

Manual

# WIB-13.2

Carriage lighting  
Colour of lighting: warm white

Item no. 53-01140

Version 2016  
with OSRAM LEDs  
Duris E5



tams elektronik



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## 1. Getting started

### How to use this manual

This manual gives step-by-step instructions for safe and correct fitting and connecting of the module, and operation. Before you start, we advise you to read the whole manual, particularly the chapter on safety instructions and the checklist for trouble shooting. You will then know where to take care and how to prevent mistakes which take a lot of effort to correct.

Keep this manual safely so that you can solve problems in the future. If you pass the module on to another person, please pass on the manual with it.

### Intended use

The carriage lightings are designed to be operated according to the instructions in this manual in model building and with model railways. Any other use is inappropriate and invalidates any guarantees.

The carriage lightings should not be mounted by children under the age of 14.

Reading, understanding and following the instructions in this manual are mandatory for the user.



#### Caution:

Integrated circuits (ICs) are inserted on the module. They are sensitive to static electricity. Do not touch components without first discharging yourself. Touching a radiator or other grounded metal part will discharge you.

## Checking the package contents

Please make sure that your package contains:

- one or six carriage lighting
- a CD (containing the manual and further information)

## Required materials

For connecting the carriage lighting you need:

- an electronic soldering iron (max. 30 Watt) or a regulated soldering iron with a fine tip and a soldering iron stand,
- a tip-cleaning sponge,
- a heat-resistant mat,
- a small side cutter and wire stripper,
- as necessary a pair of tweezers and long nose pliers,
- electronic tin solder (0,5 mm. Diameter),
- wire (diameter:  $\geq 0,05 \text{ mm}^2$  for all connections).

If you intend to shorten the module: a small metal saw.

If necessary for the external power supply of the LEDs: bridging capacitors with a voltage sustaining capability of

- $\geq 16 \text{ V}$  (when connected to a power supply  $\leq 18 \text{ V}$ ) or
- $\geq 25 \text{ V}$  (when connected to a power supply  $> 18 \text{ V}$ ) and / or
- goldcaps with a voltage sustaining capability of  $\geq 5,5 \text{ V}$ .

If necessary additional LEDs (e.g. for the train rear lighting).

If necessary, rectifiers (see section 6, connecting remaining sections).

## 2. Safety instructions

### Mechanical hazards

Cut wires can have sharp ends and can cause serious injuries. Watch out for sharp edges when you pick up the PCB.

Visibly damaged parts can cause unpredictable danger. Do not use damaged parts: recycle and replace them with new ones.

### Electrical hazards

- Touching powered, live components,
- touching conducting components which are live due to malfunction,
- short circuits and connecting the circuit to another voltage than specified,
- impermissibly high humidity and condensation build up

can cause serious injury due to electrical shock. Take the following precautions to prevent this danger:

- Never perform wiring on a powered module.
- Mounting should only be done in closed, clean, dry rooms. Beware of humidity.
- Only use low power for this module as described in this manual and only use certified transformers.
- Connect transformers and soldering irons only in approved mains sockets installed by an authorised electrician.
- Observe cable diameter requirements.
- After condensation build up, allow a minimum of 2 hours for dispersion.
- Use only original spare parts if you have to repair the kit or the ready-built module.

### Fire risk

Touching flammable material with a hot soldering iron can cause fire, which can result in injury or death through burns or suffocation. Connect your soldering iron or soldering station only when actually needed. Always keep the soldering iron away from inflammable materials. Use a suitable soldering iron stand. Never leave a hot soldering iron or station unattended.

### Thermal danger

A hot soldering iron or liquid solder accidentally touching your skin can cause skin burns. As a precaution:

- use a heat-resistant mat during soldering,
- always put the hot soldering iron in the soldering iron stand,
- point the soldering iron tip carefully when soldering, and
- remove liquid solder with a thick wet rag or wet sponge from the soldering tip.

### Dangerous environments

A working area that is too small or cramped is unsuitable and can cause accidents, fires and injury. Prevent this by working in a clean, dry room with enough freedom of movement.

