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How to use this manual

If you have no specialist technical training, this manual gives step-by-step instructions for safe and correct assembly of the kit and fitting of the ready-built module, and operation. Before you start, we advise you to read the whole manual, particularly the chapter on safety instructions and the FAQ chapter. 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 kit or the ready-built module on to another person, please pass on the manual with it.

Intended use

The kit or the ready-built module can be assembled or operated using this manual. The ready-built module is designed for use in model railways. It allows to switch connected electric loads via a short impulse.

The kit and the ready-built module should not be assembled or fitted by children under the age of 14. Reading, understanding and following the instructions in this manual are mandatory for the user. Any other use is inappropriate and invalidates any guarantees.

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,
 - 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.

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.

EMC declaration

This product is developed in accordance with the European standards EN 55014 and EN 50082-1, tested corresponding to the EC - directive 89/336/EEG (EMVG of 09/11/1992, electromagnetic tolerance) and meets legal requirements.

To guarantee the electromagnetic tolerance 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, circuit diagram and PCB layout included with this manual.
- Use only original spare parts if you have to repair the kit or the ready-built module.

Operation overview

The module switches a bistable relay with two switches which are separate from each other. It is triggered by 12 to 18 Volt direct (d.c.) or alternating (a.c.) voltage. The relay is switched by an earth contact and can be switched by any earth compatible output (e.g. by a points decoder).

This enables the module to switch two connected electric loads in joint action. It is possible to connect e.g. a light signal and the block section that it controls.

Technical specifications

Supply voltage	12-18 Volt a.c. or d.c. voltage
Protected to	IP 00
Ambient temperature in use	0 - + 60 °C
Ambient temperature in storage	-10 - + 80 °C
Comparative humidity allowed	max. 85 %
Dimensions	approx. 26 x 28 mm
Weight	approx. 10 g

Checking the package contents

Check the contents of the package for completeness immediately after unpacking:

- one kit, containing the components listed in the parts list (see page 24) and one PCB or
- one ready-built module,
- one manual.

Required tools and consumables

Make sure you have the following tools, equipment and materials ready for use:

- an electronic soldering iron (max. 30 Watt) with a fine tip,
- a soldering iron stand,
- a tip-cleaning sponge,
- a heat-resistant mat,
- a small side cutter and wire stripper,
- a pair of tweezers and long nose pliers (not necessary for the ready-built module),
- tin solder (0,5 mm. diameter),
- wire (diameter: $\geq 0,25$ mm² for all connections),
- a lamp or a bulb for the functional test.

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**. If you have had training in soldering you can skip this chapter.

- 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 tin solder SN 60 Pb (i.e. 60 % tin, 40 % lead) with rosin-based 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.
- Observe correct polarity orientation of semi-conductors, LEDs electrolytic capacitors and integrated circuits before soldering and ensure that the solder time does not exceed 5 seconds, otherwise components can be damaged.
- 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. A glossy and perfect soldering spot should remain.
- 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 PCB solder side 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.

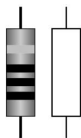
Assembling the kit

You can skip this part if you have purchased a ready-built module.

Preparation

Put the sorted components in front of you on your workbench. The separate electronic components have the following special features you should take into account to prevent mistakes in assembling:

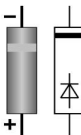
Resistors



Resistors reduce current. Their mounting orientation is of no importance. The value of resistors for smaller power ratings (under 5 W) is indicated through colour rings. Every colour stands for another figure. The colour ring in brackets indicates the tolerance of the resistor which here is of no importance.

Value	Colour rings
220 Ω	red - red - brown (gold)

Diodes



Diodes allow the current to pass through in one direction only (forward direction), simultaneously the voltage is reduced by 0,3 to 0,8 V. Exceeding of the limit voltage always will destroy the diode, and allow current to flow in the reverse direction.

The diode type is printed on the body. Diodes must be mounted in a given direction. The negative end is marked with a ring. This is shown in the PCB layout.

Relays

Relays are electronic switches, depending on their position the one or other (internal) connection is closed. Their mode of operation can be compared to that of a push-button switch, i.e. the connection is only closed as long as the voltage is applied. Bistable relays keep their status after switching – comparable to a switch.

Relays which combine two switches in one housing are common as well (shortly 2xUM). The switching between the two connections can be

heard clearly because of the resulting clicking sound. The mounting orientation of the relays which are put in a rectangular box shaped housing is given by the layout of the pins.

PCB sockets

The widely spread 2,6 mm model railway connectors fit exactly to the sockets. These are used for the connection to the voltage supply and to connected modules or components.

Parts list

Resistor	R1	220 Ω
Diode	D1	1N4148 (or similar)
Relay	Bistable relay 2xUm	
PCB-sockets	VCC, S1, S2, COM1, COM2, PIN1, PIN2, PIN3, PIN4	

Assembling the kit

Start the assembly with the PCB-sockets. Continue the assembly with the resistor and the diode. First solder the components on the solder side of the PCB and then cut the excess wires with the side cutter, as short as possible. Finally solder in the relay.

Caution:

Diodes must be placed in the right direction! If you solder them the wrong way the affected parts can be damaged when you connect the power. In the worst case the whole circuit can be damaged. In any case, a wrongly connected part will not function.

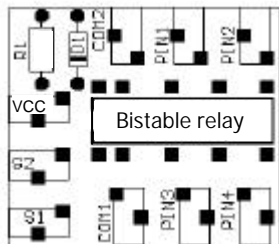


Fig. 1: PCB layout

Performing a visual check

Due to material defects and/or improper assembly there may be risks of injury. Transport damage to ready-built modules is also possible. So you must perform a visual check after the assembly or after unpacking the module.



