

Manual

ARTEMIS

Item no. 46-00117



BiDiB HUB

for a sublevel with 32 nodes

tams elektronik



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1. Getting started

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 hub, 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 hub on to another person, please pass on the manual with it.

Intended use

The hub ARTEMIS is designed to be operated according to the instructions in this manual in model building, especially in digital model railroad layouts. Any other use is inappropriate and invalidates any guarantees.

The hub 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

- hub ARTEMIS
- one pluggable screw terminal for connection to the power supply
- 4 short-circuit jumpers
- a CD (containing the manual and further information)

Required materials

You will need a switching or plug-in power supply. Technical data:

- output voltage: 12 - 18 V direct voltage (DC)
- output current: at least 1 A

If you use a power supply unit without an integrated cable, make sure that the cross-section of the supply cable is sufficient. Recommended cross-section: $> 0.25 \text{ mm}^2$ mm^2 .

For connection to the BiDi-Bus you need patch cables with RJ-45 connectors. To increase the clarity we recommend the use of different coloured patch cables for the different bus lines of your model railway layout (e.g. green for the BiDiBus).

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.

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 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

3.1. Background

In the BiDi-Bus the maximum number of participants in one level or sublevel is limited to 32 nodes (e.g. interface, booster, accessory decoder, feedback modules) for technical reasons.

In total up to 4 levels are permitted. With special nodes (the bus bridges or so-called "hubs") further sublevels can be added in the top 3 levels, again with 32 nodes each. Theoretically, about 1 million nodes are possible in one system - a number that is certainly not exhausted in practice.

The hierarchical structure enables the structured wiring of the system. This results in various advantages:

- Depending on the system concept, the wiring of individual system parts or component groups can be clearly grouped in sublevels.
- The extension of a layout or the addition of additional stationary components is very easy. Changes and additions remain permanently traceable.

Principle structure of a BiDiB-controlled system

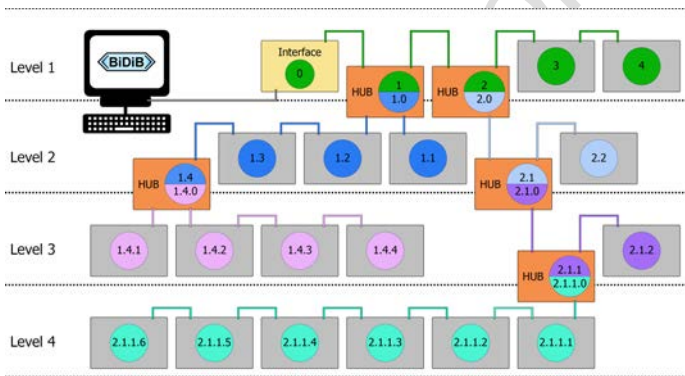
The system comprises up to 4 levels with a maximum of 32 nodes each. In the top 3 levels, additional sub-levels can be inserted with the help of hubs, which can also have up to 32 nodes each. Hubs are no longer permitted on the 4th level.

Level 1 contains the interface which establishes the connection to the PC and the control software. In the first level up to 31 additional nodes can be inserted (the interface counts as one of 32 possible nodes).

The hubs technically represent 2 nodes, one in the main level to which they are assigned and one in the sublevel which is set up with their help.

Note on the numbering of the nodes in the example: According to the BiDiB specification the user does not have to deal with numbers or addresses of the components. The numbers in the figure were dialled in analogy to the addresses that the components receive according to the BiDiB protocol. However, they are only intended here to clarify the structure.

Tip: In order to keep the overview with a larger number of sublevels, it is recommended to mark the bus cables of a sublevel uniformly or to use patch cables in a different colour for each sublevel.



3.2. ARTEMIS

Properties according to BiDiB specification ("Features")

The ARTEMIS bus bridge ("hub") is, in the sense of the BiDiB specification, a node on a bus level which is also the interface for a subordinate level. It corresponds to the requirements for the class "interface" defined in the BiDiB specification.

In the BiDiB specification properties are given for devices of the class "Interface" which all nodes of this class must have ("mandatory features"). They mainly refer to the transmission of messages from and to further nodes in a sub-level.

According to the BiDiB specification ARTEMIS transmits all system messages as well as all messages for node management (NEW, LOST, etc.).

ARTEMIS is overload-proof, i.e. integrated buffers ensure that no messages are lost.

In addition to the mandatory features ARTEMIS has the following additional features ("optional features"):

Firmware update: It is possible to update the firmware for ARTEMIS.