### Other dangers

Children can cause any of the accidents mentioned above because they are inattentive and not responsible enough. Children under the age of 14 should not be allowed to mount the modules.

**Caution:**

Little children can swallow small components with sharp edges, with fatal results! Do not allow components to reach small children.

In schools, training centres, clubs and workshops, mounting and operation must be supervised by qualified personnel.

In industrial institutions, health and safety regulations applying to electronic work must be adhered to.

## 3. Safe and correct soldering

**Caution:**

Incorrect soldering can cause dangers through fires and heat. Avoid these dangers by reading and following the directions given in the chapter **Safety instructions**.

- Use a small soldering iron with max. 30 Watt. Keep the soldering tip clean so the heat of the soldering iron is applied to the solder point effectively.
- Only use electronic tin solder with flux.
- When soldering electronic circuits never use soldering-water or soldering grease. They contain acids that can corrode components and copper tracks.
- Solder quickly: holding the iron on the joints longer than necessary can destroy components and can damage copper tracks or soldering eyes.
- Apply the soldering tip to the soldering spot in such a way that the wire and the soldering eye are heated at the same time. Simultaneously add solder (not too much). As soon as the solder becomes liquid take it away. Hold the soldering tip at the spot for a few seconds so that the solder flows into the joint, then remove the soldering iron.
- The joint should be held still for about 5 seconds after soldering.
- To make a good soldering joint you should use a clean and unoxidised soldering tip. Clean the soldering tip with a damp piece of cloth, a damp sponge or a piece of silicon cloth.
- After soldering check (preferably with a magnifying glass) tracks for accidental solder bridges and short circuits. This would cause faulty operation or, in the worst case, permanent damage. You can remove excess solder by putting a clean soldering tip on the spot. The solder will become liquid again and flow from the soldering spot to the soldering tip.

## 4. Operation overview

### Possibilities of use

The carriage lighting WIB-13.2 can be connected directly to a vehicle's current collector or the function output of a digital vehicle decoder. For the power supply analogue a.c. or d.c. transformers or digital boosters can be used.

### Design of the PCB

The carriage lighting WIB-13.2 have inserted 8 warm white LEDs. The length of the PCB as well as number and layout of the LEDs correspond to the carriage lighting WIB-33.2 with integrated function decoder. Thus the (analogue) carriage lighting WIB-13.2 are suitable especially for combining with the lighting WIB-33.2 in a block train.

### Flickering protection

An integrated smoothing capacitor supplies the LEDs when short current interruptions occur, which prevents the lighting from flickering when points or smudges on the rails are crossed. In case the integrated smoothing capacitor is not sufficient, you can connect an additional external bridging capacitor and / or an external gold cap.

### Dividing and shortening the PCB

The 240 mm long PCB (with 8 LEDs) can be divided into two 100 % equivalent parts of approx. 107 mm each (with 4 LEDs). Each part has:

- a soldering jumper to set the switching on mode for the LEDs:
  - smooth brightening of the LEDs or
  - simulation of flickering fluorescent lamps;
- a trimmpot to set the brightness;
- connecting points for two external LEDs (e.g. for the train rear lighting);
- an integrated smoothing capacitor as a flickering protection;
- connecting points for an external bridging capacitor and an external gold cap to supply the LEDs when current interruptions occur.

Each of the two parts of the PCB can be shortened by 30 mm to approx. 210 mm (with 7 LEDs) or 75 mm (with 3 LEDs). The remaining segment with one LED can be used e.g. as a driver's cab lighting or as lighting for the passenger entrance, by adding a small circuit (not included in the package).

| Length approx. [mm]    | Number of LEDs   | Example of use  |
|------------------------|------------------|---|
| 240                    | 8                | H0 carriage   |
| 210 (+ 30)             | 7 (+1)           | Shortened H0 carriage + driver's cab  |
| 2 x 105                | 2 x 4            | 2 small H0 carriages  |
| 72 (+ 35)<br>77 (+ 30) | 3 (+1)<br>3 (+1) | 2 tramways or<br>2 N - or TT- carriages<br>+ passenger entrance<br>+ driver's cab |