Caution: Do not power up the module yet.

Check all nuts, pins and connections as well as the mechanical connections for correct assembly.

The following points are inapplicable if you have purchased a ready-built module.

- Remove all loose parts, wire ends or drops of solder from the PCB. Remove all sharp wire ends.
- Check that solder contacts which are close to each other are not unintentionally connected to each other. Risk of short circuit!
- Check that all components are polarised correctly.

When you have remedied all faults, go on to the next part.

Performing a functional test

Even if you have purchased a ready-built module, check all functions. Transport damage can never be excluded.

Do not install the relay circuit board until you have tested it with a lamp.

Connect one side of the power supply to the PCB sockets "COM1", "COM2" and "VCC" and the second side of the power supply to one side of the lamp. Connect the second side of the power supply temporarily with the socket "S2". Connect the second side of the lamp alternately to the sockets "PIN3" and "PIN4". When connected to "PIN 3" the lamp should light, when connected to "PIN 4" it should go out.

Next connect the second side of the power supply temporarily with the socket "S1" and connect the second side of the lamp alternately to the sockets "PIN3" and "PIN4". When connected to "PIN 4" the lamp should light, when connected to "PIN 3" it should go out.

Repeat the test with the lamp connected to "PIN1" and "PIN2". When the second side of the power supply is temporarily connected to "S2" the lamp should light when connected to "PIN1" and when connected to "PIN2" it should go out. When the second side of the power supply is temporarily connected to "S1" the lamp should light when connected to "PIN2" and when connected to "PIN1" it should go out.



Caution:

If a component gets too hot, disconnect the module and power supply from the mains **immediately**. Possible short circuit! Check the assembly.

After a successful function test, disconnect the power supply and the lamp from the module. Mount the module as desired in your model railroad.

Connecting the relay circuit board

Connect the relay circuit board as follows:

VCC	Power supply (for the light, not earth!)
S1	Switching input 1 of the relay
S2	Switching input 2 of the relay
COM1	Input 1 of the relay
PIN3	Output 3 of the relay (connected to input 1, when S2 is switched)
PIN4	Output 4 of the relay (connected to input 1, when S1 is switched)
COM2	Input 2 of the relay
PIN1	Output 1 of the relay (connected to input 2, when S2 is switched)
PIN2	Output 2 of the relay (connected to input 1, when S1 is switched)

In Fig. 2 is shown as an example, the connection of the relay circuit board to a double purpose light signal.

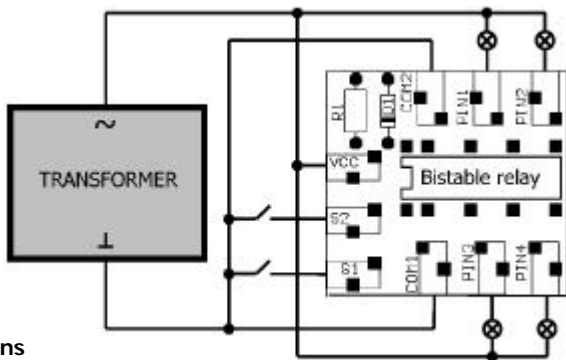


Fig. 2:
Connections

FAQ

- Parts are getting too hot and/or start to smoke.
 ⚠ **Disconnect the system from the mains immediately!**
 Possible cause: one or more components are soldered incorrectly.
 → Perform a visual check.
- The relay does not switch.
 Possible cause: The diode D1 is soldered the wrong way. → Swap the mounting direction.
 Possible cause: The power supply is not connected properly.
 → Check the connections.

If you cannot find the problem, please return the module for repair (address on the cover page).

Manufacturer's note

According to DIN VDE 0869, the person who builds this kit or brings the circuit into operation is the manufacturer of the product. If he sells the product to another person he is responsible for passing on all the relevant papers. Domestic appliances assembled from a kit are deemed industrial products and must comply with health and safety regulations.

Certification

This product conforms with the EC- directive 89/336/EWG on electromagnetic radiation and is therefore CE certified.

Conditions of warranty

This product is guaranteed for two years. The warranty includes the correction of faults which can be proved to be due to material failure or factory flaw. As we have no control over the correct and proper assembly and mounting we can only guarantee the quality of the components and the completeness of kits. We guarantee the function of the parts according to the parameters in not mounted state as well as the adherence to the technical specifications of the circuit when assembled and connected according to the manual.

Other claims are excluded. By law, we are not responsible for damages or secondary damages in connection with this product. We retain the right to repair, make improvements, supply spare parts or return the purchase price.

The following invalidate the warranty:

- using an unsuitable soldering iron, solder containing liquid acids or similar or if the kit is assembled and soldered poorly,
- if damage is caused by not following the instructions in this manual,
- if the ready-built module has been altered and repair attempts have failed,
- if arbitrary changes in the circuit are made,
- if the circuitry is changed in any way, through adding or omitting wiring or components, or through modifying the circuit board,
- if parts other than the original ones delivered with this kit are used,
- if the copper tracks or soldering eyes are damaged,
- when components are mounted incorrectly, or if the components or the circuit are poled incorrectly, also subsequent damage resulting from these faults,
- if damage occurs due to an overload of the module,
- if connected to an incorrect voltage or current,
- if damaged by other persons, by faulty operation or by careless use or abuse.

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:

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