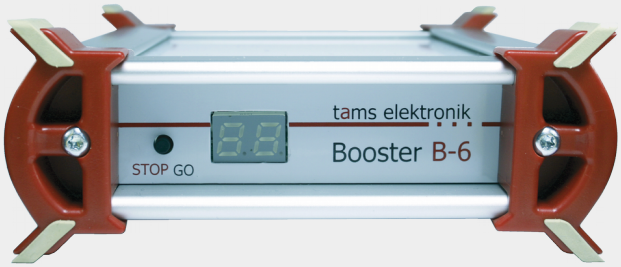
B-6

Booster for digital model railway layouts

Item no. 40-19607

Manual



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Printing the manual

The formatting is optimised for double-sided printing. The standard page size is DIN A5. If you prefer a larger display, printing on DIN A4 is recommended.

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.

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In order to increase the readability of this text, we have refrained from referring to it whenever the term BiDiB is used.

**** The asterisks**

The asterisks indicate further products from the Tams Elektronik GmbH product range :

- Power-Splitter | Item numbers 40-20106, 40-20107
- Digital control unit MasterControl 2 (mc²) | Item numbers 40-30007, 40-30017
- Digital control unit RedBox | Item numbers 40-20007 … 40-20067
- Digital control unit MasterControl | Item number 40-10007

Contents

1. Getting started

This manual will help you step by step to install and use your booster B-6 safely and properly. Before you start using the booster, read through this manual completely, 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 booster on to another person, please pass on the manual with it.

1.1. Contents of the package

- booster B-6
- power supply unit
- mains cable (black) with Euro plug (CEE 7/16) and plug for mains cable socket (European version / C7)
- connection cable (green) with RJ-45 connectors (at least Cat. 5e)
- 1 plug-in connection terminals 2-pole, RM 3.81
- 1 plug-in connection terminals 3-pole, RM 3.81
- 4 plastic brackets for fixing the booster

1.2. Accessories

Connection cables

Digital control unit via DCC-compliant booster interface ("CDE")	Stranded wire*, recommended cross-section $\geq$ 0,25 mm²
Digital control unit via BiDiB-interface	Patch cable (RJ 45) Note: A patch cable is included in the scope of delivery.
Track	Stranded wire*, recommended cross-section: 0,75 mm² bis 1,5 mm² (depending on current)

* The use of stranded wire is recommended for making the connections. Stranded wires consist of several thin individual wires and are therefore more flexible than rigid wires with the same copper cross-section.

Distribution of the booster current

In order to utilise the current of 6 A that the B-6 can provide, even with smaller nominal sizes, a power splitter** can be used. The power splitter distributes the current to 2 to 3 booster sections with 2 to 3 A each.

1.3. Intended use

The booster B-6 is intended for use in digital model railway layouts as specified in the instructions. Any other use is not in accordance with the intended use and will result in the loss of the warranty claim. Intended use also includes reading, understanding and following all parts of the instructions. The booster is not intended to be used by children under the age of 14.

1.4. Safety instructions

Improper use and non-observance of the instructions can lead to incalculable hazards. Prevent these dangers by carrying out the following measures:

- Use the booster and the power supply unit only in closed, clean and dry rooms. Avoid humidity and splash water in the environment. After condensation has formed, wait two hours for acclimatisation before use.
- Disconnect the booster from the power supply before carrying out wiring work.
- Only plug the mains plug of the power supply unit into properly installed and fused earthed sockets.
- Heating of the booster and the power supply unit during operation is normal and harmless. Keep a distance of at least 20 cm between the sides, the top and the back to surrounding surfaces to allow unhindered air exchange and to predect the units from overheating.
- Do not expose the units to high ambient temperatures or direct sunlight. Observe the information on the maximum operating temperature in the technical data.
- Regularly check the operational safety of the units, e.g. for damage to the connection cables or damage to the housing.
- If you notice damage or if malfunctions occur, switch off the supply voltage immediately. Send in the booster and/or the power supply unit for inspection.
- Dangerous voltages occur inside the power supply unit. Therefore, never open the housing of the power supply unit.

1.5. Care

Do not use any cleaning agents to clean the booster and the power supply unit. Only wipe the units dry. Disconnect the units from the power supply before cleaning.

2. Your B-6

Boosters have three main tasks:

1. supply the current needed to operate the digitally controlled locomotives and turnouts, but also other (digital) consumers.
2. to bring the voltage to the track so that the digital driving and switching commands arrive at all vehicle and accessory decoders.
3. in case of a short circuit on the layout (e.g. derailment of a vehicle), ensure that the current is switched off and damage to the rails and the vehicles is prevented.

In RailCom-monitored layouts, the booster also provides the so-called RailCom cutout, which is required for the transmission of the feedback data.

2.1. Track voltage

The Booster B-6 can provide 2 to 6 A of current at the track output, depending on the setting. The maximum output current set for the booster is identical to the cut-off current, when reached, the layout is switched off for safety reasons (e.g. in case of a short circuit). The switch-off current must be lower the smaller the nominal size (and the more filigree rails or vehicle parts such as wheel sliders are).

→ Section 5 "Recommendations for the settings".

Division of the booster current

In order to be able to utilise the current of 6 A that the B-6 can provide, even with smaller nominal sizes, a power splitter** can be used. The power splitter distributes the current to 2 to 3 booster sections with 2 to 3 A each.

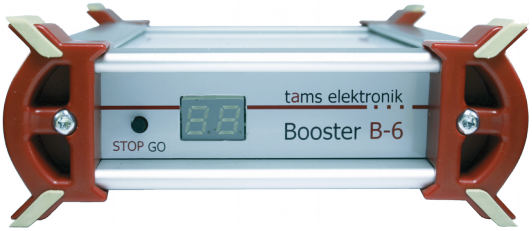
Connecting additional boosters

If the current requirement is higher than the current provided by the B-6, a corresponding number of further boosters must be connected to supply the digital model railway layout.

→ Section 3 "Conception of the digital layout"

Background information: **Rough calculation of the current requirement**	
1 locomotive nominal size N:	600 mA
1 locomotive nominal size H0:	800 mA
1 locomotive nominal size 0:	1,000 mA
Carriage interior lighting:	50 - 200 mA
one other consumer (e.g. sound module):	100 - 300 mA
Reserve for turnouts	10 % of the determined total

2.2. Displays and operation



Display (7-segment display)

The 2-digit 7-segment display shows you essential information, e.g.

- the current power consumption in the booster circuit
- the operating status (e.g. normal operation, stop, short circuit, overheating)
- during programming: the set values

RGB LEDs in the housing

The top of the B-6 is made of translucent plastic. During operation, RGB LEDs built into the housing clearly indicate the operating status of the B-6, e.g.

