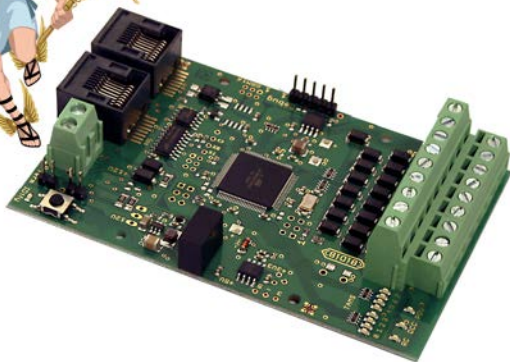


Manual

HERMES

Item no. 46-01086 | 46-01087



8-fold Track Occupancy
and RailCom Detector



tams elektronik



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1. Getting started

Notes on RailCom®

The RailCom devices described here meet the requirements of the RailCommunity standard proposal RCN-217 "RailCom DCC feedback protocol" (status 18.12.2016). The RCN-217 is published at: www.railcommunity.org

RailCom® is a registered German trademark of Lenz Elektronik GmbH. In order to increase the readability of the text, we have refrained from making reference to it whenever the term RailCom is used.

Notes on BiDiB®

The BiDiB devices described in this manual comply with the standards of the BiDiB specification (status V0.7). The BiDiB specification has been published on: www.bidib.org.

BiDiB® is a registered trademark. Copyrights and trademarks to BiDiB are held by Wolfgang Kufer, OpenDCC.de.

In order to increase the readability of this text, we have dispensed with referring to this with every use of the term BiDiB.

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

HERMES is designed to be operated according to the instructions in this manual in digital model railway layouts. Any other use is inappropriate and invalidates any guarantees.

The module 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.

Package contents

- HERMES, depending on the model
 - ready-built module, item number 46-01086 or
 - ready-built module in a housing, item number 46-01087
- an Ethernet patch cable with RJ-45 connectors (length: 0.5 m)
- two short-circuit jumpers
- a CD (containing the manual and further information)

Required materials

In order to connect the module to the booster and the track sections you need wire. Recommended cross-sections:

- Booster: $\geq 0,75 \text{ mm}^2$
- Track sections: $\geq 0,25 \text{ mm}^2$

Power supply

As a power supply for HERMES you can use:

- external power supply BiDi-Power (item no. 46-09016 or 46-09017) with an a.c. or d.c. power pack or
- separate d.c. power pack (11-15 V)

If used in a BiDiB-system, you can supply HERMES via the BiDiBus – provided that there is enough current available fed in by other BiDiB devices.

Displaying and analysing feedback messages

HERMES can send RailCom messages and occupancy messages via the BiDiBus to a BiDiB-interface (e.g. ZEUS item-no. 44-05106 or 44-05107).

Moreover, it is possible to send (alternatively or additionally) the messages

- to the RailCom displays RCA-1 (item no. 45-02016) and/or
- RCA-24 (item no. 45-02247) and/or
- to the PC-interface RC-Link (item no. 45-02257 or 45-02267).

As a connection between HERMES and the mentioned devices a RCA-Bridge (item-no. 46-01116 or 46-01117) is required.

2. Safety instructions



Caution:

The detector contains integrated circuits. These are very sensitive to static electricity. Do not touch components without first discharging yourself. Touching a radiator or other grounded metal part will discharge you.

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.

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 this module.

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. Operation overview

HERMES is a combined track occupancy and local RailCom detector, surveying 8 track sections belonging to one booster section. It can be used in different digital surroundings as:

Track occupancy detector in a BiDiB-system

In terms of the BiDiB specification HERMES is a node to be operated together with up to 31 other nodes on one level. Depending on the structure of the system, the nodes of one level are connected to

- an interface providing the connection to the PC or
- a hub allowing to extend the structure by an additional level

The track occupancy messages are sent via the BiDiBus to a BiDiB interface and forwarded to the PC.