Power supply for additional nodes

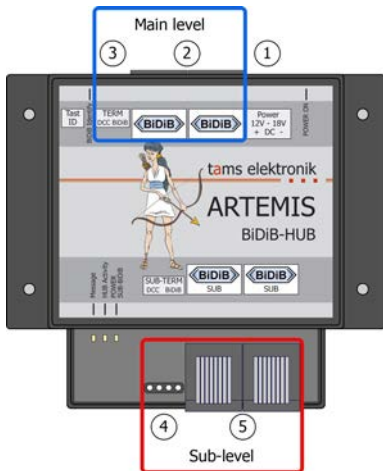
According to the BiDiB specification, components that do not require additional power for their basic functions (e.g. feedback devices) obtain their power via the bus cable. ARTEMIS can provide up to 0.5 A for the supply of components in the sublevel.

4. Technical specifications

Features according to the BiDiB-specification	Node, class "Interface" Optional Features: <ul style="list-style-type: none">▪ Firmware update
Status of the BiDiB specification	V0.7
Voltage supply	12 – 18 V d.c. voltage
Current consumption (without connected devices)	max. 25 mA
Data Protocols	BiDiB
Interfaces for BiDiBus	Main level: 2 RJ-45 sockets Sub-level: 2 RJ-45 sockets for max. 31 further BiDiB nodes
Output current for BiDiB components in the sublevel	Max. 0.5 A
Protected to	IP 00
Ambient temperature in use	0 ... +60 °C
Ambient temperature in storage	-10 ... +80 °C
Comparative humidity allowed	max. 85 %
Dimensions including housing	approx. 100 x 90 x 35 mm
Weight including housing	approx. 83 g

5. Connecting ARTEMIS

5.1. Pin assignment



1	Power	Voltage supply (12 – 18 V direct voltage)	
2		Main level	BiDi-Bus
3	TERM DCC BiDiB		Final jumper DCC/BiDiB termination
4	SUB-TERM DCC BiDiB	Sub-level	Final jumper DCC/BiDiB termination
5	 SUB		BiDi-Bus

5.2. Connection of the power supply

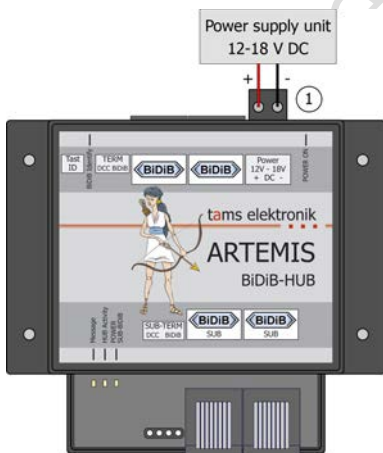
Use a separate plug-in or switching power supply for ARTEMIS.
Technical data:

- Output voltage: 12 - 18 V direct voltage (DC)
- Output current: at least 1 A

Please note :

Do **not** use an AC transformer or AC power supply unit as the power supply. ARTEMIS would be damaged (possibly irreparably) during commissioning!

Never connect digital components which are integrated in a conventional digital controller (with digital central unit) to a power supply unit which is used to supply BiDiB components.



Use the supplied terminal block to connect the power supply. Connect the terminal to the "Power" connector so that the screws are visible from above.

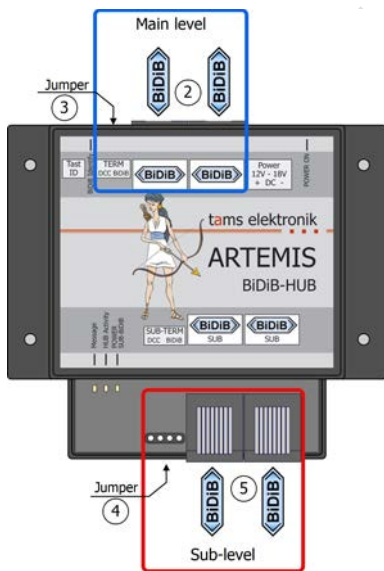
Insert the power supply connection cables into the terminal and screw them tight. Observe the polarity. If the polarity is incorrect, the unit will not function.

5.3. Connection to the BiDi-Bus

In terms of the BiDiB specification, ARTEMIS is a node that is operated together with up to 31 other nodes on one level. At the same time ARTEMIS is the interface for a subordinate level with up to 31 further nodes.

Cabling

According to the BiDiBus specification, patch cables with RJ 45 connections (Cat5 cable) are provided as bus cables for ARTEMIS. These cables are easy and quick to handle and ensure secure connections to the interface and to other nodes. Connecting and disconnecting the cables during operation is permitted (hot plugging).



The two RJ 45 connection sockets on the main and sub levels are each connected in parallel. They can therefore optionally be used for connection to other BiDiB nodes of the respective level.