## 5. Technical specifications

|   |   |
|---|---|
| Supply voltage  | Digital voltage of the central unit or analogue d.c. or a.c. voltage  |
| Minimum supply voltage approx.  | 6 V (yellow LEDs)<br>7 V (white LEDs)   |
| Maximum supply voltage  | 24 Volt   |
| Current consumption at maximum brightness (without connected loads) approx. | 50 mA   |
| Connections for external LEDs   | 2 (each for 2 LEDs in series)   |
| Connections for buffer capacitors<br>Capacity / Electric strength           | 2<br>$\geq 100 \mu\text{F} / \geq 16 \text{ V}$<br>(supply voltage $\leq 18 \text{ V}$ )<br>$\geq 100 \mu\text{F} / > 25 \text{ V}$<br>(supply voltage $> 18 \text{ V}$ )     |
| Connections for gold caps<br>Capacity / Electric strength                   | 2<br>$\geq 5,5 \text{ V}$   |
| LEDs  | 8 x OSRAM Duris E5 (warm white)<br>dimensions: 5,6 x 3,0 x 0,6 mm<br>colour temperature: 3.000 K<br>luminous intensity: 15.000... 19.400 mcd<br>angle of reflected beam: 120° |
| Protected to  | IP 00   |
| Ambient temperature in use  | 0 ... +60 °C  |
| Ambient temperature in storage  | -10 ... +80 °C  |
| Comparative humidity allowed  | max. 85 %   |
| Dimensions of the PCB approx.   | 9 x 240 mm  |
| Weight of the PCB approx.   | 6 g   |

## 6. Mounting the carriage lighting

### 6.1. Overall view

The diagram shows a vertical PCB layout with components arranged in two main sections, Section 1 and Section 2, separated by a vertical grey bar. Section 1 contains LEDs 1-4 and Section 2 contains LEDs 5-8. Each LED is accompanied by a power supply (P1-P8), external bridging capacitors (E(+), E(-)), goldcaps (G(+), G(-)), and additional LEDs (LED(-), LED(+)). A trim-pot and soldering jumper are also shown. Red dashed lines indicate where the PCB can be shortened.

|                  |  |
|------------------|--|
| P1 ...<br>P8     | power supply                               |
| E(+)<br>E(-)     | external bridging capacitor                |
| G(+)<br>G(-)     | goldcap or external bridging capacitor     |
| A1<br>A2         | power supply (remaining segment)           |
| LED(-)<br>LED(+) | additional LEDs (e.g. train rear lighting) |

**Shortening the carriage lighting**

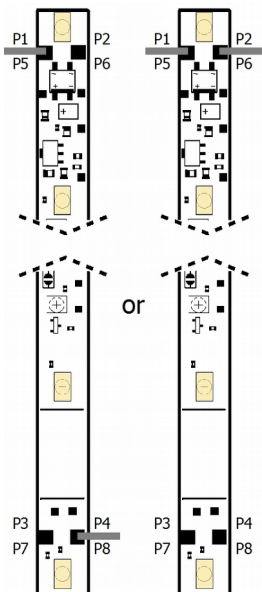
You can divide or shorten the print at the marked spots!

**! Caution:**  
Pay attention not to damage the connection pads or the parts on the PCB when sawing.

You can divide or shorten the PCB as follows:

- division into 2 parts with 4 LEDs each,
- shortening of the whole PCB by one LED to 7 LEDs,
- shortening of the parted PCB by one LED to 3 LEDs.

## 6.2. Connection to the power supply



Solder the connecting wires for the power supply to the connecting points P1, P3, P5 or P7 (from the one rail / centre conductor) and the connecting points P2, P4, P6 or P8 (from the other rail / outer conductor). Follow the connection diagram.

You can loop through the power supply from one PCB to the next and thus supply several carriage lighting from one current source. Follow the connection diagram.