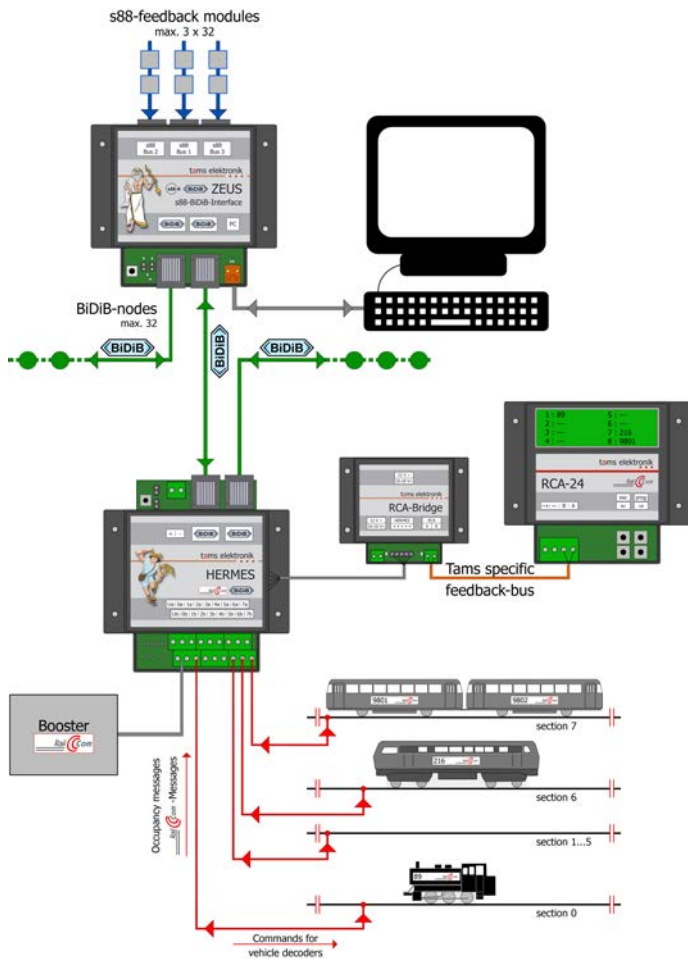
RailCom-detector

The RailCom-messages can be sent

- via the BiDiBus to a BiDiB-Interface and/or
- via a RCA-Bridge to the RailCom-displays RCA-1 and RCA-24 and/or to a PC-Interface RC-Link.

Combination of track occupancy and local RailCom detector

Hermes provides as well (prompt) track occupancy messages as detailed information of the feedback system RailCom. The BiDiBus allows sending both types of messages to a BiDiB interface and analysing them by the PC.



Example for the use of HERMES as a combined track occupancy and local RailCom detector (Page 9)

The occupancy and RailCom messages are sent via the BiDiBus to a BiDiB-interface (ZEUS). The interface provides the connection between PC control and the nodes on the different levels of the system.

In addition, the RailCom messages are sent via a RCA-Bridge to a RailCom-display RCA-24.

3.1. Procedure

HERMES combines the (prompt) messages of a conventional track occupancy detector with detailed information of the feedback system RailCom. As soon as a consumer enters into one of the (maximum eight) surveyed sections, HERMES detects the track as "occupied" and sends a track occupancy message via the BiDiBus to the PC. It is of no importance, if the consumer is equipped with a RailCom-sender or not.

HERMES listens for RailCom-messages sent by the vehicle decoders in the connected track sections, and sends the messages via the BiDiBus to the PC. This information arrives with a delay of some milliseconds after the occupancy messages at the PC.

Moreover, HERMES can send the messages (alternatively or additionally) to RailCom-devices designed for use with the Tams specific feedback-bus. For that purpose a RCA-Bridge is required which provides the connection to:

- RailCom-display devices RCA-1 and/or RCA-24
- Interface RC-Link

3.2. HERMES as a BiDiB-occupancy detector

In terms of the BiDiB-specification, HERMES is a node recording the track occupancy messages, and reporting bi-directional RailCom-messages in parallel. It complies with the requirements for the class "Occupancy" defined in the BiDiB-specification.

