LED LIGHT
FAILURE MONITOR

FOR VEHICLES WITH 12 V OR 24 V VEHICLE ELECTRICAL SYSTEM
LED LIGHTING:
FAILURE MONITOR AND ELECTRICAL CONNECTION

In the ECE R48 area of application, it is necessary by law to ensure failure monitoring for LED lights / LED headlamps in the vehicle’s electrical system by means of suitable measures. Failure must be communicated to the driver in the vehicle visually or acoustically.

HELLA recommends, as the best solution, detecting the electrical pulse directly in the car manufacturer’s vehicle electrical system. It is merely necessary to integrate the check according to ISO 13207-1. This means that you no longer have to rely on interim solutions and use direction indicator control units.

All HELLA LED direction indicators with integrated electronics for failure monitoring run checks on themselves and generate a single pulse. This pulse is evaluated by the electronic ballasts. The ballasts simulate a 21 W bulb. This makes operation with conventional flasher units possible.

In the event of a defect in the light, which can occur even if a single LED fails, the above-mentioned impulse is not generated. The ballasts switch off the bulb simulation and the flasher unit reports the defect to the driver. By measuring the lamp current during the time window of 10 ms, a direct exchange between the HELLA LED lamp and a bulb version is possible.
If the vehicle manufacturer does not offer direction indicator failure monitoring via the vehicle electrical system, HELLA offers the following solutions:

HELLA provides electronic ballasts which make it possible to display direction indicator failure for various vehicle assemblies and modifications. This is necessary if the vehicle manufacturer does not guarantee direction indicator bulb failure control via the vehicle’s electrical system.

ISO 13207-compliant LED lights and LED flasher units
LED flasher unit: towing vehicle

LED light control units for function monitoring
LED light control unit

Simulation devices for cold check when switched off
Simulation device for cold check
Vehicle manufacturers’ light control units are able to check the failure pulse in a standardised and unified manner in accordance with ISO 13207-1. Therefore interim solutions 1 - 3 will not be necessary since communication takes place directly with the direction indicators. HELLA recommends this solution.

(Since trailers do not currently have their own vehicle electrical system, this solution must be integrated in the towing vehicle.)

### RETROFITTING/EQUIPMENT VEHICLE

<table>
<thead>
<tr>
<th>Start</th>
<th>Is an indicator relay installed in the vehicle?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Yes</strong> Turn on the vehicle ignition and remove the bulb of a direction indicator without pressing the direction indicator switch.</td>
</tr>
<tr>
<td></td>
<td><strong>No</strong> A flasher unit failure is indicated.</td>
</tr>
<tr>
<td></td>
<td><strong>Yes</strong> Press the direction indicator switch</td>
</tr>
<tr>
<td></td>
<td><strong>No</strong> A flasher unit failure is indicated.</td>
</tr>
<tr>
<td></td>
<td><strong>Yes</strong> Vehicle not ECE-compliant</td>
</tr>
</tbody>
</table>

### TRAILER RETROFITTING/EQUIPMENT

**Solution 1:** Light control unit with integrated check of the failure pulse in accordance with ISO 13207-1

**Solution 2:** LED flasher unit

<table>
<thead>
<tr>
<th>12 V</th>
<th>24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>10 – 15 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 to +85°C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 53 (contacts underneath)</td>
</tr>
</tbody>
</table>

**LED flasher unit**

- 3+1
  - 3 direction indicators on the vehicle / towing vehicle
  - 1 direction indicator on the optional trailer
  - 4DW 009 492-111
- 2+1+1
  - 2 direction indicators on the vehicle / towing vehicle
  - 1 direction indicator on optional trailers
  - 4DN 009 492-101
  - 1 direction indicator on max. of 2 optional trailers
  - 4DM 009 492-001

---

THE RIGHT SOLUTION FOR YOUR VEHICLE ELECTRONICS

ISO 13207-1 SOLUTION
Solution 1:
By means of monitoring in compliance with ISO 13207-1 in the vehicle manufacturer’s vehicle electrical system.
Light control unit already integrated in the vehicle by the manufacturer.

