm
LUMUL 12V Generation 1 PVC LED Neon Flex	Solid dome	9mm * 19mm
LUMUL 12V Generation 2 PVC LED Neon Flex	Hollow dome	8mm * 18mm
LUMUL 24V Silicone LED Neon Flex (Vertical FPC)	Hollow dome	10mm * 25mm
LUMUL 24V Silicone LED Neon Flex (Horizontal FPC)	Hollow dome	13mm * 14mm



Getting Started Guide

CHOOSING THE RIGHT LED NEON FLEX

There are different types of LED Neon Flex available and not all of them will be suitable for your installation. Consider your needs carefully then match them to the available LED Neon Flex products offered by LUMUL.

Do you need the LED Neon Flex to bend laterally or vertically ?

You possibly need LED Neon Flex with a vertical FPC if:

- You're creating a neon sign
- You're installing LED Neon Flex in a bulkhead / cove for indirect lighting
- You're creating regular bends on a building face

You possibly need LED Neon Flex with a horizontal FPC if:

- You're lighting a rounded building façade
- You're installing LED Neon Flex on a bulkhead / cove and want the LED Neon Flex facing outwards for direct lighting

How precise do you need the LED Neon Flex to be cut without dark areas ?

If you're working with signage, you'll almost certainly require our 12V generation 2 LED Neon Flex with the smallest cutting unit available of 3.6cm. If you're lighting building facades you will probably want one of our 24V (PVC or silicone) LED Neon Flex products which can run longer lengths but still have a relatively short cutting unit. If your building façade can accommodate LED Neon Flex sections in multiples of 1m and you have clean power, then our 220V LED Neon Flex may be suitable.

What is your tolerance for future maintenance ?

If you need to minimize possible future maintenance then only consider our LUMUL 24V silicone LED Neon Flex.

Examples where future maintenance may not be tolerable include façade lighting on a multi-story building where maintenance would require rope work or expensive scaffolding. The initial higher outlay of the silicone LED Neon Flex pales in comparison with the cost of rope work or scaffolding.



Getting Started Guide

CHOOSING THE RIGHT LED NEON FLEX

How intricate is your installation ?

Intricate installations, such as a sign with cursive writing, many tight curves and loops, will generally require LED Neon Flex in a small jacket size, and one which has a small minimum diameter, such as our 12V generation 2 8*18 LE Neon Flex.

What shape LED Neon Flex do you require ?

- If LED Neon Flex is being recessed into a wall, floor or ceiling the designers / architects sometimes ask that the Neon top sits flush with the surface. This can only be achieved with a square / rectangular LED Neon Flex (which we don't stock but order on demand).
- If you're creating a neon-type sign the dome LED Neon Flex is generally preferred.
- If you absolutely require a 360°degree glass-neon-tube look then you should consider the round jacket LED Neon Flex (which we don't stock).

What unbroken lengths of LED Neon Flex do you need to run?

- If you need to run extra long lengths of between 30 and 50m then you should consider 220V LED Neon Flex but only if you can run it off a double conversion UPS.
- If you are only running short lengths under 10m then consider our 12V generation 2 8*18 LED Neon Flex.
- If you need to run lengths up to 30m then consider our 24V generation 2 11*27 LED Neon Flex or a custom order of our 24V generation 2 8*18 LED Neon Flex.

Do you need a coloured jacket ?

- If your LED Neon Flex installation is visible when unlit, and then needs to fit in with a colour scheme, consider purchasing a coloured jacket LED Neon Flex.
- If your LED Neon Flex installation is only seen when lit, consider a white jacket LED Neon Flex.

How large does your LED Neon Flex need to be?

- If you're creating a sign then you should consider our 12V generation 2 8*18 LED Neon Flex since this size best matches the size of the old gas glass neon tubes.
- If you're installing LED Neon Flex on a building façade you might need to consider a larger jacket size, such as our 24V generation 2 11*27 LED Neon Flex or our 220V generation 1 14*26 LED Neon Flex.



Getting Started Guide

DECIDING WHAT YOU NEED TO ORDER

Power

You need to provide power your LED Neon Flex and for this we have a few options to consider.

- 220V LED Neon Flex requires a 220V Power Converter + connector pin – we do not recommend
- 12V and 24V generation 1 and generation 2 LED Neon Flex requires either:
 - 2 mini wired connector pins (one for positive and one for negative) and an end cap for each power feed, or
 - A power connector + connector pin for each power feed.
- 12V and 24V LED Neon Flex requires a suitably sized constant voltage power supply; aim to never draw more than 80% of the rated power of any power supply so as to extend its' lifespan.

Mounting

LED Neon Flex is typically mounted in an aluminium channel which is custom manufactured to the correct size for the different LED Neon Flex product ranges / sizes. The aluminium channel is available in 5cm, 1m and 2m lengths where the longer lengths are used when straight lines are required, and the shorter 5cm lengths are used for signage where curves are required.

Some customers will use a CNC router to cut a channel in a backing board – usually MDF or Perspex – so that the LED Neon Flex can be glued into a pre-cut channel. This results in perfectly accurate lettering.

In signage installations, it is possible to glue the LED Neon Flex directly onto a Perspex backing board and concealing all wires behind the backing board.