The BiDiB-specification provides characteristics for the class "Occupancy" which all nodes of this class have to comply with ("obligatory features"). HERMES sends information on the number of surveyed track sections as well as vacancy and occupancy messages. In addition, HERMES sends information on the quality of the messages, i.e. if

- it is an actual status
- it is a surrogate measurement (e.g. with a short circuit)
- it is a "frozen" status (dating back to a measurement made before the breakdown of the track signal)

In addition to the obligatory features, the detector HERMES has the following optional features:

Secure-ACKnowledgement procedure ("Secack")

HERMES repeats sending a message several times, until the PC has confirmed its reception. After 16 failed repetitions HERMES sends an error message.

RailCom

According to the BiDiB-specification, HERMES can send the following RailCom-messages from the vehicle decoders via the BiDiBus to the PC:

- DCC address data (basic address, extended address or multiple traction)
- CV values
- dynamic information (real speed, reception statistics, tank contents)

- rerailing direction (in 2-rail systems)

Further informationen → section 3.3.

User configuration

The Secure-ACKnowledgement procedure ("Secack") can be switched on and off. The same applies to the transmission of RailCom-messages.

Firmware update

It is possible to update the firmware of the detector HERMES.

3.3. HERMES as a local RailCom-detector

HERMES is a local RailCom-detector, designed to report the RailCom-messages of vehicle decoders in a maximum of 8 track sections within one booster section.

Reporting the RailCom-messages

HERMES can distinguish the RailCom-messages of a maximum of four different vehicle decoders in one section, e.g. locomotive decoders in a multiple traction or locomotive and function decoders in a block train. For that purpose, HERMES analyses the messages from both channels of the sent data packet.

Background information: RailCom-messages of vehicle decoders

On channel 1 vehicle decoders send their address when a DCC-command has been sent to any vehicle decoder.

On channel 2 they send their messages after a DCC-command has been sent to their address.

HERMES analyses the following RailCom-messages:

- DCC-address data (basic address, extended address or multiple traction)
- CV values (upon a corresponding readout command, sent e.g. by the digital central unit or the PC)
- dynamic information

Background information: Dynamic RailCom information

"Dynamic information" mean contents of CVs (RailCom CVs 64-127) which change during operation (e.g. real speed, reception statistics, tank content). If needed, they are sent to the decoder spontaneously.

The reception statistics are kept by the vehicle decoder, and are reported as number of faulty data packet in relation to the total number of data packages. These statistics allow interference on the transmission quality between vehicle and rails.

Detecting the rerailing direction

In 2-rail systems HERMES can detect the rerailing direction of vehicles from the assignment of the decoder connections to the current collectors on the "left" and "right" side, and report it. This provides the correct assignment of the directions of travel "fowards" / "backwards" to the vehicle.

Transmitting RailCom-messages

HERMES can transmit the RailCom messages in two different ways:

- via the BiDiBus to a BiDiB-Interface / the PC
- via an RCA-Bridge
 - to the RailCom-displays RCA-1 and/or RCA-24
 - and/or
 - to a PC-Interface RC-Link / the PC

3.4. Wiring

According to the BiDiBus specification patch cables with RJ 45 connectors (Cat5 cables) are used as bus lines for the detector HERMES. These cables allow simple and quick handling and provide safe connections to the interface and other nodes.

Plugging in and out the cables during operation is permitted (hotplug).

3.5. Assignment in the BiDiBus system (addressing)

According to the BiDiB-specification the assignment of the detector HERMES in the BiDiBus system is made automatically. As a basis for the automatic assignment, the detector has a unique number (unique ID) programmed by the manufacturer. When switching on the BiDiB system, the interface scans the present nodes within its structure, and makes a list with the available nodes, their unique IDs and a local address valid for this session only.