- "normal operation" (green) or "stop, track power is switched off" (red)
- change to programming mode, send BiDiB Identify signal
- short circuit, overtemperature

STOP-GO button

The button can be used to manually switch the track voltage on or off at the output of the B-6 independently of the connected digital control unit. The button is also used to

- trigger a restart
- identify the B-6 via BiDiB with the PC control software (BiDiB-Identify)

Switching on and off with a DCC turnout command

The track voltage at the output of the B-6 can alternatively be switched on and off via DCC turnout setting commands sent to a turnout address assigned to it.

Autostart function

Activating or deactivating the autostart function determines whether the track voltage at the booster output is automatically switched on as soon as the track signal is present (the control unit is set to "GO") or not.

Even if the autostart function is activated, the track voltage at the booster output is not switched on automatically if it was previously switched off with the STOP-GO button or the booster was switched off due to overheating or by triggering the watchdog.

If the autostart function is inactive, the track voltage must always be switched on (again) by pressing the STOP-GO button.

Configuration

The Booster B-6 can be adapted to individual requirements:

- via BiDiB with PC software that supports BiDiB, or
- via main track programming (POM) according to RailCommunity standard RCN-226 ("DCC protocol | special values for configuration"), which regulates, among other things, the configuration of devices that do not have their own address and whose connection to a programming track is not possible or reasonable. For further information see RailCommunity standard RCN-226 (at: www.railcommunity.org).

2.3. Interfaces of the B-6

Power supply

Only the supplied power supply unit may be used as the power supply for your B-6 and the components of your layout that are supplied by the B-6. Conventional model railway transformers are not suitable as power supply for the B-6.

Track connection

The B-6 provides a regulated, symmetrical track voltage, which is adjusted in 1 V steps to a value between 8 and 22 V. It can thus be optimally used for operation with model railways. It can thus be optimally adapted for operation with layouts of different nominal sizes. On delivery, the track voltage is set to 18 V.

The regulation of the track voltage to a fixed value prevents the driving speeds of the locomotives and the brightness of the illuminations from varying as a result of voltage fluctuations.

→ Background information "Output signal" (next page)

Booster interfaces

The B-6 has two different booster interfaces, which are optionally used for connecting the digital control unit and other boosters:

- DCC-compliant booster interface (3-pole / "CDE"): for connection to the DCC-compliant booster interface of a control unit or the track output of a control unit.
- BiDiB interface (RJ 45): for connection to the BiDiB interface of a BiDiB device with track output function, a BiDiB interface or further BiDiB nodes (e.g. further boosters, stationary decoders, feedback devices).

  → Section 2.6 "Use with BiDiB"

Background information: Output signal

Symmetrical output signal

The output signal is created by constantly reversing the polarity of the transformer voltage according to the specifications of the digital control signal from the central unit. Since the same voltage is always present at the output (alternately positive and negative), the output voltage at the booster output of the B-6 is 100 % symmetrical.

Use of the ABC braking method

This symmetrical output voltage is required for the use of the ABC braking method. The ABC braking method is based on the fact that, deviating from standard operation, asymmetrical voltages are generated at the two conductors in the braking sections.

Galvanic separation ↔ Continuous system ground

In digital layouts, the circuits supplying the tracks and the digital equipment can either be galvanically (i.e. electrically) separated from each other or connected to a common, continuous ground. Establishing a common, continuous ground is prone to errors in practice and therefore unreliable, especially in larger installations.

By using galvanically separated circuits, ground loops ("hum loops") and fault currents, which can cause malfunctions and in the worst case damage to the digital devices, can be reliably prevented.

The inputs and outputs of the B-6 are galvanically separated from each other by optocouplers. This means that there is no electrical connection between the digital control unit and the booster output.

Use with s88 feedback units

If a common system ground is required, e.g. when using the s88 feedback system, the ground connection of the s88 feedbacks must be connected to a rail. Just as with the use of ground-related boosters, it is also crucial with this variant that the ground connection is made to the "correct" rail, i.e. always to the continuous rail.

2.4. Protocols

2.4.1. Digital formats

The Booster B-6 is multi-protocol capable, it can transmit data (via both the DCC compliant and BiDiB interfaces) in the following formats:

- DCC
- Motorola I and II
- m³ and mfx: The B-6 transmits control commands in m³ and mfx format, but no mfx feedback.

DCC-A

The RailCom-based extension of the DCC format according to RailCommunity Norm RCN-218 enables the automatic registration of vehicle decoders with the central unit.

→ RailCommunity standard RCN 218 (at: www.railcommunity.de)

Currently (as of April 2023), the B-6 is not able to forward the automatic registrations of vehicle decoders to the central unit, as the required standard defining the data transmission is still in progress. In a later software version the Booster B-6 will support registrations via DCC-A. The update will be available for download free of charge.

2.4.2. RailCom

RailCom cutout

The Booster B-6 can provide the so-called RailCom-Cutout, which enables the transmission of feedback data in RailCom-monitored sections.

When using the B-6 with central units that send a DCC signal and are not RailCom-capable, the RailCom-Cutout can lead to disturbances in the data transmission. Some older DCC vehicle decoders and some current DCC decoder types (especially from US manufacturers), which are not designed for use with RailCom, do not react correctly to run commands when RailCom cutout is switched on. With non-RailCom-capable DCC sound decoders, the sound reproduction can be disturbed.

Therefore, the B-6 offers the possibility to switch RailCom on or off (RailCom is switched on in the delivery state).

In the case of pure Motorola central units, interference with data transmission through the RailCom cutout is excluded due to the principle.

Integrated global RailCom detector

A global RailCom detector is integrated in the Booster B-6, which receives feedback from decoders in channel 2. According to the RailCom standard, channel 2 is reserved for feedback from decoders to whose address a DCC command was previously sent.

The RailCom feedback messages are forwarded by the B-6 via the BiDi data bus to RailCom display devices or the PC.

→ Section 2.6 "Use with BiDiB"

2.5. Safety devices

2.5.1. Short-circuit switch-off

The B-6 has an internal short-circuit cut-off which automatically sets the booster to "STOP" (i.e. switches off the track voltage at the output) in the event of a short-circuit at the track output. This prevents defects on the booster, the track and the vehicles. The time until the short-circuit switch-off responds (= short-circuit sensitivity) can be set to a value between 20 and 200 milliseconds.

The cut-off current in case of a short circuit (= maximum track current) can be set to a value between 2 and 6 A (in 1 A steps). In order to effectively prevent damage in the event of a short circuit, the cut-off current must not be set too high, especially for smaller nominal sizes. → Section 5 "Recommendations for the settings".

