

Manual

**DS-1**

Item no. 51-03036



Light-sensitive Switch

tams elektronik  
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Subject to technical modification.

## 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 light-sensitive switch DS-1 is designed to be operated according to the instructions in this manual in model building, especially with model railways. Any other use is inappropriate and invalidates any guarantees.

The DS-1 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.

### **Checking the package contents**

Please make sure that your package contains:

- one light-sensitive switch,
- one light depending resistor,
- one monostable relay 1 x Um 12 V,
- one diode 1N4148,
- one manual

## Required materials

For mounting and connecting the module 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, a wire stripper and a pair of tweezers
- electronic tin solder (0,5 mm diameter)
- wire, recommended diameter:  $\geq 0,10 \text{ mm}^2$  for all connections

When supplying the light-sensitive switch with a.c. voltage, you additionally need:

- a rectifier (e.g. bridge rectifier item no. 83-19100)
- an electrolytic capacitor 470 F /  $\geq 35 \text{ V}$  (e.g. item no. 84-43264)

## 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.
- Assembling and mounting the kit 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 work with this kit or the ready-built module.



### 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, assembly 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 or a regulated soldering iron.
- 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.
- Insert the component connecting pins into the PCB's holes as far as possible without force. The components should be close to the PCB's surface.
- Observe correct polarity orientation of the parts before soldering.
- 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 part 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.

- Do not move the component for about 5 seconds after soldering.
- To make a good soldering joint you must 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.
- Cut the wires after soldering directly above the soldering joint with a side cutter.
- After placing the parts, please double check for correct polarity. Check the PCB tracks for solder bridges and short circuits created by accident. This would cause faulty operation or, in the worst case, 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

The light-sensitive switch switches any accessories depending on the environmental lighting via a relay. A light depending resistor (also named as photoresistor) serves as a trigger. It's resistance value depends on the environmental lighting. The light sensitivity can be set individually at a trimm pot.

It is possible to connect (several) accessories with a current consumption of max. 1,000 mA. Depending on the chosen connection variant the connected accessory will be switched on with increasing darkness (typical example: house lighting, street lanterns) or with increasing lightness.

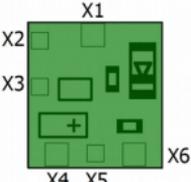
The circuit has been designed that way, the switching operation is released at a lower luminance intensity with decreasing environmental lighting than with increasing environmental lighting (hysteresis). This prevents the circuit to be released with little variations of the environmental lighting.

## 5. Technical specifications

Supply voltage	10 – 20 V a.c. or d.c. voltage
Current consumption	approx. 80 mA
Max. current at the output	1,000 mA
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 including trim-pot	approx. 10 x 10 x 8 mm
Weight of the assembled board including trim-pot	approx. 1 g

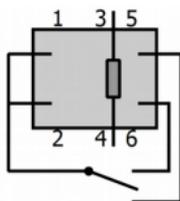
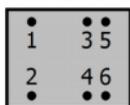
## 6. Connecting the DS-1

### 6.1. Pin assignment of the light-sensitive switch

	Connection to	
X1 and X6	Trimmpot (connected in state of delivery)	
X3 and X4	Light depending resistor (R). Place the light depending resistor that way it is exposed to the environmental lighting during operation. The mounting direction is of no importance.	
X2 and X5	Connections 3 and 4 of the relay. The assignment to the connecting points of the DS-1 to the relay's connections 3 and 4 is optional.	
X2 and X5	Diode 1N4148 (D). The diode is necessary to protect the light-sensitive switch from current peaks possibly occurring when switching off the relay. Observe the mounting direction of the diode. The negative end is marked with a ring.	
X3	Voltage supply, with d.c. voltage: minus pole	Please note: With connection to a.c. voltage you have to mount additionally a rectifier and a capacitor!
X5	Voltage supply, with d.c. voltage: plus pole	