Solution 2:
Replacement of the existing one by an LED flasher unit from HELLA with ISO pulse.
One flasher unit is required per vehicle. Any possible combination of bulbs and HELLA LED direction indicators is permitted: from a full package with bulbs through mixed versions right up to a full package with LED lights. Bulbs or HELLA LED direction indicators are also permitted on trailers.

Solution 3:
Using simulation device for cold check.
One simulation device is required per LED light.

Solution 4:
Using LED light control unit from HELLA with ISO pulse.
Two LED direction indicators can be monitored per vehicle using one simulation device. (Only one simulation device can be used per vehicle.)

Solution 4:
Using LED light control unit from HELLA with ISO pulse.

### Solution 3: Simulation device for cold check

<table>
<thead>
<tr>
<th></th>
<th>12 V</th>
<th>24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>10 – 15 V</td>
<td>18 – 32 V</td>
</tr>
<tr>
<td>Rated current</td>
<td>11 – 14 V</td>
<td>1.5 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40°C to +85°C</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 54 (contacts underneath)</td>
<td>IP 54 (contacts underneath)</td>
</tr>
</tbody>
</table>

Simulation device for cold checking
- SDS 009 602-011
- SDS 009 602-001

### Solution 4: LED light control unit

Universal trailer solution, truck-independent, warning light mode must be taken into consideration separately.

#### Basic control unit
- 12 V
- 24 V

#### Premium control unit
- 12 V (1 stop light channel)
- 12 V (2 stop light channels)
- 24 V (1 stop light channel)

Basic / Premium
- Operating temperature: -40°C to +50°C
- Protection class: IP 6K9K

- SDS 227 488-001*
- SDS 227 488-101*

- SDS 227 489-001*
- SDS 227 489-011*
- SDS 227 489-101*

*The LED control unit does not generate a load supplement in the event of a warning light flashing. This must also be taken into account.
SOLUTION 2: LED FLASHER UNIT - TOWING VEHICLE
FAILURE MONITOR AND ELECTRICAL CONNECTION

LED direction indicators in compliance with ISO 13207 can “communicate” with the flasher unit. The flasher unit checks for a defined energy requirement at a defined point in time: exactly 21 W for 100-130 ms after each activation of the direction indicator. The energy consumption or “pulse” corresponds here to that of a bulb so that the flasher unit notices no difference between a bulb and an LED light in compliance with ISO 13207.

The big advantage: bulbs and ISO LED lights can be operated in any combination on an ISO 13207-compliant flasher unit. This is relevant both for vehicles that are frequently operated with different trailers and also for manufacturers who wish to offer several variants of the lighting system without having to modify the underlying electronics.

Control function: The failure of a direction indicator in a motor vehicle or trailer has to be indicated to the driver either acoustically or by means of indicator lamps. HELLA flasher units ensure such control by means of the following:
1. Doubling of the flashing frequency (e-controller) or
2. Control lamp switch-off system (p-control).

THE SINGLE-CIRCUIT TEST CIRCUIT

<table>
<thead>
<tr>
<th>Technical data – 12 V</th>
<th></th>
<th>Technical data – 24 V</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>12 V</td>
<td>Rated voltage</td>
<td>24 V</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>10.5–15 V</td>
<td>Operating voltage</td>
<td>18–32 V</td>
</tr>
<tr>
<td>Rated load</td>
<td>4+2 x 21 W (84 W)</td>
<td>Rated load</td>
<td>2+1 x 21 W (84 W)</td>
</tr>
<tr>
<td>Failure control</td>
<td>EP / EPP</td>
<td>Failure control</td>
<td>EP</td>
</tr>
<tr>
<td>Flashing frequency</td>
<td>75–110 Hz</td>
<td>Flashing frequency</td>
<td>70–110 Hz</td>
</tr>
<tr>
<td>Bright-light time</td>
<td>40–60 %</td>
<td>Bright-light time</td>
<td>40–60 %</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 54</td>
<td>Protection class</td>
<td>IP 54</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40°C to +85°C</td>
<td>Operating temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°C to +85°C</td>
<td>Storage temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Contact</td>
<td>Flat connector DIN 44244 A6: 6.3 x 0.8 mm</td>
<td>Contact</td>
<td>Flat connector DIN 44244 A6: 6.3 x 0.8 mm</td>
</tr>
</tbody>
</table>
### 12 V, LED flasher unit 3+1