Short-circuit feedback

How the digital control reacts when the maximum current at the track output of the booster is exceeded (e.g. a short circuit) depends on the connection of the booster:

- Connection of the short-circuit feedback line ("CDE") to a digital central unit via the DCC-compliant booster interface: The booster reports the exceeding of the maximum current to the control unit, which switches the complete layout to "STOP". This solution is useful for automated driving, for example.
- Connection to the track output of a central unit or omitting the connection of the short-circuit feedback line: If the maximum current is exceeded, the booster automatically switches off the track voltage for the connected booster circuit. Operation continues in further booster circuits. This solution is suitable for areas with independent operation, e.g. in the depot.
- Connection to a BiDiB PC interface (separate or integrated in the digital control unit): Based on the status messages and operating values sent by the B-6 via the BiDi bus, the PC control takes over the complete booster management.
- Connection to a digital central unit via the BiDiB interface without integration in a BiDiB control: The digital central unit can react on receipt of a short-circuit message via the BiDi bus, provided it supports this function and is configured accordingly. → Manual of the digital central unit.

Automatic restart after a short circuit

If the digital control unit cannot receive a short-circuit feedback or is configured to ignore this message, the Booster B-6 automatically switches the track signal at the output back on ("GO") after 4 to 10 seconds have elapsed following a short-circuit. If the short circuit is still present, it switches the track signal off again immediately.

In the delivery state, the automatic switch-on is interrupted for one minute after the booster has switched itself on and off again five times. This restart time after 5 short circuits can be individually adjusted to a value between 0 and 90 seconds.

Inrush time

The sum of the charging currents of buffer capacitors on vehicle decoders (especially sound decoders) and additional external backup capacitors can become so high when the layout is switched on that the short-circuit disconnection of the booster reacts immediately. This makes it difficult to start up the layout when the short-circuit cut-off is active.

The B-6 can accept an increased current of 6 A for a short time (adjustable up to max. 500 ms) after switching on, regardless of the set cut-off current, and tolerates the brief collapse of the voltage. This time is sufficient to charge buffer capacitors and backup electrolytic capacitors. Only if the current does not drop again after the set time and the voltage does not rise again, the short-circuit switch-off of the B-6 reacts (because then a "real" short-circuit can be assumed).

Further information on inrush current: RailCommunity standard RCN 530 (at: www.railcommunity.de).

2.5.2. Switching off in case of overtemperature

In case of overheating, the booster automatically switches off the track voltage for safety reasons. Possible causes:

- obstruction of air exchange
- very high ambient temperature or direct solar radiation with simultaneous high load.

2.5.3. Watchdog function

The watchdog is used in PC-controlled layouts to check whether the digital signals are transmitted in a booster circuit. For this purpose, the central unit (controlled by the PC software) sends a DCC turnout setting command to a turnout address assigned to the B-6 at intervals of max. 5 seconds. As soon as the B-6 no longer receives these commands, it automatically switches off the track voltage.

After switching on the B-6, the watchdog function is initially inactive. It is activated by sending an adjustment command to the assigned turnout address. This makes it possible to control the layout without PC control without deactivating the watchdog function.

2.6. Use with BiDiB

The Booster B-6 is in the sense of the BiDiB specification a device of the class "Booster" with the additional specification "BiDi-(RailCom-)Detector".

2.6.1. Features

According to the BiDiB specification, data can be sent to and from the B-6 via the BiDi bus.

Setting options

On the PC, all settings for the B-6 can be made, e.g.:

- output voltage
- RailCom cutout on/off
- maximum output current
- reconnection time after a short circuit

In addition, an update can be carried out via the software.

Status messages and reporting of operating values

During operation, the B-6 sends its current operating status, including information about the cause of the current status, as well as its current operating values to the PC via BiDiB, e.g.

- track voltage at the booster output is switched on ("GO")
- track voltage at the booster output is switched off, e.g. due to short circuit, overtemperature, missing mains voltage ("STOP")
- actual current consumption
- actual voltage at track output
- current operating temperature

These messages can be evaluated by the PC control software and serve as a basis for booster management.

Integrated RailCom detector

The integrated global RailCom detector sends the RailCom messages from the connected booster circuit to the PC via BiDiB:

- vehicle addresses
- CV responses of the vehicle decoders
- dynamic information, i.e. CV contents that change during operation: e.g. real speed, reception statistics, tank contents

2.6.2. Possible applications

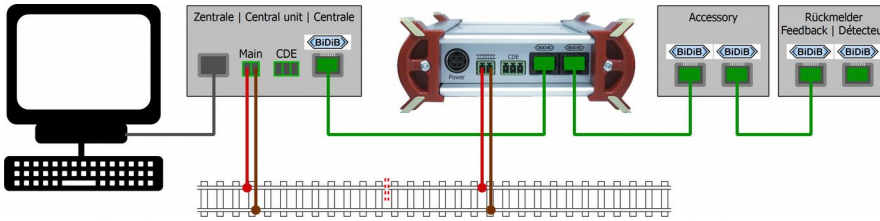
The Booster B-6 can be operated together with up to 31 other nodes on one level. It can be used together with different types of so-called track output devices in the BiDi bus:

- Digital central units with integrated BiDiB-PC interface (e.g. MasterControl 2**).
- Digital central units without BiDiB interface (e.g. MasterControl**, RedBox**) in combination with BiDiB PC interfaces (e.g. ZEUS**)

In both variants, all settings for the B-6 can be made on the PC with the help of software that supports BiDiB. The B-6 sends its status messages and operating values as well as the RailCom messages to the PC via the BiDi bus. These messages serve as the basis for the booster management of the control software, which, for example, ensures that the booster is switched off in the event of a short circuit or overtemperature.

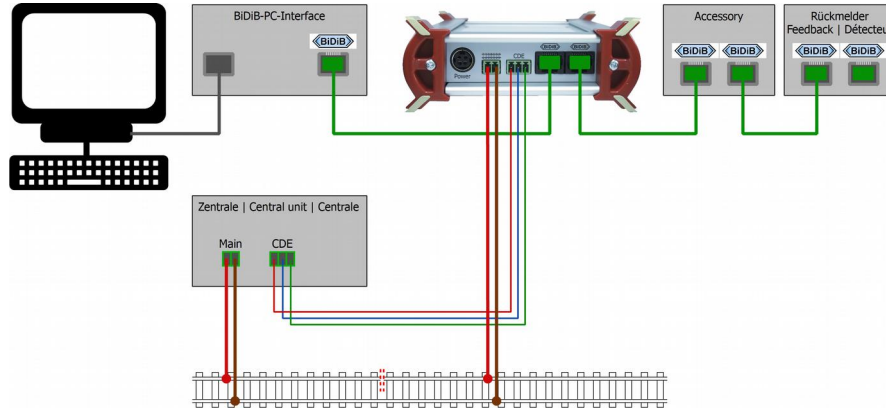
With digital central units with integrated BiDiB PC interface

The DCC track signals are sent to the B-6 via the BiDi bus. Vehicle decoders and conventional accessory decoders that are not designed for BiDiB receive their digital commands via the rails in the connected booster circuit.



