Anleitung | Manual | Mode d´emploi | Handleiding

FI-1

Art. 70-020000

Funktionsinverter
für Fahrzeugdecoder

Function inverter
for vehicle decoders

Inverseur de fonction
pour décodeurs de véhicules

Functie-inverter
voor voertuigdecoders

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Technische wijzigingen voorbehouden.

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Contents

1. Getting started

How to use this manual

This manual gives step-by-step instructions for safe and correct 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 function inverter FI-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 function inverter FI-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 function inverter,
- 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),
- wire.

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.

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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.

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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.

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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.

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4. Operation overview

The function inverter has to be connected between the LED and the function output of the locomotive or function decoder and inverts the polarity of the decoder connections. Examples of use:

Red-yellow or red-white dual-LEDs are suitable as the front or back lighting of model railway locomotives or carriages. Often they have a common cathode for both colours. For that reason they cannot be connected directly to the function outputs of vehicle decoders, as decoders´ return conductors have a reverse polaritiy (+). These dual-LEDs can be connected via a function inverter to the decoder outputs.

The cathodes (-) of LED-lighting in standard control cab coaches are often mounted with a common connection to earth. For that reason they cannot be connected directly to a vehicle decoder when mounting a decoder. Instead of altering the diodes you can mount a function inverter.

5. Technical specifications

Supply voltage	Digital voltage of the decoder
Current consumption (without connected LEDs) approx.	0,1 mA
Max. total current	30 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 (approx.)	7,5 x 6,5 x 2 mm
Weight of the PCB	0,1 g

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6. Connecting the FI-1

Connecting the LEDs

LEDs should always be connected to the function outputs of the vehicle decoder via a series resistor. If not operated via a series resistor they will be destroyed when put into operation. The value of the series resistor depends on the supply voltage.

Necessary value of the series resistor for a dual-LED with 15 mA current input:

Digital voltage on the rails [V]	Value of the series resistor
12	820 Ω
14 – 16 V	1,0 kΩ
18	1,2 kΩ
20 – 22 V	1,5 kΩ
> 24 V	1,8 kΩ

Advice: When using a not regulated booster, the digital voltage on the rails is 1,4-fold as high as the nominal voltage of the transformer. Example:

Nominal voltage of the transformer: 18 V

→ Digital voltage on the rails: 1,4 x 18 V = 25,2 V

Connecting a LED for the top light

You can connect an additional yellow LED for the top light in series with one of the two dual-LEDs (yellow LED) to the function inverter.

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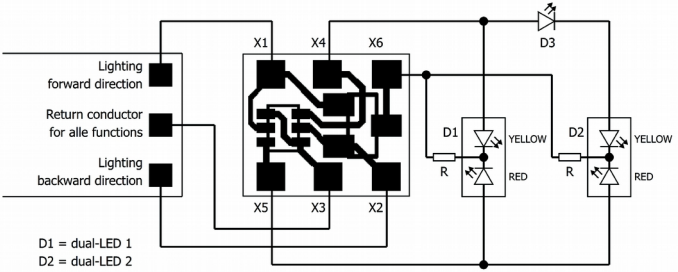
Example: Connecting dual-LEDs

The LEDs are connected that way the yellow parts light at forward motion.

Connecting point FI-1	Connection to
X1 (colour: yellow)	Function outputs of the vehicle decoder
X2 (colour: red)	
X3	Return conductor for all outputs of the decoder
X4	Anodes (+) of the yellow LEDs of the dual-LEDs
X5	Anodes (+) of the red LEDs of the dual-LEDs
X6	Cathodes (-) of the dual-LEDs



D1 = dual-LED 1
D2 = dual-LED 2
D3 = LED for top light (optional)
R = Series resistor

Fig. 2: Connection Diagram

Caution:

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

Fixing the module

Mount the PCB in a suitable position in the carriage as required, using double sided adhesive tape for instance.

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 supply voltage is too high. → Reduce the supply voltage according to the specifications in the chapter "Technical specifications".

Possible cause: The module is defective. → Return the module for repair.

- The LED does not light.

Possible cause: None of the decoder outputs are active. → Check if at least one of the function outputs of the decoder is switched on.

Possible cause: The connection to the power supply is interrupted. → 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.

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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.

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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).

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.

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Aktuelle Informationen und Tipps:
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Informations et conseils:
Actuele informatie en tips:

http://www.tams-online.de

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