**EP control**
- Lamp failure monitor C: tractor unit, high frequency
- Lamp failure monitor C2: 1st trailer C2, lamp off

<table>
<thead>
<tr>
<th>Load</th>
<th>C2</th>
<th>Frequency (49a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 21 W</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>2 x 21 W</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>3 x 21 W</td>
<td>Off</td>
<td>F1</td>
</tr>
<tr>
<td>(3+1) x 21 W</td>
<td>F1</td>
<td>F1</td>
</tr>
</tbody>
</table>

**4DW 009 492-111**

### 24 V, LED flasher unit 3+1

**EP control**
- Lamp failure monitor C: tractor unit, high frequency
- Lamp failure monitor C2: 1st trailer C2, lamp off

<table>
<thead>
<tr>
<th>Load</th>
<th>C2</th>
<th>Frequency (49a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 21 W</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>2 x 21 W</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>3 x 21 W</td>
<td>Off</td>
<td>F1</td>
</tr>
<tr>
<td>(3+1) x 21 W</td>
<td>F1</td>
<td>F1</td>
</tr>
</tbody>
</table>

**4DW 009 492-011**

### 12 V, LED flasher unit 2+1+1

**EP control**
- Lamp failure monitor C: tractor unit, high frequency
- Lamp failure monitor C2: 1st trailer C2, lamp off
- Lamp failure monitor C3: 2nd trailer C3, lamp off

<table>
<thead>
<tr>
<th>Load</th>
<th>C2</th>
<th>C3</th>
<th>Frequency (49a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 21 W</td>
<td>Off</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>2 x 21 W</td>
<td>Off</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>(2+1) x 21 W</td>
<td>F1</td>
<td>Off</td>
<td>F1</td>
</tr>
<tr>
<td>(2+1+1) x 21 W</td>
<td>F1</td>
<td>F1</td>
<td>F1</td>
</tr>
</tbody>
</table>

**4DN 009 492-101**

### 24 V, LED flasher unit 2+1

**EP control**
- Lamp failure monitor C: tractor unit, high frequency
- Lamp failure monitor C2: 1st trailer C2, lamp off

<table>
<thead>
<tr>
<th>Load</th>
<th>C2</th>
<th>Frequency (49a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 21 W</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>2 x 21 W</td>
<td>Off</td>
<td>F2</td>
</tr>
<tr>
<td>(2+1) x 21 W</td>
<td>F1</td>
<td>F1</td>
</tr>
</tbody>
</table>

**4DM 009 492-001**

---

**Key**
- F1: normal flashing frequency
- F2: increased flashing frequency
If the existing vehicle electrical system is programmed to monitor the lighting even when it is not in operation, it is known as a cold check. During a cold check, a small test pulse is transmitted to the light while switched off to see whether this pulse is discharged via the bulb to ground. The energy here is so low that the bulb does not light up.

As LED lights are essentially not suitable for this form of monitoring, HELLA offers an electronic system for 'simulation of the cold check' to ensure operation.

The control unit for cold checking is connected between the body control unit and an ISO13207-compliant LED direction indicator.

The control unit for cold checking checks the function of the direction indicator during operation using the ISO pulse. If the direction indicator fails the device saves the last status, meaning it can be displayed during the next cold check.

### Pin assignment

![Pin assignment diagram]

### Technical data

<table>
<thead>
<tr>
<th></th>
<th>12 V</th>
<th>24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>10 – 15 V</td>
<td>18 – 32 V</td>
</tr>
<tr>
<td>Rated current</td>
<td>11 – 14 V</td>
<td>1.5 A</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 to +85°C</td>
<td>-40 to +85°C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 54 (contacts underneath)</td>
<td>IP 54 (contacts underneath)</td>
</tr>
</tbody>
</table>

### Simulation device

for cold checking: 5DS 009 602-011 5DS 009 602-001
SOLUTION 4: LED LIGHT CONTROL UNIT
FAILURE MONITOR AND ELECTRICAL CONNECTION

HELLA offers two different types of LED light control units designed to monitor lighting functions.

- **Basic version:** This only monitors the direction indicator.
- **Premium Version:** This monitors the stop light and direction indicator light.