With digital central units without BiDiB interface

The DCC track signals are sent to the B-6 via the DCC-compliant ("CDE") booster interface. Status messages and operating values of the B-6 as well as the RailCom messages are sent from the B-6 to the PC via the BiDiB PC interface and are available there as a basis for the booster management of the control software.



2.6.3. Wiring

In accordance with the BiDiBus specification, patch cables with RJ 45 connectors (Cat5 cables) are provided as bus cables for the B-6 booster. 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 plug).

2.6.4. Assignment in the BiDiBus system (addressing)

According to the BiDiB specification, the assignment of the booster B-6 in a BiDi bus system is automatic. As a basis for the automatic assignment, a unique number, the Unique-ID, is programmed into the B-6 by the manufacturer. When the BiDiB system is switched on, the interface searches for the existing nodes within its structure, creating a list of available nodes, their Unique ID and a local address valid for this session.

If a new node is connected to the bus, the list of available nodes is automatically expanded and the interface sends a corresponding message to the PC.

The Booster B-6 has a so-called "Identify button" according to the BiDiB specification. After pressing the button, the booster is highlighted in the screen display of the nodes and the RGB LEDs under the top cover flash.

3. Conception of the digital layout

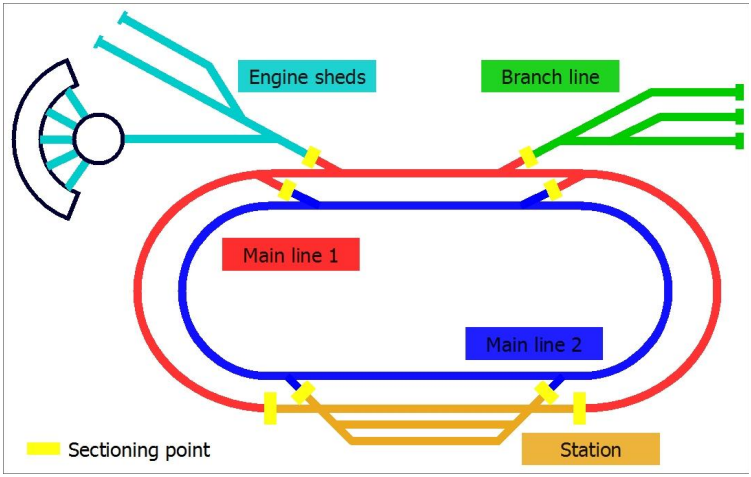
3.1. Dividing the layout

Divide your layout into individual, electrically separate sections (booster circuits), each supplied with its own booster. A maximum of three to five locomotives should run in each booster circuit at the same time. The following subdivisions are useful:

- station
- depot
- main line (if necessary in several sections)
- secondary line (if necessary in several sections)

Arrange the transitions between the booster circuits in such a way that

- they are crossed as little as possible
- in operation, never more than one crossing point between two booster circuits can be bridged by a (long) train (i.e. not two crossing points between three booster circuits).



Background information: Short circuit of the booster outputs

As soon as a vehicle bridges the separation point between two booster circuits, the track outputs of the two associated boosters are connected to each other. If this connection is only for a short time, the risk of this damaging the boosters is low. The situation is different if the vehicle stops at the separation point. If in this case the short-circuit disconnection does not react or reacts too late, the track outputs of the boosters can be damaged.

The risk of damage to the boosters increases significantly if a train is so long (or the separation points between several booster circuits are arranged so close together) that it connects more than two booster circuits and thus more than two boosters with each other when passing over them.

Cut the transitions between the booster circuits as follows:

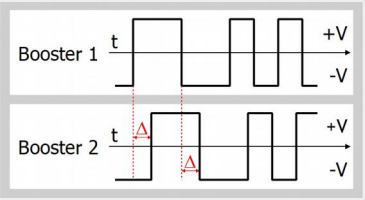
- For 2-conductor layouts: one rail. Make sure that you cut the same rail ("left" or "right") in all booster circuits. In larger, unclear systems, it is recommended to cut both rails.
- In centre-conductor layouts: the centre conductor.

3.2. Supply with several boosters

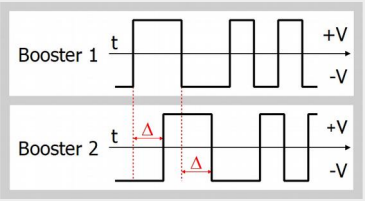
If possible, a layout should be supplied by identical boosters from the same manufacturer. If necessary, ask the manufacturer whether and, if so, which booster models can be combined with each other. Different booster models can be used on one layout if they are used for completely separate parts of the layout (e.g. standard gauge line and narrow gauge line) or separately for the tasks "switching" and "driving".

If boosters are connected to a central unit or a small digital control unit via the track output, the integrated and external boosters should generally not be used together to supply the layout with traction current. The booster integrated in the central unit can be used sensibly for switching the accessory decoders in its own booster circuit.

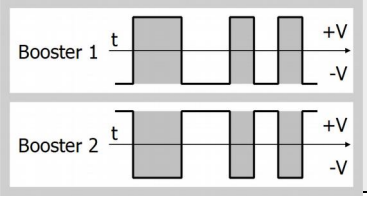
Background information: Track signals



The digital track signals that the boosters receive from the central unit need a certain amount of time to be processed and to get from the data input to the track output. This processing time is different for each booster due to its design. Even for boosters of the same design it differs due to component and manufacturing tolerances. A slight time shift of the voltage characteristics is therefore the normal state.



The more different the run-through time of the signals in the two boosters, the greater the time shift of the voltage curves. This can go so far that a positive voltage is already present at the output of one booster and a negative voltage is still present at the next booster, which is controlled by the same central unit.



If the two booster circuits are connected to the booster outputs with different polarity, opposite voltages will be present. If the isolating points between the booster circuits are bridged, the track voltage is twice the set maximum track voltage.

Equalising currents and double track voltage

When crossing the separation points, equalising currents occur between the (briefly differently polarised) booster circuits, even when using identical boosters from the same manufacturer. These currents are harmless for rails and vehicles and do not affect the operation.

The more different the voltage curve is in the two booster circuits, the higher the equalising currents are. High equalising currents can cause short circuits on boosters, rails, wheels and sliders.

