



# Wiring Guide

A quick look at best practice and simple LED wiring



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Thanks to M4 (UK) Ltd (National Media Museum), All Round Signs (BSW timber Group), Vyniline (Langtree Park) and Blue Raptor Signs (Art Gallery).

# Introduction



This wiring guide is intended as a supportive document for customers purchasing Applelec's LED-illuminated letters. The guide has been written by Applelec's business development manager Andy Armitage alongside the qualified electricians of our technical team.

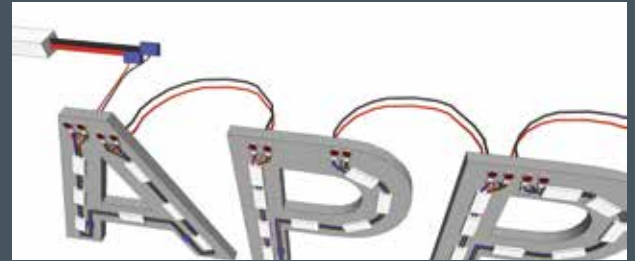
The guide covers some of the most common methods used in sign wiring including series and parallel wiring along with details of some useful components to keep in your toolbox.

We hope the points covered in our trouble-shooting sections will help you better understand best practice LED wiring methods.

Warm regards - Applelec

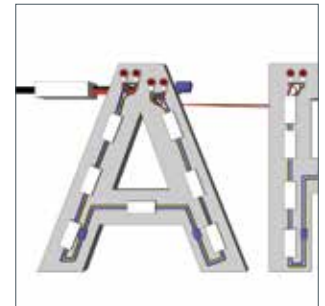
# Series wired letters

Also known as daisy-chained



One of the main two ways LED-lit letters can be powered is with a series wired system.

- Power passes from LED to LED.
- This method is often preferred when no access to the rear of the wall/facade is available.
- 3M Scotchlocks are usually connected in the letters making them easy to maintain from the front of the sign.

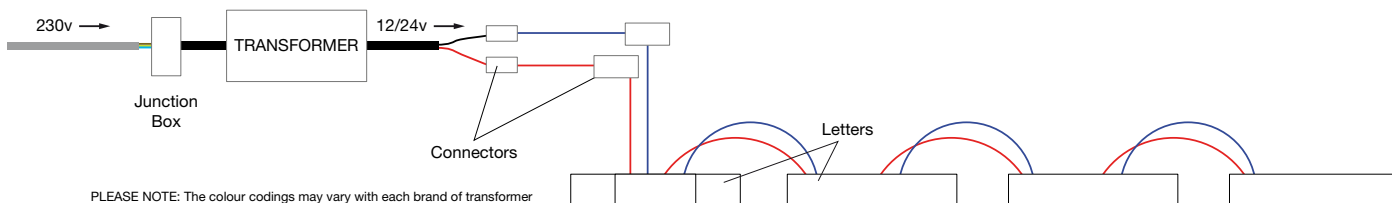


# Problem solving: Series wired letters

## What to do when none of the letters are lit:

1. Check the 230V feed to the sign is on.
2. Check the connection from the 230V to the transformer is ok.
3. Does the transformer work? (Test with a single LED).
4. Check you are connecting the correct wires i.e. Live > live, Neg > neg\*.

5. If all ok then you must have a poor connection, probably located in the first letter. Recompress each connector with the 3M crimping tool.
6. If all connections are correct then the LEDs must be damaged. This could have been caused by water ingress, 230V\*\* charge or poor quality LEDs.



## What to do when individual letters are not lit:

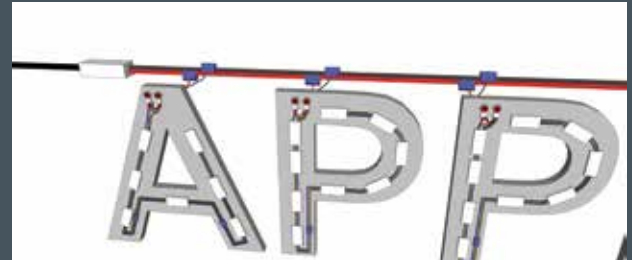
- This is an easier fix due to the fact that we know there is a live feed and the transformer works, because some of the letters are lit.
- With this style of wiring, individual letters cannot go out due to poor connections unless it is the last letter.