**⚠ Caution:**

When using power transmitting couplings pay attention not to exceed the maximum current of the couplings!





### 6.3. Connecting bridging capacitors

In order to bridge currentless sections you can connect

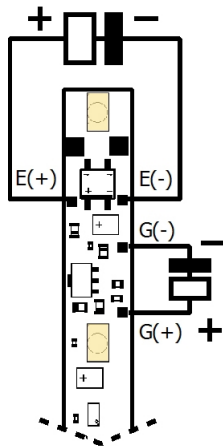
- an external bridging capacitor and / or
- a goldcap or
- two external bridging capacitor

to each of the two parts. In order to supply the 8 LEDs of a whole PCB (or the 7 LEDs of a shortened PCB), normally one capacitor or goldcap is sufficient.

Choose an electrolytic capacitor or a goldcap with a capacity as high as possible. As the housings of electrolytic capacitors and goldcaps are bigger when the capacity is higher, the maximum capacity is limited by the space available to mount the capacitor.

The minimum voltage sustaining capability of the goldcaps is 5,5 V. The minimum voltage sustaining capability of the capacitor depends on the power supply.

Solder the external bridging capacitors according to the connection diagram to the connecting points E(+) and E(-) and the goldcaps or further bridging capacitors to the connecting points G(+) and G(-).

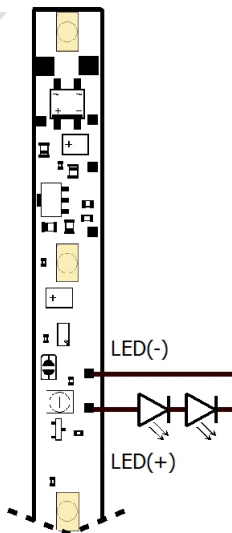


|             |  |
|-------------|--|
| E(+) / E(-) | Bridging capacitor $\geq 16$ V (power supply $\leq 18$ V)<br>Bridging capacitor $\geq 25$ V (power supply $\geq 18$ V)                               |
| G(+) / G(-) | Bridging capacitor $\geq 16$ V (power supply $\leq 18$ V)<br>Bridging capacitor $\geq 25$ V (power supply $\geq 18$ V)<br>or<br>Goldcap $\geq 5,5$ V |

### 6.4. Connecting additional LEDs

You can connect up to 2 additional LEDs in series to each of the two parts (e.g. for the train rear lighting). The necessary series resistors are integrated on the PCB. Solder the LEDs according to the connection diagram to the connecting points LED(-) and LED(+).

Please note: It is not possible to use electric bulbs instead of LEDs, as the voltage is restricted so far by the integrated series resistors, that the bulbs would not light.



### 6.5. Setting the switching on mode for the LEDs

You set the way the LEDs light when switched on, separately for each of the two parts (with 4 LEDs each):

- smooth brightening of the LEDs or
- simulation of flickering fluorescent lamps.

The setting is done at the two soldering jumpers on the PCB (see diagram in section 6.1.). In state of delivery (= soldering jumpers not bridged) the LEDs brighten smoothly. In order to simulate flickering fluorescent lamps you have to bridge the soldering jumper with a little tin-solder.

### 6.6. Setting the LEDs' brightness

You can set the LEDs' brightness via a trim-pot (see diagram in section 6.1.) separately for each of the two parts (with 4 LEDs each). This is also valid when using the unparted whole PCB. For setting the trim-pot use a small screw-driver.

## 6.7. Fixing the carriage lighting

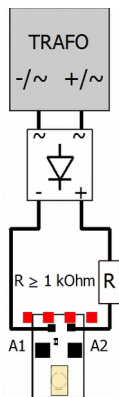
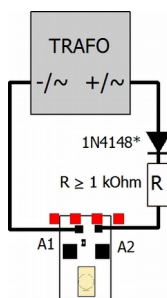
After completing the connections, secure the lighting in place (eg. with double sided adhesive tape).