In addition, the applied track voltage always doubles when opposite voltages are applied in the two booster circuits. The longer opposite voltages are present, the more serious the consequences.

The possible consequences of short circuits and doubled track voltages:

- damage to wheels, sliders and rails
- damage to the track outputs of the boosters involved

"Data salad"

Due to a shift in the voltage curves in the two booster circuits, the vehicle decoders receive information that differs from each other and may interpret it incorrectly. This can lead to the following phenomena, for example:

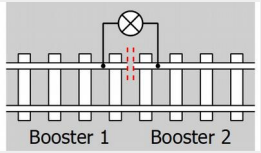
- Locomotive decoders understand the signal as an impulse to switch to analogue mode. However, since the locomotives are on the digital track, they race off at top speed.
- Locomotive decoders read out a run command for their address from the faulty data signal and set locomotives in motion as if by magic.
- Functions such as lighting or sound are switched on or off without the corresponding switching commands having been entered at the central unit.

The differences in the throughput time of the data are particularly large when the layout is jointly supplied with traction current by the booster integrated in the central unit and external boosters connected via the track output.

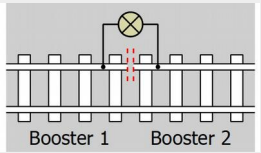
Tip: Detecting equalising currents

The question of whether or not dangerous equalising currents occur at a booster separation point can be detected relatively easily with the help of a model railway incandescent lamp connected to the rails or the centre conductors across the separation point.

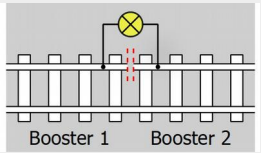
Note: For the test, use an incandescent lamp whose maximum voltage corresponds approximately to the set maximum track voltage. Suitable are e.g. bulbs with integrated cables or wire ends. LEDs are not suitable for this test!



Ideally, the lamp does not light up or only lights up very weakly. This case occurs when a power splitter** is used that distributes the output current of a booster to 2 or 3 booster sections or when using identical boosters from one manufacturer whose component and manufacturing tolerances are very small.

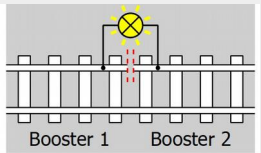


With well-matched, properly connected boosters, the lamp glows a little. When passing over the separation points, no damage to vehicles, tracks or boosters and no problems due to faulty data transmission are to be expected.



If the lamp glows visibly, it is not recommended to start operation. The two boosters should be checked in any case:

- Is the same output voltage set for both boosters?
- Is the RailCom gap switched on for the boosters? If yes, the test should be repeated with the RailCom switched off. If the lamp then only glows, operation with RailCom switched on can be started without hesitation.
- Boosters of different types / from different manufacturers may not fit together. It is advisable to check with the manufacturer.
- One of the two boosters is defective. A check by the manufacturer is recommended.

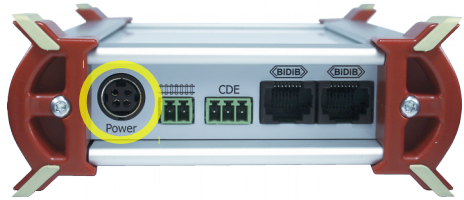


If the lamp lights up brightly, the start of operation can have fatal consequences for vehicles, tracks and the connected boosters! Either the two boosters are connected to the rail / centre conductor with different polarity or the two boosters do not fit together and should therefore not be used together.

4. Connections

4.1. Connection to the power supply

Note:
Only use the supplied power supply unit as power supply for your B-6 and the components of your layout that are supplied by the B-6.



Insert the 4-pin appliance plug of the power supply connection cable into the "Power" socket on the rear of the B-6, with the flat part of the plug pointing upwards.

Note:
Some versions of the power supply unit have a locking device on the unit plug that prevents the power supply unit connection cable from being pulled out accidentally. To be able to pull out the cable, you must pull the catch in the direction of the cable. Never pull the cable out of the socket by force! Doing so may damage connections in your booster.

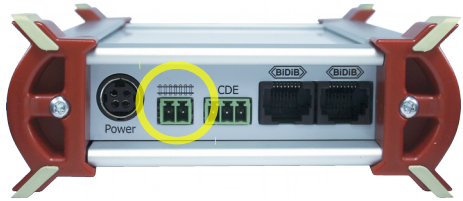
Then plug the supplied (black) mains cable into the connection socket of the power supply unit and into the mains socket.

4.2. Connecting to the track

Connect the track output of the booster

- with the two rails (for 2-conductor layouts) or
- with one rail and the centre conductor (with centre-conductor layouts).

Feeding the booster current into the track should be done at a distance of approx. 2 to 3 m from a ring line, as the resistances at the transitions of the track sections are quite high. If the distances are chosen too large, there may be problems with the short-circuit feedback or with the power supply to the vehicles.



Use the supplied 2-pin plug section to connect the cables leading to the track. Insert the connecting cables into the plug part, screw them tight and then plug the plug part onto the socket on the back of the booster with the screws facing upwards.

Cable cross-sections

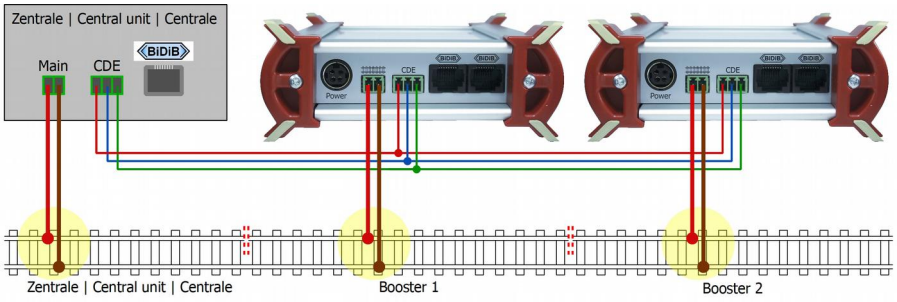
For the connection to the rails, use a cable with a cross-section sufficient for the load (recommended cross-section: > 0.75 to 1.5 mm²).

> **Please note:**
> If the cross-section is too small, the overcurrent/short-circuit cut-off will not function reliably and the cable may become very warm. **Fire hazard!**

Assignment of the poles of the track connection to the rails

The assignment of the poles of the siding to the two rails (or the rail and the centre conductor) is initially arbitrary. However, this does not apply if you have already connected a booster to the layout. In this case you must ensure that all booster circuits have identical polarity!

> **Please note:**
> If the polarity of the two booster circuits is different, considerable disturbances in the data transmission and damage to the vehicles, rails and the track outputs of the boosters can occur when crossing the separation points!