With a new node connected to the bus, the list of the present nodes is upgraded automatically, and the interface sends a corresponding message to the PC. By means of the control software the detector is assigned to the track sections and configured.

HERMES has a so-called "identify button" according to the BiDiB specification. After pushing the button on the PCB the detector is highlighted in the screen display and the LED on the detector flashes.

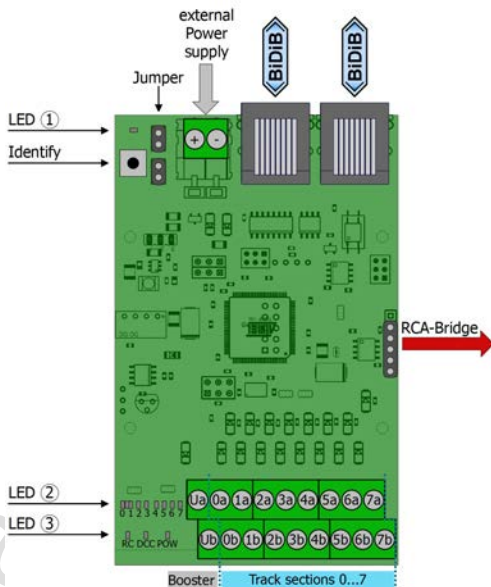
4. Technical specifications

| | |
|---|---|
| Features according to the BiDiB-specification | Node, class "Occupancy" Optional Features: <ul style="list-style-type: none"> ▪ Secure-ACKnowledgement procedure ("Secack") ▪ RailCom ▪ Firmware update |
| Status of the BiDiB specification | V0.7 |
| Interfaces | BiDiB, RCA-Bridge |
| Voltage supply | <ul style="list-style-type: none"> ▪ via the BiDiBus or ▪ external BiDiB-power supply (e.g. BiDi-Power item no. 46-09016 or 46-09017) or ▪ separate DC power pack (11-15 V) |
| Current consumption (without connected devices) | approx. 30 mA |
| Number of surveyed track sections | 8 |
| Voltages supply of the track sections | 1 booster section |
| Maximum current per track | 3,000 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 housing | approx. 65 x 105 mm approx. 100 x 105 x 35 mm |
| Weight of the assembled board / including housing | approx. 56 g approx. 104 g |

5. Connecting HERMES

On two sides, HERMES has terminal strips inserted to plug in and screw on the connecting wires for the track sections, the booster and and, if required, a separate power supply. The two RJ 45 connection sockets are intended for the connection to the BiDiBus.



Make the connections one after the other:

- the booster and the track sections
- the interface and/or other nodes on the same level
- the RCA-Bridge (optional)
- the separate power supply (if required)

5.1. Connection of the booster and the track sections

Separating the controlled track sections

The track sections (maximum 8) surveyed by HERMES, have to be separated from the remaining tracks. For that purpose

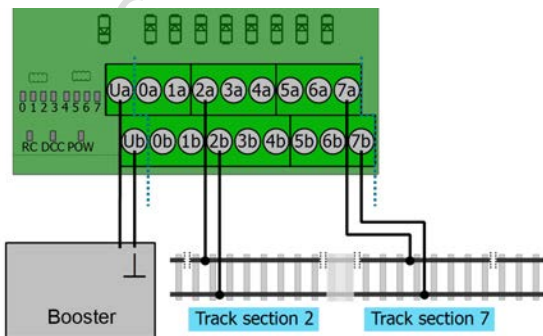
- one conductor with 2-rail systems or
- the middle conductor with 3-rail systems

has to be cut through at both ends of the track section. When connecting several rail sections to RailCom detectors be sure to always cut the same conductor.

! Attention: If you don't cut the same conductor in layouts controlled by several RailCom detectors, a short circuit is going to occur as soon as the cut-off point is traversed. Normally, the layout will be switched off automatically in these cases.

