

Anleitung | Manual | Mode d'emploi | Handleiding

LRA

Art. 70-02105 | 70-02106



Lastregel-Adapter für Wechselstrom-Motoren

Load control adapter for a.c. Motors

Adaptateur pour compensation de charge
pour moteurs à courant alternatif

Lastregel adapter voor wisselstroommotoren

tams elektronik



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Technische wijzigingen voorbehouden.



Deutsch	3
English	17
Français	31
Nederlands	45

Table of contents

1. Getting started	17
2. Safety instructions.....	19
3. Safe and correct soldering.....	21
4. Operation overview.....	23
5. Technical specifications.....	23
6. Assembling the kit	24
7. Connecting the LRA	26
8. Check list for troubleshooting.....	28
9. Guarantee bond.....	29
10. EU declaration of conformity.....	30
11. Declarations conforming to the WEEE directive.....	30

1. Getting started

How to use this manual

This manual gives step-by-step instructions for safe and correct assembly of the kit and fitting and connecting 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 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 kit or the ready-built module on to another person, please pass on the manual with it.

Intended use

The LRA is designed to be operated according to the instructions in this manual in model railroad locomotives with alternating current (a.c.) motor. Any other use is inappropriate and invalidates any guarantees.

The LRA should not be assembled or 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 kit, containing the components listed in the parts list and one PCB or
- one ready-built module,
- one manual.

Required materials

For assembling the kit 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).

In order to connect the module you need wire. Recommended diameters: $\geq 0,05 \text{ mm}^2$ for all connections.

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

Most locomotive decoders with load control are designed to control locomotives with direct current (d.c.) motor. There are only few locomotive decoders with load control available to control locomotives with alternating current (a.c.) motor. In order to drive a locomotive with a.c. motor in digital operation with load control, it is widespread to alter the motor (by replacing the field coil with a permanent magnet or exchanging it completely).

The load control adapter LRA has to be mounted between the a.c. locomotive motor and a decoder with load control for d.c. motors. It allows to drive a.c. motors with locomotive decoders for d.c. motors and supplies the load control, without altering the motor.

5. Technical specifications

Max. current	1500 mA
Predicted to	IP 00
Ambient temperature in use	0 ... +60 °C
Ambient temperature in storage	-10 ... +80 °C
Comparative humidity allowed	max. 85 %
Dimensions (approx.) PCB with horizontally mounted capacitors with upright mounted capacitors	33 x 14 mm 38 x 14 x 10 mm 33 x 14 x 17 mm
Weight of the assembled board (approx.)	4 g

6. Assembling the kit

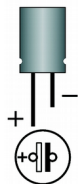
You can skip this part if you have purchased a ready-built module.

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 in assembling:

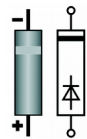
Electrolytic capacitors



Electrolytic capacitors are often used to store energy. In contrast to ceramic capacitors they are polarized. The value is given on the package.

Electrolytic capacitors are available with different voltage sustaining capabilities. Using an electrolytic capacitor with a voltage sustaining capability higher than required is always possible.

Diodes

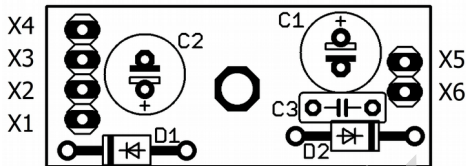


Diodes allow the current to pass through in one direction only (forward direction), simultaneously the voltage is reduced by 0,3 to 0,8 V. Exceeding of the limit voltage always will destroy the diode, and allow current to flow in the reverse direction. The diode type is printed on the package.

Parts list and PCB layout

Diodes	D1, D2	1N400x, x=2..7
Electrolytic capacitors	C1, C2	470 μ F, 16 V
	C3	not assembled

PCB LRA
Component side



Assembly

Proceed according to the order given in the list below. First solder the components on the solder side of the PCB and then cut the excess wires with the side cutter. Follow the instructions on soldering in section 3.

⚠ Caution: Several components have to be mounted according to their polarity. When soldering these components the wrong way round, they can be damaged when you connect the power. In the worst case the whole circuit can be damaged. At the best, a wrongly connected part will not function.

1.	Diodes	Observe the polarity! The negative end of the diodes is marked with a ring. This is shown in the PCB layout.
2.	Electrolytic capacitors	Observe the polarity! One of the two leads (the shorter one) is marked with a minus sign. Depending on the space available in the locomotive you should mount the capacitors either <ul style="list-style-type: none"> ▪ upright, with the package vertical to the PCB or ▪ horizontal, with the package in parallel to the PCB. Bend the legs before soldering near to the package to 90 degrees.

Performing a visual check

Perform a visual check after the assembly of the module and remove faults if necessary:

- 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.

7. Connecting the LRA

Preparation

With a ready-built module you can carefully erect the capacitors mounted horizontally, as needed with regard to the space available in the locomotive.

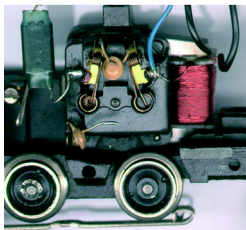


Be especially careful not to apply pressure to the soldering pads and not to damage the PCB tracks.

Connection to locomotive motor and locomotive decoder

Connect the LRA, according to the following list, to the locomotive motor and the motor output of the locomotive decoder. Solder the connecting cables directly to the connecting points of the PCB, in order to save space. When there is enough space available in the locomotive you can alternatively connect the cables via pin strips and sockets (spacing 2,54 mm, not included in the package).

X4 X3 X2 X1



X1 X2	Field coil wire 1 and wire 2
X3	Engine plate, field coil page
X4	Engine plate, track page
X5 X6	Motor output of the decoder

Advice: Possibly the locomotive's driving direction does not match the direction set at the control unit after mounting the load control adapter. In this case you should exchange the connections X1 and X2 or X5 and X6 or program the decoder's CVs that way, the driving direction is inverted.

Fixing

Fix the LRA with a screw or double sided adhesive tape, in order to prevent components from touching accidentally metal parts of the locomotive.



Caution: When components of the LRA touch the metal parts of the locomotive, there is a risk of short circuits. The LRA as well as the connected decoder possibly can then be damaged!

Optimising the driving characteristics

The standard settings of the load control parameters of locomotive decoders regularly are optimised to control d.c. motors. For that reason the driving characteristics of the locomotive possibly are not satisfying after having mounted the LRA. In this case you have to alter the load control parameters of the decoder according to the instructions in the decoder's manual. Proceed in small steps.

8. 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 components are soldered incorrectly.
→ In case you have mounted the module from a kit, perform a visual check (→ section 6.) and if necessary, remedy the faults. Otherwise send in the module for repair.

- The locomotive does not run.

Possible cause: In case you have mounted the module from a kit, components have been soldered the wrong way around. → Perform a visual check. Check the polarisation of the components.

Possible cause: The LRA has been mounted the wrong way around.
→ Check the connections.

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.

9. 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.

10. EU declaration of conformity

CE 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.

11. Declarations conforming to the WEEE directive

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



DE 37847206

The Tams Elektronik GmbH is registered with the WEEE-no. DE 37847206, according to. § 6 sect. 2 of the German electro regulations from the responsible authority for the disposal of used electro equipment.

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:

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