4.3. Connection to the digital central unit

You can use

- either the BiDiB interface (variant 1)
- or the DCC-compliant interface (version 2)

for the connection of the B-6 to the central unit.

Preferred connection variant: BiDiB interface

If you use a digital control unit with BiDiB interface (e.g. MasterControl 2**), it is recommended to use the BiDiB interface of the B-6 for the connection to the control unit. This also applies if BiDiB is not used for the system control. The connection of the two devices via a patch cable is easier to establish and permanently safer compared to the connection via the DCC-compliant interface.

4.3.1. Connection variant 1: BiDiB interface (RJ 45)

Connect one of the two BiDiB sockets of the B-6 to the BiDiB interface of your control unit via a RJ 45 cable. The two RJ 45 sockets of the BiDiB interface are connected in parallel, so you can use any socket.

Note:

RJ 45 connectors are also used for other data buses. Make sure that you plug the RJ 45 cable for connection to the BiDiB interface of the B-6 only into the BiDiB interface of your central unit. If you plug the cable into an RJ 45 socket for another data bus, serious damage may occur to one or both units.

Tip: To avoid confusion between different RJ 45 connections, it is recommended to use different coloured cables for the different bus lines, e.g. green for the BiDi bus, blue for the s88 bus, red for the data bus of the digital control.

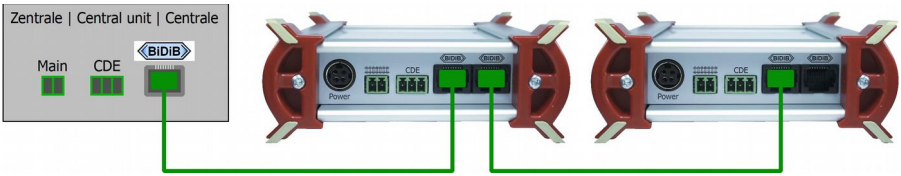
Evaluation of short-circuit feedback signals

The B-6 sends a corresponding message via the BiDi bus in case of an overload at the track output (e.g. in case of a short circuit). The digital control can react to this and e.g. switch off the track voltage for the entire installation.

If the layout is controlled via PC with software that supports BiDiB, the software takes over the so-called booster management. If the B-6 is only connected to the digital control unit via the BiDiB interface, the digital control unit can react to short-circuit messages sent via the BiDi bus. The prerequisite is that the central unit supports this function and is configured accordingly (→ instructions for your digital central unit).

Connection of further boosters (BiDiB)

The remaining RJ 45 socket is available for the connection of further BiDiB components (e.g. additional booster, stationary decoder, feedback unit). For the connection of additional boosters, also use the BiDiB interface and not the DCC-compliant ("CDE") interface of the B-6. The BiDiB and the DCC-compliant interface of the B-6 are not internally connected to each other.



⚠ When selecting additional boosters, be sure to observe the notes and background information in section 3 "Conception of the digital layout"!

Installing the B-6 at the end of the BiDi bus line

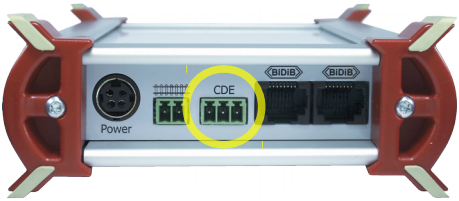
If you only connect one B-6 to the central unit via a patch cable with a length of up to 5 m via BiDiB, you do not need a terminating resistor.

In a BiDiB-controlled system, the B-6 booster should not be installed at the end of a BiDi bus line, if possible, because setting a terminating resistor for the B-6 is comparatively complex compared to other BiDiB devices (stationary decoders, feedback devices). If it is not possible to avoid installing the B-6 at the end of the bus line and then problems with data transmission occur during operation, please contact our Technical Hotline. In this case, there is no risk of damage to the units connected to the bus line.

4.3.2. Connection variant 2: DCC-compliant interface ("CDE")

Via the "CDE" booster connection you can connect the B-6 to

- the DCC-compliant booster connection of the control unit ("CDE") or
- if the control unit has no DCC booster output: to the track output of the control unit (only connections C and D).



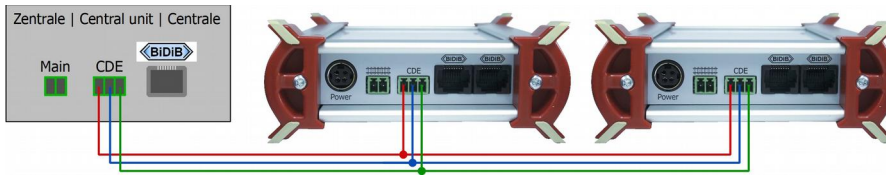
To connect the cables to the booster, use the enclosed 3-pin connector in which the cables are screwed tight.

Make sure that the pin assignment of the central unit's booster interface and the booster connector match.

If the booster is to be switched off by the central unit in the event of a short circuit, connect the short-circuit feedback. If the short-circuit feedback line is not connected, the booster switches off automatically in the event of a short circuit and switches on again automatically after the set time.

Connection of further boosters ("CDE")

To connect additional boosters, also use the DCC-compliant ("CDE") interface of the B-6 and not the BiDiB interface. The BiDiB and the DCC-compliant interface of the B-6 are not internally connected to each other.



⚠ When selecting additional boosters, be sure to observe the notes and background information in section 3 "Conception of the digital layout"!

4.4. Connection to a BiDiB-PC interface without track output function

Via the BiDiB-PC interface the B-6 is integrated into the BiDiB control system and the booster management of the control software can be used for the B-6 (→ section 2.6 "Use with BiDiB").

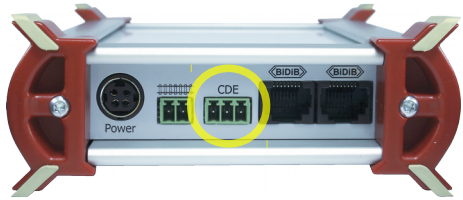
Connect one of the two BiDiB sockets of the B-6 to the BiDiB PC interface via an RJ 45 cable. The two RJ 45 sockets of the BiDiB interface are connected in parallel, so you can use any socket.

Connecting further boosters

The remaining socket is available for connecting further BiDiB components (e.g. additional boosters, stationary decoders, feedback devices). When connecting additional boosters, also use the BiDiB interface and not the DCC-compliant ("CDE") interface of the B-6. The BiDiB and the DCC-compliant interface of the B-6 are not internally connected to each other.

Connection to the digital control unit

If the B-6 is only connected to a BiDiB PC interface without track output function via the BiDi bus, no track signal is present at the BiDiB interface of the B-6. In this constellation, you must therefore additionally connect the B-6 to a digital control unit via the DCC-compliant booster interface (→ section 2.6 "Use with BiDiB").