## 6.2. Connecting the downstream accessory

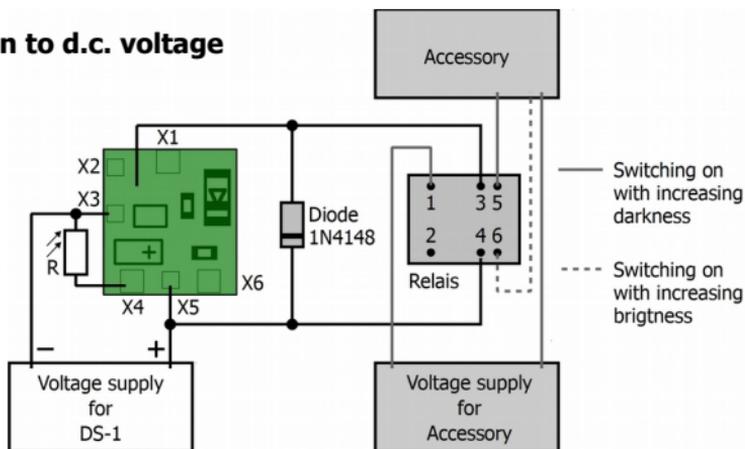
The relay serves as a changeover switch and switches the connected accessory on and off. When the environmental lighting decreases, the relay is switched via the light-sensitive switch and the connections 1 and 2 (firmly connected to each other) are connected to connection 5, connection 6 is open then. When the environmental lighting increases, the connections 1 and 2 are connected to connection 6, connection 5 is open then.



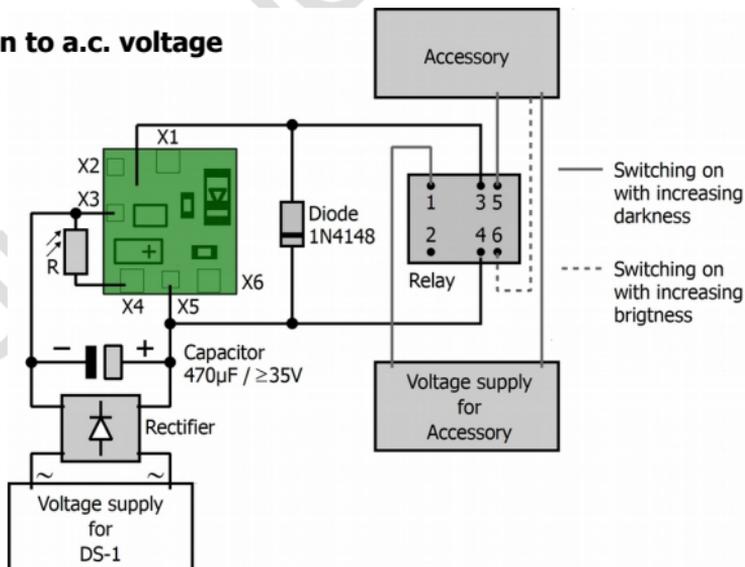
Relay	Connection to
1 or 2	Voltage supply for the downstream accessory. The polarity is of no importance.
5 or 6	Downstream accessory, connection for the voltage supply. Connection 5 → Switching on the accessory with increasing darkness. Connection 6 → Switching on the accessory with increasing brightness.

## 6.3. Connection diagrams

### Connection to d.c. voltage



### Connection to a.c. voltage



## 6.4. Setting the light sensitivity

In order to set the light sensitivity of the light-sensitive switch first set the trimpot to mid-position and then alter the sensitivity according to your needs. Please note the light-sensitive switch is designed that way, the switching threshold for switching the relay is different with increasing and decreasing luminosity.

## 7. Check list for troubleshooting

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



Disconnect the system from the mains immediately!

Possible cause: The voltage supply has been connected with a wrong polarity. → Check the connections. Possibly the light-sensitive switch has been damaged.

Possible cause: The voltage supply is too high. → Check the voltage supply. Possibly the light-sensitive switch has been damaged.

- The downstream accessory is permanently switched on or off resp. the light-sensitive switch cannot be released.

Possible cause: The trimming potentiometer has been set faultily. → Alter the settings.

Possible cause: The light depending resistor has been placed faultily. → Alter the light depending resistor's placement.

**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 the difference between the price for the ready-built module and the kit 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.

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Information and tips:

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

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