Connecting the booster and the track sections

Mount HERMES into the supply line from the booster to the track sections.

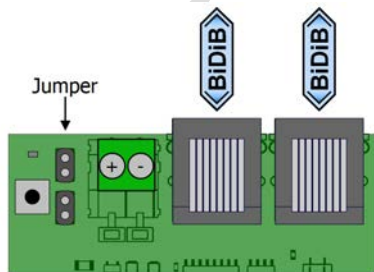


! Observe the correct assignment of the connections to the through and the interrupted conductor.

| | |
|-----|--|
| Ua | Track connection Booster interrupted conductor |
| Ub | Track connection Booster through conductor (earth) |
| 0a | Track section 0 interrupted conductor |
| 0b | Track section 0 through conductor (earth) |
| 1a | Track section 1 interrupted conductor |
| 1b | Track section 1 through conductor (earth) |
| ... | ... |
| 7a | Track section 7 interrupted conductor |
| 7b | Track section 7 through conductor (earth) |

5.2. Connection to the BiDiBus

The two RJ 45 connection sockets are connected in parallel and thus can be used optionally for the connection to the BiDiB interface and/or other BiDiB nodes on the same level.

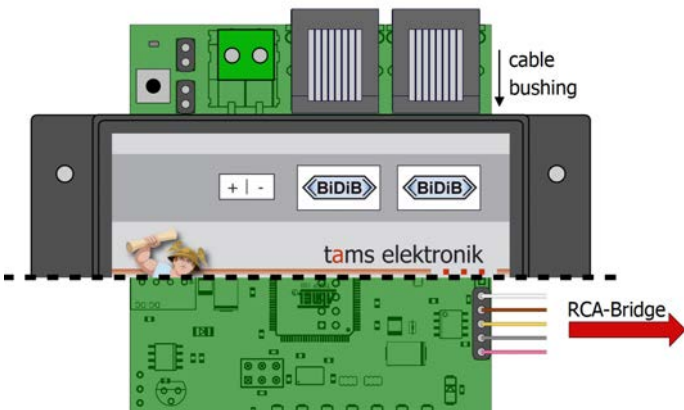


If HERMES is the last node in a level you have to bypass the two 2-pole socket pins beside the RJ 45 connection sockets.

The easiest way is to insert the jumpers included in the scope of supply.

5.3. Connection to the RCA-Bridge

You can transfer the RailCom-messages to the display devices RCA-1 and RCA-24 as well as to the RailCom-PC-interface RC-Link. As these devices have been designed for the Tams specific feedback databus, you need a RCA-bridge. The RCA-bridge converts the feedback messages sent by HERMES that way they can be analysed by the display devices RCA-1 and RCA-24 and the RailCom-PC-interface RC-Link. You need one RCA-bridge for every HERMES.



In order to connect HERMES and the RCA-Bridge it is recommended to use the cable included in the scope of delivery of the RCA-bridge. Pay attention to insert the cable connector that way the cables' colours correspond to the figure. When using a housing, use the hole beside the BiDiB connection sockets as a cable bushing.

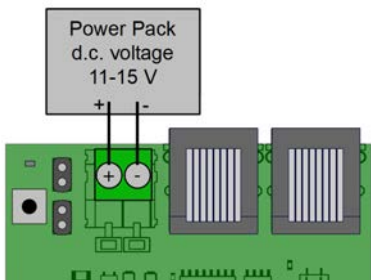
Continue according to the instructions given in the manual for RCA-Bridge.

5.4. Power supply

According to the BiDiB-specification devices without need for additional current for their basic functions (e.g. feedback modules) get the current they need via the bus cable.