To connect the cables to the booster, use the enclosed 3-pin connector in which the cables are screwed tight.

5. Settings / Configuration

The Booster B-6 can be adapted to individual requirements:

- via BiDiB with PC software or
- via main track programming (POM) according to RailCommunity standard RCN-226 ("DCC protocol | Special values for configuration"), which regulates, among other things, the configuration of devices that do not have their own address and whose connection to a programming track is not possible or reasonable. For further information, see RailCommunity standard RCN-226 (at: www.railcommunity.org).

5.1. Programming via BiDiB

As soon as the Booster B-6 is connected to a BiDiB controlled and monitored layout, it is automatically integrated into the PC layout control. By aid of the PC control software or (if not possible with this) special auxiliary programs (e.g. BiDiB-Monitor or BiDiB-Wizard) the booster-specific configuration variables (CVs) and the BiDiB feature settings are programmed. A software update of the Booster B-6 is also possible via BiDiB.

5.2. Main track programming (POM)

You can adapt the booster to individual requirements via main track programming (POM). With control units that do not support this programming mode, the factory (default) settings cannot be changed.

Switching to programming mode

To be able to program the B-6, it must be connected to a BiDiB connection or the DCC booster connection of the digital control unit and the control unit must be set to "GO". To start the programming mode of the B-6, enter the value "62" for CV 7 of any DCC vehicle decoder address on your digital control unit.

Proceed as described in the instructions for your control unit. This entry has no effect on a decoder with the address in question, as no entry is possible for CV 7 of vehicle decoders (= version).

After you have started the programming mode (entered the value "62" for CV 7), the RGB LEDs under the translucent housing cover flash. Depending on the operating state of the booster ("stop" or "go"), the LEDs flash red or green. You can now change the settings of the booster by selecting CV 7 again and entering a value from the table below for it.

If no value is entered for CV 7 within 30 seconds after starting the programming mode, the programming of the booster is automatically aborted (the RGB LEDs stop flashing). After a value has been entered, the programming mode is automatically terminated. If you want to change further values, you must restart the programming mode by entering the value "62" for CV 7.

Function	Input value for CV 7	Setting / Comment	Display
Start programming mode	62	To change settings, you must enter a value for CV 7 again within 30 seconds. Otherwise, the programming mode is automatically terminated.	
Reset	7	To reset all settings to the default values (= values at delivery). → The RGB LEDs light up purple.	rE
Track voltage Default value: 18 V → Section 5.3 "Recommendations for the settings"	8	8 V	08
	9	9 V	09
	10 … 21	11 … 21 V	10 … 21
	22	22 V	22
Restart time after short circuit Default value: 4 seconds	34	4 sec.	t4
	35	5 sec.	t5
	36 … 39	6 … 9 sec.	t6 … t9
	40	10 sec.	t1
Maximum track current (Switch-off current in case of short circuit) Default value: 4 A → Section 5.3 "Recommendations for the settings".	42	2 A	2A
	43	3 A	3A
	44 … 46	4 A … 6 A	4A … 6A
RailCom Default value: active	51	RailCom active	r1
	52	RailCom inactive	r0
Switching on and off with DCC turnout command Default value: –- / inactive	73	→ The RGB LEDs flash blue. Switch to switch turnouts on your digital control. Set the desired turnout address and enter a turnout setting command for this address ("straight ahead" for "GO" or "branch" for "STOP"). The turnout address and operating state are now set.	

Function	Input value for CV 7	Setting / Comment	Display
Switching the watchdog on and off with DCC turnout command Default value: –– / inactive	76	→ The RGB LEDs flash white. Switch to switch turnouts on your digital control. Set the desired turnout address and enter a turnout setting command for this address ("straight ahead" for "active" or "branch" for "inactive"). The turnout address and operating status are now set.	
Autostart Default value: active	80	Autostart active	S1
	81	Autostart inactive	S0
Brightness of the RGB LEDs Default value: 3	90	1 = minimum brightness	1
	91 … 97	2 … 8	2
	98	9 = maximum brightness	9
Restart time after 5 short-circuits Default value: 60 seconds	100	0 sec.	00
	101	10 sec.	10
	102	20 sec.	20
	103 … 108	30 ... 80 sec.	30 … 80
	109	90 sec.	90
Time until the short-circuit switch-off responds (Short-circuit sensitivity) Default value: 100 ms	110	20 ms	02
	111	40 ms	04
	112	60 ms	06
	113 … 118	80 … 180 ms	08 … 18
	119	200 ms	20
Max. duration of inrush current ("Inrush time") Default value: 500 ms	120	50 ms	05
	121	100 ms	10
	122	150 ms	15
	123 … 128	200 … 450 ms	20 … 45
	129	500 ms	50

Recommendations for the settings

Track voltage

Locomotive motors are - depending on the nominal size - designed for operation with a certain track voltage. If they are driven with a track voltage significantly higher than the recommended one, the motors will be more heavily loaded and the carbons more worn, HF interference and brush fires will be increased.

Locomotive decoders are usually designed for a maximum track voltage of 24 V, some mini decoders only for a track voltage of 18 V. A slight exceeding of the maximum permissible voltage by 1 to 2 V usually does not cause damage to the locomotive decoder, but in any case leads to significant heating. In case of an unfavourable installation situation with poor heat dissipation, damage to the adjacent plastic parts of the locomotive can be the (undesirable) consequence.

Nominal size	Z	N and TT	H0	0, I and II
Recommended track voltage	12 V	14 V	18 V = default setting	20 - 24 V

Maximum track current (cut-off current in case of short circuit)

The idea of using the current of 6 A, which the Booster B-6 can provide, to supply large sections or even the complete layout is obvious. This solution, which at first glance appears to be cost-effective, promises minimised installation effort and avoids problems that can arise when crossing separation points between booster circuits. This idea has only one decisive catch: in order to be able to utilise the high output current of the booster, the cut-off current, when reached, the layout is switched off for safety reasons (e.g. in case of a short circuit) is also increased.

The smaller the nominal size (and the more filigree rails or vehicle parts such as wheel sliders are), the lower the cut-off current must be..

Nominal size	Z and N	TT and H0	0, I and II
Recommended maximum track current	2 A	3 A	$\geq$ 4 A 4 A = default setting

Tip: Utilise the total booster current with smaller nominal sizes

With smaller nominal sizes, the current in the booster circuit is limited to 2 to 3 A in order to protect rails and vehicles from damage in the event of a short circuit. By using a power splitter**, the entire output current of the booster B-6 can be utilised even with smaller nominal sizes. The power splitter is connected between the booster's track output and the tracks and splits the booster's power into two or three sections with a maximum current of either 2 or 3 A.