- If a bank of letters is not lit, then check the connection from the last letter that is lit with the first letter that is not lit.
- The most common causes of poor connections are people using pliers instead of the Scotchlok tool. Use the Scotchlok tool to engage the connector.
- If the letters do not light then see point 6.

\*Don't worry, switching the wiring round on the 12V side will not do any harm to you or the LEDs

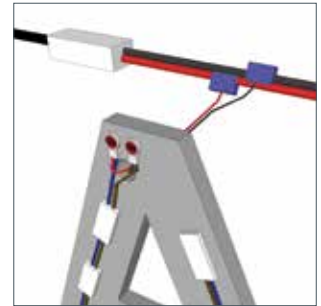
\*\*Connecting LEDs directly to a live 230V feed instead of the transformer will blow the diodes causing permanent failure

## Parallel wired letters



The second main way LED-lit letters can be powered is with a parallel wired system. These systems have the following features:

- LEDs are tapped into and fed from a live wire/source.
- They are easy to fault find.
- Wiring and some connections will be hidden behind facade/wall/ tray. This means that access to the back of the wall or tray may be needed to maintain or service the sign.

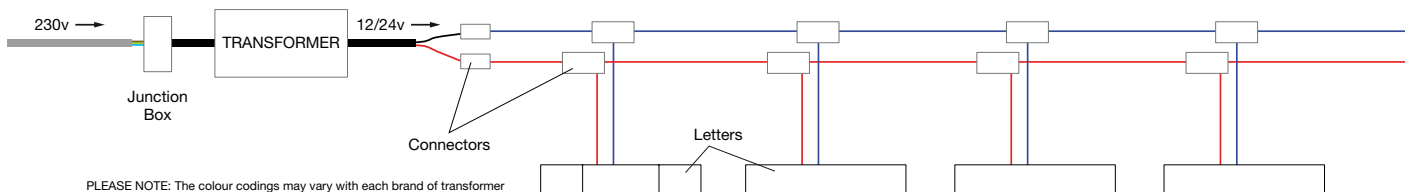


# Problem solving: Parallel wired letters

## What to do when none of the letters are lit:

1. Check the 230V feed to the sign is on.
2. Check the connection from the 230V to the transformer is ok.
3. Does the transformer work? (Test with a single LED).
4. Check you are connecting the correct wires i.e. Live > live, Neg > neg\*.
5. Is the connection from the live transformer to the running wire ok? (Test with a single LED).

6. If all ok then every letter must have a poor connection to the running wire. Recompress each connector with the 3M crimping tool.
7. If all connections are correct then the LEDs must be damaged. This could have been caused by water ingress, 230V\*\* charge or poor quality LEDs.



## What to do when individual letters are not lit:

- This is an easier fix due to the fact that we know there is a live feed and the transformer works, because some of the letters are lit.
- If individual letters are out, check each connection with the running wire.

The most common causes of poor connections are people using pliers instead of the Scotchlok tool. Use the Scotchlok tool to engage the connector.

- If the letters do not light see point 7.

\*Don't worry, switching the wiring round on the 12V side will not do any harm to you or the LEDs

\*\*Connecting LEDs directly to a live 230V feed instead of the transformer will blow the diodes causing permanent failure

# Points to consider

1. When planning each LED-lit lettering job, consider whether you will need the circuit terminated for parallel wiring or left open for a series wired installation. The letters can then be constructed accordingly.



Circuit terminated.



Circuits left open for series wiring onsite.

2. If you have no choice but to leave the wiring exposed on the wall it may be easier to ask for the circuits to be left open and to wire in series on site.



The image shows visible wire between series wired letters.

3. When problem solving parallel and series wired systems, use a single LED to test the transformer.



A single LED is a very useful thing to keep in your tool box/van.



It is an instant way of telling you your transformer is working.