## 6.8. Connecting the remaining segments

The after shortening remaining segment with one remaining LED can be used for instance as a driver's cab lighting or as lighting for the passengers' entrance. The remaining segment should be connected to the power supply via a series resistor of minimum 1 kOhm.

When connecting it to analogue a.c. voltage, you have to connect additionally a diode 1N4148 according to the connection diagram, as the LED will be otherwise damaged after a certain operating duration.

When connecting it to analogue d.c. voltage, the LED on the remaining segment will light in one direction of travel only. If you want the LED to light in both directions of travel, you have to mount a bridge rectifier as in the connection diagram.



## 7. Check list for troubleshooting

- Parts are getting too hot and/or start to smoke.



Disconnect the system from the mains immediately!

Possible cause: one or more connections are soldered incorrectly. → Check the connections.

Possible cause: Short circuit. The module is connected to locomotive or carriage ground. → Check the connections. A short circuit can result in irreparable damage.

- The LEDs do not light.

Possible cause: The connection to the power supply has been interrupted. → Check the connection of the module.

### Hotline

If problems with your module occur, our hotline is pleased to help you (mail address on the last page).

### Repairs

You can send in a defective module for repair (address on the last page). In case of guarantee the repair is free of charge for you. With damages not covered by guarantee, the maximum fee for the repair is 50 % of the sales price according to our valid price list. We reserve the right to reject the repairing of a module when the repair is impossible for technical or economic reasons.

Please do not send in modules for repair charged to us. In case of warranty we will reimburse the forwarding expenses up to the flat rate we charge according to our valid price list for the delivery of the product. With repairs not covered by guarantee you have to bear the expenses for sending back and forth.

## 8. Guarantee bond

For this product we issue voluntarily a guarantee of 2 years from the date of purchase by the first customer, but in maximum 3 years after the end of series production. The first customer is the consumer first purchasing the product from us, a dealer or another natural or juristic person reselling or mounting the product on the basis of self-employment. The guarantee exists supplementary to the legal warranty of merchantability due to the consumer by the seller.


The warranty includes the free correction of faults which can be proved to be due to material failure or factory flaw. With kits we guarantee the completeness and quality of the components as well as the function of the parts according to the parameters in not mounted state. We guarantee the adherence to the technical specifications when the kit has been assembled and the ready-built circuit connected according to the manual and when start and mode of operation follow the instructions.

We retain the right to repair, make improvements, to deliver spares or to return the purchase price. Other claims are excluded. Claims for secondary damages or product liability consist only according to legal requirements.

Condition for this guarantee to be valid, is the adherence to the manual. In addition, the guarantee claim is excluded in the following cases:

- if arbitrary changes in the circuit are made,
- if repair attempts have failed with a ready-built module or device,
- if damaged by other persons,
- if damaged by faulty operation or by careless use or abuse.

## 9. EU declaration of conformity

 This product conforms with the EC-directives mentioned below and is therefore CE certified.

2004/108/EG on electromagnetic. Underlying standards: EN 55014-1 and EN 61000-6-3. To guarantee the electromagnetic tolerance in operation you must take the following precautions:

- Connect the transformer only to an approved mains socket installed by an authorised electrician.
- Make no changes to the original parts and accurately follow the instructions, connection diagrams and PCB layout included with this manual.
- Use only original spare parts for repairs.

2011/65/EG on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS). Underlying standard: EN 50581.

## 10. Declarations conforming to the WEEE directive



This product conforms with the EC-directive 2012/19/EG on waste electrical and electronic equipment (WEEE).

Don't dispose of this product in the house refuse, bring it to the next recycling bay.

Aktuelle Informationen und Tipps:

Information and tips:

Informations et conseils:

Actuele informatie en tips:

<http://www.tams-online.de>

Garantie und Service:

Warranty and service:

Garantie et service:

Garantie en service:

Tams Elektronik GmbH

Fuhrberger Straße 4

DE-30625 Hannover

fon: +49 (0)511 / 55 60 60

fax: +49 (0)511 / 55 61 61

e-mail: [modellbahn@tams-online.de](mailto:modellbahn@tams-online.de)

