# LED Turn Signals

**Modern LED (Light Emitting Diode) technology has opened up a whole new world of possibilities in vehicle design: low power consumption takes a load off the electrical system, small-diameter cables reduce cost and save weight, the powerful light output allows tiny dimensions and imaginative designs, and long LED life saves you the bother of frequent replacement. Especially on a motorbike, small housings are a great bonus – a traditional "bulb" turn signal looks like a soup bowl compared to today's, street-legal LED mini turn signals.**

So it's no wonder that many bikers decide to switch to stylish LEDs when an original turn signal needs to be changed and the dealer's price for the OEM spare part puts them off - if they haven't already made the switch, that is. In principle any bike with a 12 V DC electrical system can be fitted with LED turn signals. However, you do need a basic knowledge of vehicle electrics to do it yourself. If you are not confident in this area or you have a motorcycle with complex electronics (e.g. a BMW with CAN bus or a motorbike with start-up system check), you should leave the fitting to a motorcycle workshop. If your motorcycle is still under warranty, you should first check with your authorised dealer if conversion would affect it.

LEDs have a substantially lower wattage (power consumption) than conventional incandescent bulbs. You can easily tell if a turn-signal bulb has blown because the flashing frequency greatly speeds up. This is because the flasher has lost half of the "load", which keeps it at the right tempo.

The effect is exaggerated if, for example, you replace two 21 watt stock turn signals (one per side) with two LED turn signals, each with 1.5 watts. Now the load on the original flasher is only 3 watts (2 x 1.5) instead of 42 watts (2 x 21). This won't work. There are two ways to solve the problem: either you fit a special LED flasher (Order no. 10033844), or you "fool" the original flasher into thinking the LEDs have the correct wattage by installing electrical resistors. By the way: flashing frequencies of 90 flashes per minute (tolerance of plus/minus 30) are legal.

The simpler option, namely to replace the relay, is only possible under certain conditions:

- Two separate indicator lights for left/right turn signals (not a single one for both sides) on the instrument panel
- There must not be any turn signal beepers or a hazard warning flasher system
- The original relay must be not be integrated in a multifunctional electronics unit (this is the case if there are more than three cable outlets).

Once you have checked the above, you'll know which option is for you: relay replacement or fitting resistors.

**Please note!**

These tips for DIY mechanics contain general recommendations that may not apply to all vehicles or all individual components. As local conditions may vary considerably, we are unable to guarantee the correctness of information in these tips for DIY mechanics. Thank you for your understanding.

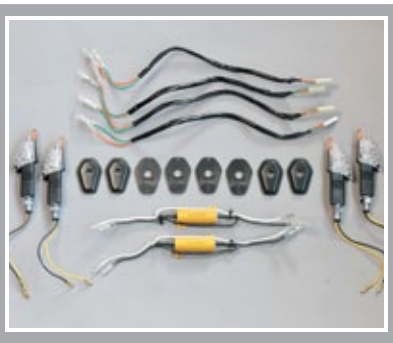
1


Important: Only use turn signals with an "E" mark

2

Vital for the relay: correct polarity

3



4 LED turn signals, 2 resistors, 4 adapter cables, mount cover

1 When buying turn signals, make sure that the lenses have an "E" mark so they do not have to be entered in the vehicle documents. Approved "front" turn signals bear the code 1, 1a, 1b or 11, and approved "rear" turn signals bear the code 2, 2a, 2b or 12 (see Fig. 2). Most turn signals in the Louis range are approved for both front and rear, so have two codes. If you have a choice of turn signals with stalks of different lengths, please bear the following in mind: under EU rules front turn signals must be at least 240 mm apart, rear turn signals at least 180 mm.

2 If you are changing the relay, simply skip the step described below for installing the resistors. The flasher with Order no. 10033844 always flashes with the same frequency at a load of between 1 and 30 watts; in other words it is independent of the load. The flasher can only be installed under the conditions described. Ensure that the polarity of the relay is correct – incorrect connection will immediately destroy the relay electronics and void any manufacturer's warranty.

Take special care: Even if the arrangement of connections is the same as in the original relay, the polarity may still be different. Always check the polarity with an LED test light first (to do so, follow the flasher installation instructions). If the plug-in connectors do not fit, it is relatively easy to make adapter cables to save you having to cut off the original connectors on the wiring harness.

Unfortunately, almost every vehicle manufacturer now uses turn signal bulbs with different wattages. So a turn signal could be 10, 18 or 21 watts. The wattages are also vary with LED turn signals. But since the stock flasher has to be fooled into thinking that a bulb with the correct (standard) wattage is fitted, you need to do a bit of research and a small calculation before writing your shopping list. Like this:

- Find the wattage of a bulb from the original turn signal (shown on the lens) and multiply by 2
- Find the wattage of one of your chosen LED turn signals and multiply by 2
- Subtract one from the other and select a resistor closest to the difference (see next page).

3 On a Kawa Z 750, we demonstrate what to fit, and how best to do it (see Fig. 4).
The LED turn signals we are using are curved, which is why there is one model for front left and rear right and another for front right and rear left. Based on the formula above, we calculated the resistors to be used:
A stock turn signal is 10 watts, x 2 = 20 watts
An LED turn signal is 1.5 watts, x 2 = 3 watts
Difference between the two values: 17 watts

The resistor to be selected therefore has to dissipate 17 watts to ensure the correct flashing frequency. In our case, we need the 8.2 ohm resistor that dissipates 18 watts. As, of course, the turn signals flash separately on each side of the bike, we need one resistor each for left and right.
The ready-made adapter cables for many different Kawasaki models, available in the Louis range, are pretty handy. They fit directly onto the compact connectors of the wiring harness on the bike, and the other connectors fit to the resistors or turn signals without any modification. Of course, when you remove original turn signals, you're left with unsightly holes almost big enough to throw the new mini turn signals through. This is where the turn signal mount covers come in handy. These covers are not specifically designed for the Z 750 but fit just fine. If you cannot find something suitable for your motorbike, you can make a cover out of aluminium, plastic or sheet metal.