As a power supply for HERMES (demand: 30 mA) you can use:

- BiDiBus. It is required that other BiDiB-devices connected directly to a power supply (e.g. digital central unit, accessory decoders) are designed to feed current into the bus cable.
- Specific BiDiB-power supply (e.g. BiDi-Power). This is connected with patch cables to the BiDiB-interface of HERMES. Observe the instructions given in the manual for the BiDiB power supply.
- Direct connection to a power pack (11-15 V **DC** voltage)



! Attention:

You can use one powerpack to supply several BiDiB nodes.

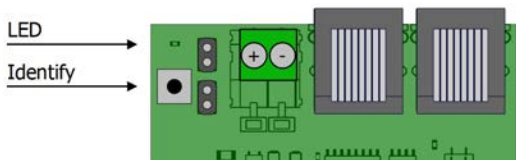
Do not connect digital devices integrated into a common digital control (with digital central unit) to the power pack.

6. Settings

When switching on the BiDiB system all nodes are identified automatically by the interface. As far as supported by the control software, all new nodes that have not been configured, are displayed when switching on and can be configured immediately afterwards.

6.1. Identify button

In order to identify HERMES in the screen display of the control software, you have to push the identify button on the PCB. Then, the assigned BiDiB node is highlighted in the screen display, and the LED on the detector flashes.



6.2. Firmware update and configuration

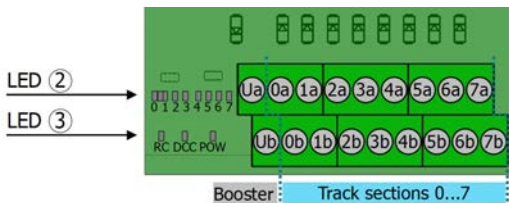
By means of the applications BiDiB-Wizard and BiDiB-Monitor (both available as free downloads), you can perform a firmware update and configure HERMES. Please check the description to determine whether a particular program provides these possibilities as well.

Firmware update

The current firmware is available as a free download under:

<http://tams-online.de/download/firmware>

7. LED displays



LEDs ②: Display of the occupied status

| | |
|---------|--------------------------------|
| 0 ... 7 | LED on: track section occupied |
| | LED off: track section vacant |

LEDs ③: Display of the operating states

| | |
|-----|---|
| RC | LED on: RailCom-cutout available |
| | LED off: No RailCom-cutout available. Check if the booster basically can provide the RailCom-cutout and if RailCom has been activated. |
| DCC | LED on: Booster switched on |
| | LED off: Booster switched off |
| POW | LED on: Power supply for HERMES switched on |
| | LED off: Power supply for HERMES switched off or not sufficient. When supplied via the BiDiBus or a specific BiDiB power supply, check if the current fed into the bus cable is sufficient. |

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 several connections are faulty. → Check the connections.

- When used in a BiDiB system HERMES is not displayed by the control software (the node has not been identified).

Possible cause: The patch cable(s) is/are incorrectly inserted into the connection sockets or is/are defective. → Check the cable(s) and the connection(s).

Possible cause: The interface's connection is faulty or the interface is defective. → Check the interface and the connections. Check whether other nodes connected to this interface are also not displayed.

- The LED "RC" does not light.

Possible cause: The booster does not provide the RailCom-cutout. → Check if the booster basically can provide the cutout. If yes, switch on the Railcom-functions. If no, you have to exchange the booster.

- The LED "DCC" does not light.

Possible cause: The booster has not been switched on or is not connected properly. → Check the booster.

- The LED "POW" does not light.

Possible cause: The power supply via the Bidibus ist not sufficient. → Check if there is a minimum of 30 mA available for supplying HERMES.

Possible cause: The power supplied by an external DC power pack or a specific BiDiB power supply (e.g. BiDi-Power) has been interrupted. → Check the connections.

- At the junctions between the track sections short circuits occur.
Possible cause: The assignment of the connections to the through and the interrupted conductors is not consistent. → Check the connections. The connections 0a to 7a should be connected to the interrupted, the connections 0b to 7b to the through connector.

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 current 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 decoders 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

 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).

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

Information and tips:

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

Warranty and service:

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