Failure control with LED indicators

General points

In the case of vehicles approved for use on public roads, the indicators must be monitored. The failure of an indicator must be shown optically or acoustically
in the vehicle. This applies in all ECE states. The manufacturers use various methods for failure control. The failure control systems currently in use cannot detect simple LED lights and display a fault. All Hella LED indicators have integrated electronics for failure control. The indicators are self-monitoring. They generate a pulse that is evaluated by the electronic ballast. This ballast simulates a 21 W bulb, which makes operation with conventional flasher units possible.

As soon as one single LED fails, the light can be considered faulty, the pulse is not generated. The ballast then switches the bulb simulation off and the flasher unit indicates the fault to the driver.

Hella supplies electronic ballasts for all Hella LED indicators which make it possible to convert the indicator failure display for various vehicles. This is necessary if the vehicle manufacturer does not guarantee indicator bulb failure control via the vehicle wiring system. At the moment, there are three different ballasts and several different LED indicator types available.

Design and function

This section intends to explain why failure detection works with different LED lights with some flasher units and not with others.

Fig. 1 illustrates the typical current pattern when a bulb is switched on. Different flasher units detect this in different ways, for example by:

a) measuring the pulse peak or
b) measuring the current at some point during the switch-on pulse or
c) measuring the current after the pulse, when the current is constant and has a certain intensity, or
d) determining the total energy flowing through the light (area A represents the total energy).

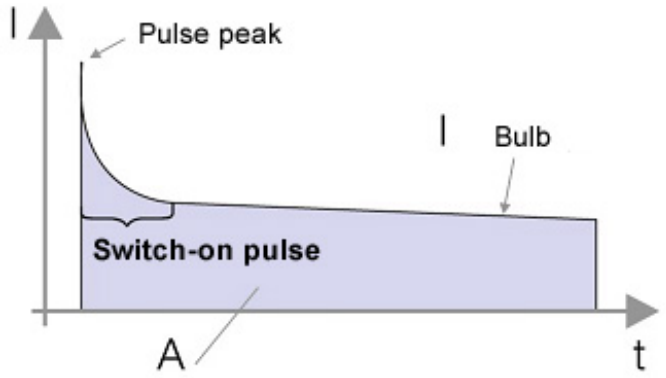


Fig. 2 shows the LED current (I LED) in relation to this. None of the above-mentioned methods can work here since there is neither a switch-on pulse available
nor is the current intensity high enough or the total energy through both lights is identical (area B is as large as A).

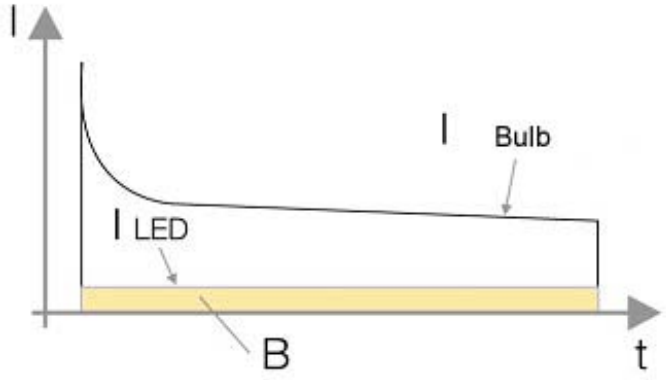


Fig. 2

If a simple Ohmic resistor is inserted, e.g. a resistor cable, the current is increased by a certain value (IR) and the curve illustrated in Fig. 3 is the result.

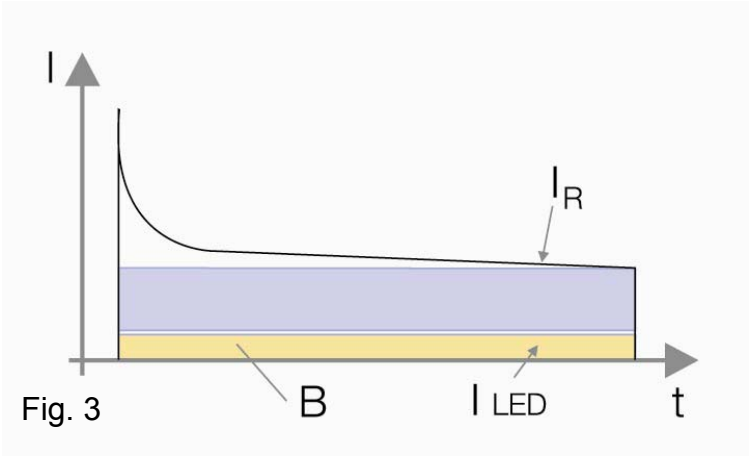


Fig. 3

In this case, only a flasher unit according to principle c would work. If the resistance is chosen somewhat higher, principle d could also possible work. If the light then
fails due to mechanical damage, the flasher unit could detect the inserted resistor as a functional bulb. In this case, a light working
perfectly would be indicated although this is not the case! This means: In this case the vehicle would lose its approval for use on public roads.