4 As with all work on the bike's electrical system, the negative cable must first be disconnected from the battery to avoid a short-circuit. To replace the front turn signals, take off the front fairing and set it down in a safe place (on a cloth or blanket).

5 Now you can remove the original turn signals and screw on the new ones including the mount covers. When tightening them, remember they are not truck wheel bolts, so don't use too much elbow grease
Incidentally, mini turn signals often have a fine thread M10 x 1.25 (standard nuts are M10 x 1.5). So if you lose a nut underneath the workbench, please order a replacement.

6 Next, connect up adapter and turn signal cables. Remember: LED turn signals will only work if the polarity is correct. Since vehicle manufacturers do not use standardised cable colours, a wiring diagram, if you can find one, will help you locate the positive or negative cable; otherwise, simply try out both possibilities – doing so will not break the LED turn signals. Proceed in the same way for the other side and then you can put the fairing back on. The cross-head screws all engage in plastic threads, so take care or else you will damage them.

7 To fit the rear turn signals and resistors, take off the seat and unscrew the tail fairing. Once again, carefully set down this expensive and delicate piece of plastic.

8 Like before, remove the rear turn signals, and fit the new mini turn signals and the mount covers. The turn signal cables are routed similarly to the original ones.

9 Now fit the resistors. These are already pre-wired in parallel. The resistors have no polarity, so it doesn't matter which way round they go. The cable terminals provided for the Louis resistors make fitting easy. If you need 2 resistors per side, they can both be connected at the rear turn signal (usually more space).

10 But first you must decide on a suitable place to fit the resistors, as they can heat up to over 100°C in operation (with long signalling or using your hazard warning lights if you break down), so they need a little cooling air. They should not be completely enclosed or mounted in direct contact with a plastic surface. It's a good idea to make a little mount plate out of sheet aluminium and place that in the bike.
The Z 750 has a metal plate on the right next to the control unit, which is an ideal place to install it. This is where we fitted the resistor for the right turn-signal circuit using 3 mm nuts and bolts. We fitted the resistor for the left turn-signal circuit on the left side next to the control unit.
However, the resistor cannot be screwed directly to the visible metal plate on this side, as there is another control unit underneath the plate, which could get damaged. We screwed the resistor to a metal plate and inserted the whole thing under the black box. As long as you bear in mind that the resistors can heat up, there are other positions where they could be secured.

11 Do they work?: test run
Once you have wired and connected them (don't forget the battery earth cable), you can do a test run. We monitored the temperature of the resistors with an infrared thermometer. They heat up to almost 80°C in just a few minutes. So never attach the resistors with double-sided adhesive tape, for example in the fairing. The double-sided adhesive tape will come away in the heat and the plastic will deform or melt.
If everything is working, you can put the tail fairing back on, and you're done!


4 Remove cockpit fairing


5 Mount covers are a ready-made solution


6 Adapter cables leave the wiring harness intact

12 If you cannot use adapter cables, it is important to establish a safe, permanent cable connection. One option is to solder the cables and then to insulate them with heat shrink tubing; another is to use crimp-type cable terminals. For this, Japanese connectors should be used, for which a special crimping tool is required. Both are available in the professional set.

CAUTION: There is a crimping tool that is suitable only for insulated cable terminals, but NOT for Japanese connectors. You can recognise it by a red, blue and yellow dot on the tip of the tool.

## Which resistors are required for which conversion?

| Original turn signal front/rear | Conversion to | Required resistors |
|---|---|---|
| 4 x 21 W | 4 x 0.4 - 2.6 W | 4 x Order no. 10032089 |
| 4 x 21 W | 4 x 2.7 - 5.0 W | 4 x Order no. 10032063 |
| 4 x 21 W | 2 x 21 W / 2 x 10 W | 2 x Order no. 10032205 |
| 4 x 21 W | 2 x 21 W / 2 x 6.0 W | 2 x Order no. 10032205 |
| 4 x 18 W | 4 x 0.4 - 2.2 W | 4 x Order no. 10032063 |
| 4 x 18 W | 4 x 2.3 - 5.0 W | 4 x Order no. 10032205 |
| 4 x 18 W | 4 x 10 W | 2 x Order no. 10032205 |
| 4 x 10 W | 4 x 0.4 - 2.2 W | 2 x Order no. 10032063 |
| 4 x 10 W | 4 x 2.3 - 4.0 W | 2 x Order no. 10032205 |

**Individual resistor values:**
Order no. 10032205: 10 ohms dissipates 14.4 W
Order no. 10032063: 8.2 ohms dissipates 18 W
Order no. 10032089: 7.5 ohms dissipates 19.2 W

If a different resistor is required in special cases, ask in an electronics store for a resistor with heat sink for use with your wattage.

7

Take off tail fairing and remove turn signals

8

Correctly wired: turn signal, resistor, adapter cable

9

Resistor connection at the rear

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Resistors fitted underneath the seat

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Infrared thermometer reads 79°C after a few minutes

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Multifunctional crimping tool for Japanese connectors without coloured markings