Setting the termination jumpers

If the ARTEMIS hub is installed at one end of a BiDiB line (i.e. only one of the two BiDiB ports of the main or sub level has an RJ-45 cable), you must plug in the two jumpers for the DCC and BiDiB termination of the level concerned. If you subsequently connect one or more devices to the second BiDiB port, you must remove the termination jumpers.

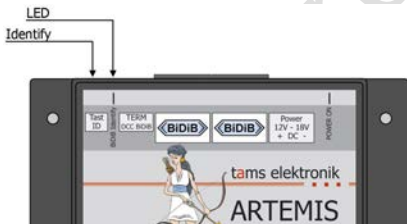
Note: If you do not set termination jumpers on a hub installed at one end of the BiDiBus cable, the deformation of the electrical signal may cause interference in data transmission. If the termination jumpers are set on a hub that is not installed at one end of the bus line, data transmission may fail. Incorrectly set or missing termination jumpers do not damage the hub.

6. Settings

When the BiDiB system is switched on, all nodes on an interface are automatically recognised. If the control software supports this, new nodes that have not yet been configured are displayed when the system is switched on and can then be configured directly.

6.1. Identify button

To identify an ARTEMIS bus bridge in the screen display of the control software, press the Identify button on the board. The associated BiDiB node is then highlighted on the screen and the LED on the hub flashes.



6.2. Firmware-Update

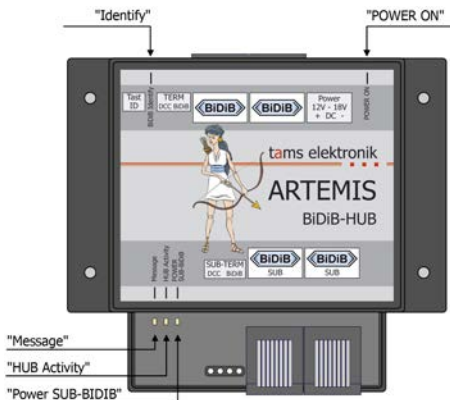
With the programs BiDiB Wizard and BiDiB Monitor (both available as free download) you can carry out a firmware update and configure the hub. Please refer to the description of the respective program to see whether other programs also offer these possibilities.

The latest firmware is available as a free download at:

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

7. Operation

The LEDs indicate the operating states and error messages.



Display of the operating states

Power on	fast flickering	Device in operation
	double flashing	Registration on the bus was refused → Section 8
Identify	off	no connection to the BiDi bus
	permanent lighting	connected to the BiDi bus
	fast flashing	Identify active → Section 6.1
	double flashing	Registration on the bus was refused → Section 8

Message	permanent lighting	Device in update mode
HUB Activity	permanent lighting	Sub-HUB im Betrieb
Power SUB-BiDiB	permanent lighting	Bus voltage in the sublevel o.k.
	fast flashing	Bus voltage in the sublevel faulty → Section 8

Error messages

Power on Identify Message	10 x fast flashing	No bootloader found / no firmware update possible. → Contact the Tams Elektronik Hotline.
Power on Identify Message	continuous flashing	EEPROM faulty. → Perform a firmware update → Section 6.2.
Power on Identify	continuous flashing	No BiDiB Unique ID found. → Contact the Tams Elektronik Hotline.

8. Check list for troubleshooting

Bus voltage in the sublevel is faulty.

Display: LED "Power SUB-BiDiB" flashes quickly.

Possible cause: The supply voltage is not sufficient (below 12 V).
→ Check the connected power supply unit. The required output voltage is 12 to 18 V DC.

Possible cause: The current consumption of all components on the sublevel which are supplied via the bus line is more than 500 mA.
→ Check the current consumption of the components. If necessary connect an additional power supply (e.g. BiDi-Power, art. no. 46-09016 or 46-09017).

Registration at the BiDi-Bus is rejected.

Display: Double flashing of the LED "Identify".

Possible cause: More than 32 components (including ARTEMIS) are connected to the BiDi-Bus in the main level. → Check the number of components.

Possible cause: The power supply collapsed during the login process.
→ Check whether the power supply unit is functional or overloaded.

The data is not transferred correctly.

Possible cause: The connection(s) between ARTEMIS and the other BiDiB nodes are interrupted. → Check the connection(s).

Possible cause: The terminating jumpers are not plugged in although ARTEMIS is installed at the end of one or both BiDiB lines or

The termination jumpers are plugged in, although ARTEMIS is not installed at one end of one or both BiDiB lines. → Check the arrangement of the termination jumpers.

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.

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Information and tips:

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

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