The only solution conceivable for universal use is one that works with all the flasher units on the market. As the above considerations have shown, this can practically only be guaranteed if the current pattern of a bulb is simulated exactly by means of an electronic circuit. Since such a circuit is extremely complex, it is not possible to integrate this in the LED light. In order to be able to benefit from the advantages of LED lights despite this fact, a ballast is required for the circuit. This combination provides the perfect - and above all legally conform - solution to the problem.

Hella's LED flasher unit now offers such a solution.

All Hella LED indicators with integrated electronics for failure control are self-monitoring and generate an individual pulse. This pulse is evaluated by the electronic ballasts. The ballasts simulate a 21W bulb. This makes operation with conventional flasher units possible. If the light is faulty, which can be the case if only a single LED fails, the above-mentioned pulse is not generated. The ballasts then switch the bulb simulation off and the flasher unit indicates the fault to the driver.

By measuring the light current during a time window of 10 ms (see Fig. 4), direct exchange between the Hella LED light and a bulb version is possible.
Hella ballasts are straightforward to convert even at a later date.

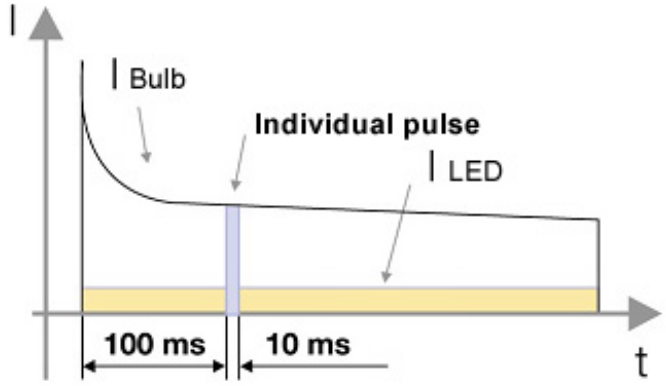


Fig. 4

Which Hella ballast for which vehicle?

1. Vehicles that use the cold scan for indicator failure control.

Description of fault indication: Is a faulty light indicated when the ignition is switched on or directly when the fault occurs or when the bulb is screwed out without the indicator being triggered?

Solution: Simulation device for cold scan 24 V (see Fig. 5).
Hella no.: 5DS 009 602-001

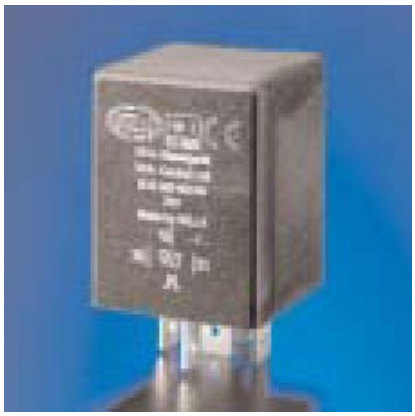


Fig. 5

2. Vehicles without flasher unit that carry out current measurement as failure control.

Description of fault indication: Is a fault only determined during flashing (e.g. double flashing frequency)?

Solution: Indicator control unit 24 V for traction vehicles
Hella no.: 5 DS 008 828-001 (see Fig. 6).

Fig. 6

Features of this control unit are:

- An independent voltage supply must be guaranteed.
- Protective rating IP 20

and for 24 V trailers Hella no.: 5 DS 009 552-001 (see Fig. 7)

Features of this control unit are:

- No independent voltage supply is necessary.
- Protective rating IP 6K9K.

Fig. 7

3. Vehicles with flasher unit

Solution: Replacement of the existing flasher unit by an LED flasher unit (see Fig. 8).

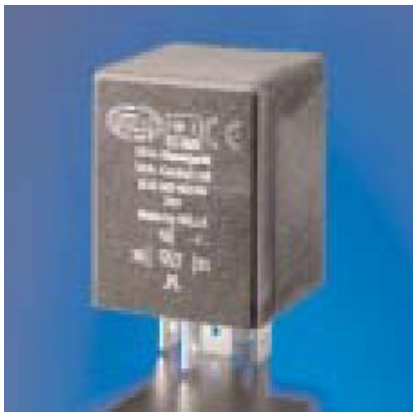
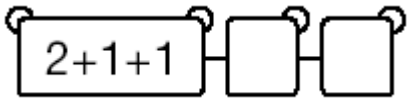
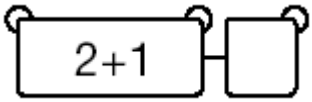


Fig. 8

LED flasher unit 12 V 2+1+1
Hella no. 4DN 009 492-101



LED flasher unit 24 V 2+1
Hella no. 4DM 009 492-001



LED flasher unit 24 V 3+1
Hella no. 4DW 009 492-011

LED flasher unit 12 V 3+1
Hella no. 4DW 009 492-111