**Only one control unit is required for both sides (right and left).**

- The DEUTSCH connector, itself integrated in the housing, enables easy integration in the vehicle architecture.
- Active thermal management, including overheating protection, for a long service life.
- Completely watertight and dust-proof for maximum functioning safety.
- Electromagnetic compatibility (EMC) for trouble-free use of, for example, radio.
- In the event of a warning light starting to flash, the simulation is switched off.

**System representation: Basic**

Control unit is only responsible for monitoring the direction indicators.

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage (12 V version)</td>
<td>9 – 16 V</td>
</tr>
<tr>
<td>Operating voltage (24 V version)</td>
<td>18 – 32 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40°C to +50°C</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 6K9K</td>
</tr>
</tbody>
</table>

For cold check: avoid pulses between 30 µA and 10 mA!

**Basic control unit**

- **12 V Basic, with 6-pin socket housing:** 5DS 227 488-001*
- **12 V Basic, with EasyConn connector:** 5DS 340 128-001
- **12 V Basic, with open cable ends:** 5DS 340 128-021
- **24 V Basic, with 6-pin socket housing:** 5DS 227 488-101

* Constant vehicle electric system voltage to the rear combination lamps must be guaranteed.

**Technical drawing**

**Pin assignment for 6-pin connection**

1. Input: Direction indicator, right
2. Input: Ground
3. Input: Direction indicator, left
4. Output: Direction indicator, left
5. Output: Ground
6. Output: Direction indicator, right

**Packaging unit**
**CONFIGURATION EXAMPLE WITH ISOPULS**

**IN ACCORDANCE WITH ISO 13207**

**System representation: Premium**

Control unit is responsible for monitoring the stop light and direction indicator light.

**Technical data**

- Operating voltage (12 V version): 9 – 16 V
- Operating voltage (24 V version): 18 – 32 V
- Operating temperature: -40°C to +50°C
- Protection class: IP 6K9K

For cold check: avoid pulses between 30 µA and 10 mA!

**Premium control unit**

<table>
<thead>
<tr>
<th>VPE**</th>
<th>Premium control unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12 V Premium, with 8-pin socket housing (1 stop light channel)</td>
</tr>
<tr>
<td>1</td>
<td>12 V Premium, with 8-pin socket housing (2 stop light channels)</td>
</tr>
<tr>
<td>1</td>
<td>12 V Premium, with EasyConn connector</td>
</tr>
<tr>
<td>1</td>
<td>24 V Premium, with 8-pin socket housing (1 stop light channel)</td>
</tr>
</tbody>
</table>

**Technical drawing**

**Pin assignment 12 V**

1. Input: Stop light, left
2. Input: Tail light, left
3. Input: Tail light, right
4. Input: Stop light, right
5. Input: Reversing light
6. Input: Rear fog light
7. Input: Ground
8. Not used

**Pin assignment 12 V/24 V**

1. Input/output: Stop light
2. Input: Tail light, right
3. Input: Tail light, left
4. Input: Tail light, left
5. Input: Reversing light
6. Input: Rear fog light
7. Input: Ground
8. Not used

**Pin assignment for 6-pin connection**

1. Input: Direction indicator, right
2. Input: Ground
3. Input: Direction indicator, left
4. Output: Direction indicator, left
5. Output: Ground
6. Output: Direction indicator, right

**Notes:**

- **B Coding**
- **A Coding**

**Technical drawing:**

- [Diagram of control unit and pin assignments]

**Key:**

1. = Direction indicator
2. = Tail light
3. = Reversing light
4. = Rear fog light
5. = Side marker light

**For more details, see ISO 13207**
THE ELECTRONICS TOOL:
SPECIAL ORIGINAL EQUIPMENT

In the field of special original equipment, HELLA offers an extensive range of electronics products for a wide variety of applications.

The electronics tool informs you quickly and clearly about which electronic products HELLA offers for special original equipment.

First of all, select an appropriate vehicle or area of application (drive train or cab). After selecting the appropriate product via a mouse click, you will receive further information as well as PDFs with important information and technical data for downloading. In addition, the tool provides clear animations showing how the products work.

www.hella.com/electronictool