# Wire Gauge Distance Chart

When the distance increases between the secondary side of the power supply and the first LED in a letter or the beginning of a tubing run, the gauge of wire needed will change as follows:

| Distance in metres from power supply   | Wire gauge                   |
|--|------------------------------|
| 0 to 4,6 m 18 AWG (1mm <sup>2</sup> ) + 1,5 m of 18 AWG (1mm <sup>2</sup> )      | 18 AWG (1mm <sup>2</sup> )   |
| 4,6 to 15,2 m 14 AWG (2.5mm <sup>2</sup> ) + 1,5 m of 18 AWG (1mm <sup>2</sup> ) | 14 AWG (2.5mm <sup>2</sup> ) |
| 15,2 to 38,1 m 12 AWG (4mm <sup>2</sup> ) + 1,5 m of 18 AWG (1mm <sup>2</sup> )  | 12 AWG (4mm <sup>2</sup> )   |
| 38,1 to 61 m 10 AWG (6mm <sup>2</sup> ) + 1,5 m of 18 AWG (1mm <sup>2</sup> )    | 10 AWG (6mm <sup>2</sup> )   |

NOTE: MODWE power supply comes from the factory with 1.5m of 18 AWG (1mm<sup>2</sup>) wire in place on the secondary side.

## Available 12V DC Power Supplies

For use with SloanLED 12V DC products

| Item description   | Part number  | Nominal input voltage | Output voltage |
|--------------------|--------------|-----------------------|----------------|
| Self-Contained 20W | 701680       | 100-240V              | 12V DC         |
| MODWE 60W          | 701507-MODWE | 100-240V              | 12V DC         |

## Available 24V DC Power Supplies

For use with SloanLED 24V DC products

| Item description | Part number | Nominal input voltage | Output voltage |
|------------------|-------------|-----------------------|----------------|
| 24V DC 100W      | 701895-24C  | 100-240V              | 24V DC         |

# 3M Connectors (available from Applelec)



- 12V / 24V
- Scotchlok UY2
- Series only
- 0.4 - 0.9mm wire
- Moisture resistant



- 12V / 24V
- Scotchlok UR2
- Series only
- 0.4 - 0.9mm wire
- Moisture resistant



- 12V / 24V
- UB2A tap connector
- Series or parallel
- 0.4 - 0.9mm wire
- Moisture resistant



- 12V / 24V
- Scotchlok 804
- Series or parallel
- Up to 1.5mm wire
- Moisture resistant

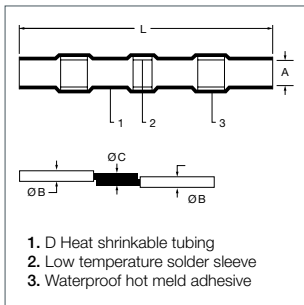


- 3M crimping tool
- E-9BM
- To ensure the connection is properly engaged
- For use with all Scotchlok connectors

# Solder Sleeves

(available from Applelec)

- Shrink ratio 2:1
- Available in four sleeve sizes
- Waterproof wiring splices
- Transparent sleeve allows inspection
- Controlled soldering process



## Product Dimensions

| Part No. | Product Dimensions (mm) |          | Wire Dimensions (mm) |                |          | Colour |
|----------|-------------------------|----------|----------------------|----------------|----------|--------|
|          | A (min.)                | L (min.) | B (min.)             | B and C (min.) | C (min.) |        |
| ASC-11   | 1.7                     | 26       | 1.0                  | 1.7            | 0.76     | White  |
| ASC-21   | 2.7                     | 40       | 1.4                  | 2.7            | 1.2      | Red    |
| ASC-31   | 4.5                     | 40       | 2.3                  | 4.5            | 2.0      | Blue   |
| ASC-41   | 6.0                     | 40       | 3.7                  | 6.0            | 3.4      | Yellow |



## Technical indicators

|                           |                  |
|---------------------------|------------------|
| MAX operating temperature | - 55°C ~ + 125°C |
| Shrinking temperature     | > 160°C          |
| Dialectic strength        | 1 kV             |
| Protection type           | IP67             |

## Operating temperature range

Operating temperature: - 55°C - 125°C  
 Minimum shrink temperature: 80°C  
 Starting temperature of solder melt: 138°C  
 Minimum full recovery temperature: 160°C


**Please note**

This guide is designed to inform Applelec's customers on recommended methods for best practice sign wiring but should not be viewed as a definitive document. As such, all letters should be wired by experienced personnel and Applelec takes no responsibility for any issues arising from letters wired incorrectly either directly or indirectly as a result of the methods advised in this guide.



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For more information on Applelec's products, please get in touch:

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