Before you plug it in

One page to print and keep next to the bench. Where the real danger is, where it isn’t, and what to check before you switch on.

1 · Where the danger is, and where it isn’t

PART	VOLTAGE	IF YOU TOUCH IT
The LED neon strip	12 V DC	You feel nothing, lit or not. You can cut it, bend it and solder it with no risk of shock (always unplugged while you solder).
The supply output (V+ and COM)	12 V DC	Same as the strip.
The supply input (L, N and ground)	Wall power: 120 V in the US, 230 V in the UK and Australia	**This is where the real danger is.** On metal-case supplies with open screw terminals, these terminals carry full wall voltage.

> **The one rule**
> Wall-power wires are only ever connected with the supply unplugged, and the terminals are covered before you plug it in. If you are not sure, have an electrician wire it. To start out, a closed 12 V plug-in adapter (the kind that looks like a charger) leaves no wall voltage exposed.

2 · Before you buy: 12 V or wall power?

Some neon flex is made to plug straight into the wall, with no 12 V supply. **That is not the one in the course**, and you never cut or handle it while it is plugged in. Check the label on the reel: the course strip says **12V DC** (or DC12V). If it says 110 V, 120 V, 220 V, 230 V or AC, it is the other kind.

3 · Eight checks before you plug in

1. If the supply has a **voltage selector**, set it to your wall voltage: **115 V** in the US and Canada, **230 V** in the UK, Ireland, Australia and New Zealand. On the wrong setting the supply fails.
2. Wall-power terminals wired with the supply unplugged, and **covered**.
3. **Polarity:** positive to positive, negative to negative. If it is the wrong way round, the strip just does not light: swap the wires.
4. No bare wire touching another. Positive touching negative is a short circuit.
5. A supply with **headroom**: more amps than the draw you measured (sections 2 and 3 of this pack).
6. Cable rated above the total current (section 4).
7. Air around the supply: not covered, not shut in a box with no ventilation.
8. If the sign goes **outdoors**: IP65 strip (water-resistant) and a supply rated for outdoor use.

4 · What is normal, and what is not

Normal	The strip and the supply get warm in use.
Unplug if…	you smell burning, a letter flickers or goes dark, or the supply is too hot to touch. Nearly always: a supply sized too tight, cable too thin, or strips chained one off the end of another (section 1).
Short circuit	The supply protects itself and cuts out, or it fails. It does not shock you — that is the 12 V side. Unplug and find the wires that touch.

5 · The rest of the shop

- **The soldering iron and the heat gun burn**, and acrylic melts if you rest anything hot on it. Always put them back in their stands.
- **Fumes:** super glue (cyanoacrylate) and heated plastic give off fumes that sting your eyes and should not be breathed. Work with ventilation.
- **Batteries:** not recommended. If a customer insists, a sealed one, mounted outside, with ventilation (section 6).

General sheet based on the course lessons. It does not replace an electrician or the electrical code where you live.

THE NEON TRADE

Wiring & Power Pack

The electrical side of the trade, pulled out of six lessons and put on one sheet. This is what you need standing in front of the customer, not sitting watching a video.

1 · Why letters burn out

This is the mistake that ruins most first jobs, and the reason a customer never calls back.
A 5-metre strip drawing 1 amp is **designed to carry 1 amp through its own tracks**. If you daisy-chain a second strip off the end of the first, all the current for both now flows through the first strip's tracks. Two strips, two amps, through a track built for one. It overheats, a letter burns, and the whole sign goes dark.

The fix

1. Measure the total draw of the whole sign (section 2).
2. Run **two heavy-gauge cables** from the supply — one positive, one negative — sized above that total.
3. Take a **branch** off those cables to each letter or group. Never chain everything off the first one.

That way the big current travels down the thick cable, not through the strips.

2 · Measuring the draw

You cannot choose a supply without this number.
1. Cut the positive lead between supply and sign, leaving the circuit open.
2. Put the meter **in series**: one probe each side of the cut. Red in the socket marked A, black in COM.
3. Set the meter to **DC amps, 10 A range**.
4. Power up. If it does not light, swap the polarity — LED neon only works one way round.

Do not use the 200 mA range. A meter limited to 200 mA (0.2 A) will burn out the moment you connect a real sign. You need one with a 10 A range.

Working it out on paper

Measure one small segment, then multiply. From the lessons: one 2.5 cm segment draws 0.0174 A. A 2.5 m strip is 250 ÷ 2.5 = 100 segments. 100 × 0.0174 = 1.74 A in theory.
Measured on the bench, that same strip drew **1.01 A**. Theory runs high — voltage varies, real parts are not ideal. **Always trust the measurement over the calculation.**

3 · Choosing the supply

Total draw	What to use
Under 1 A	A 12 V 1 A plug-in adaptor is enough.
1–2 A	12 V 2 A adaptor.
Above that	A bench power supply. Adaptors do not exist at

Total draw	What to use
	high current.

Whatever you pick, leave headroom. Sizing a supply exactly to the draw leaves nothing for a hot day or an extra letter.

The bench supply, terminal by terminal

Marking	What goes there
L and N	The two mains wires, from a plug.
Earth symbol	Earth.
COM ×3	Negative out. All three are the same terminal internally.
V+ ×3	Positive out. Same again — not three independent outputs.
V-adjust	Leave it alone. Your gear is built for 12 V; turning it up shortens its life.

If you repurpose a computer PSU

Wire	Gives	Max
Yellow	+12 V	25 A
Red	+5 V	30 A
Orange	+3.3 V	12 A
Blue	−12 V	0.8 A
Purple	+5 V	2 A
Black	Ground	—
Green	Bridge to any black	Switches the supply on. Until you do, it reads nothing.

Join every yellow wire, not one. Those 25 amps are only available if you use all the yellow wires together. One thin wire carries a fraction of it.

4 · Cable gauge

Pick a gauge rated **above** your total draw, not equal to it.

Run	Gauge
Supply to the sign (the heavy run)	12–14, sized above the total
Branch to each 5 m strip	22 is fine

Example from the lessons: three strips at 1 A each = 3 A total, so choose a cable rated above 3 A. If the sign draws 5 A, pick something rated 10–13 A so you are not running at the limit.

5 · Soldering strips

1. Cut only on the copper pads. They are marked.
2. Peel back the silicone coating with a knife before you start — solder will not take through it.
3. Tin the pads first, then tin the wires, then bring the two together with the iron.
4. **Do not blow on the joint.** It makes a dry joint that cracks later.

On RGB, the markings are +12, G, R and B. Match them end to end or the colours come out wrong.

6 · Batteries

The short answer from the lessons: **not recommended.** A battery is a box of chemicals; open types vent flammable gas. If a customer insists, use a sealed one and keep it outside with ventilation.
Runtime = amp-hours ÷ current draw. A 4.5 Ah battery on a 2 A sign gives **2.25 hours** at full brightness.
After that it dims as the charge drops. And the battery must be 12 V — a 9 V or 1.5 V will not light neon flex at all.
The Neon Trade · Wiring & Power Pack · Every figure here is measured or quoted in the lessons. Measure your own sign before you commit to a supply.