6. Operation

6.1. Operating and display elements

The Booster B-6 has a button with which you can trigger the following functions:

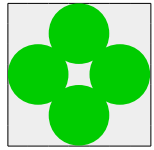
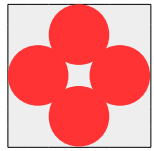
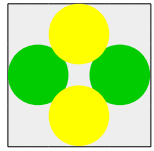
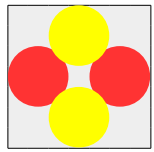
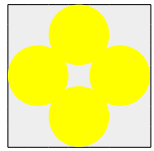
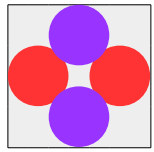
- switch the track voltage on and off independently of the control unit
- trigger a reset
- identify the B-6 via BiDiB with the PC control software (BiDiB-Identify)

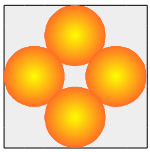
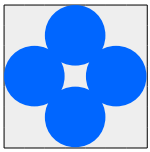
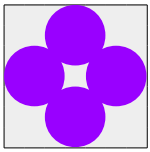
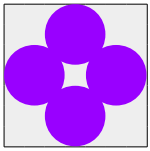
The display on the front provides you with essential information during programming and operation. In addition, the RGB LEDs built into the housing change colour, indicating the operating status visibly from a distance.

6.1.1. Functions of the STOP-GO button

Function	**Duration**	**Display**	**Colour of the RGB LEDs**
Switch **on** track voltage	press briefly	0.0 | current power consumption	**green**
Switch **off** track voltage	press briefly	St.	**red**
Send BiDiB-Identify for the B-6 (→ identification with the PC control software)	press and hold until the RGB LEDs flash blue. To stop sending the signal, press the button again until the RGB LEDs light up green or red again.		**blue flashing**
Perform reset (restart **without** resetting all settings to the default values)	press and hold until the blue flashing of the RGB LEDs changes to a violet rise and fall. After the reset, the B-6 automatically switches back to standard operation.	rE	**blue flashing + violet rising and falling**

6.1.2. Display and RGB-LEDs

<table>
<tr><th>Display</th><th>Colour
of the RGB LEDs</th><th>Meaning</th></tr>
<tr><td>0.0 to 6.0</td><td>  </td><td>GO | present current consumption [A]<table>
<tr><td>Booster</td><td>GO</td><td>Track voltage at booster output is switched on.</td></tr>
<tr><td>Central unit</td><td>GO</td><td>A valid input signal is present at the booster input.</td></tr>
</table></td></tr>
<tr><td>St.</td><td>  </td><td>STOP<table>
<tr><td>Booster</td><td>STOP</td><td>Track voltage at booster output is switched off.</td></tr>
<tr><td>Central unit</td><td>GO</td><td>A valid input signal is present at the booster input.</td></tr>
</table></td></tr>
<tr><td>--</td><td>  </td><td><table>
<tr><td>Booster</td><td>GO</td><td>Track voltage at the booster output is to be switched on.</td></tr>
<tr><td>Central unit</td><td>STOP</td><td>There is no valid input signal at the booster input.</td></tr>
</table></td></tr>
<tr><td>--</td><td>  </td><td><table>
<tr><td>Booster</td><td>STOP</td><td>Track voltage at the booster output is switched off.</td></tr>
<tr><td>Central unit</td><td>STOP</td><td>There is no valid input signal at the booster input.</td></tr>
</table></td></tr>
<tr><td>--</td><td>  </td><td>A valid input signal is present (= control unit is set to "GO"). However, the autostart function is inactive (→ section 6.3.2 "Autostart function"), therefore the track voltage at the booster output cannot be switched on automatically. Switch on the track voltage manually with the STOP-GO button.</td></tr>
<tr><td>Sh.</td><td>  </td><td>red-violet flashing: "Short Circuit" / short circuit during operation
Eliminate the cause of the short circuit. If the short circuit occurs repeatedly at the same point in the layout, you may have to make changes to the layout or increase the short circuit sensitivity (= time until the short circuit cut-off responds).</td></tr>
</table>

Display	Colour of the RGB LEDs	Meaning
ot.		**orange-red flickering:** "Overtemperature" / overheating **Immediately** disconnect the booster from the power supply. Eliminate the cause of the overheating (obstruction of air exchange, very high ambient temperature or direct sunlight). As soon as the booster has cooled down, you can put it back into operation.
--		**blue flashing:** BiDiB-Identify The B-6 reports to the PC control software via BiDiB (BiDiB-Identify). To stop sending the signal, press the button again until the RGB LEDs light up green or red again.
rE		**violet rising and falling:** Reset After the reset, the B-6 automatically switches back to standard operation.
| || | alternating with – –		Update The B-6 automatically switches back to standard operation after the update.

Adjusting the Brightness of the RGB LEDs

You can adjust the brightness of the RGB LEDs:

→ section 5.2 "Main track programming", input values for CV 7: 90 ... 98 (90 = minimum brightness | 98 = maximum brightness)

6.2. Activating the Watchdog

When delivered, the Booster B-6 is not assigned a turnout address for switching the watchdog on and off. To be able to use the function, you must therefore first assign a turnout address to the B-6.

→ Section 5.2 "Main track programming", input value for CV 7: 76

To activate and deactivate the watchdog, send a turnout setting command to the turnout address you have assigned to the booster for this function.

- Turnout "straight ahead": Watchdog active
- Turnout "branch": Watchdog inactive

After switching on the booster, the watchdog function is initially inactive. This gives you the option of controlling the layout without PC control without first deactivating the watchdog function. To activate the function, you must therefore first send the control command "Turnout straight ahead" to the assigned turnout address after switching on.

6.3. Switching the track voltage on and off

6.3.1. 6.3.1 Manual switching on and off of the track voltage

STOP-GO button

By briefly pressing the button, you switch the track voltage on or off at the output of the booster. The display and the RGB LEDs indicate the operating status of the B-6 and the digital control unit (→ section 6.1.2 "Display and RGB LEDs").

Turnout setting commands

Provided that the function "Switching on and off with a DCC turnout command" is activated (→ section 5.2 "Main track programming", input value for CV 7: 73), you can switch the track voltage on and off at the output of the booster with a DCC turnout setting command. Send the command to the turnout address you have assigned to the booster for this function.

- Turnout "straight ahead": track voltage on
- Turnout "branch": track voltage off

6.3.2. Autostart function

→ section 5.2 "Main track programming", input values for CV 7:
80 = Autostart active | 81 = Autostart inactive

When the autostart function is active, the track voltage at the booster output is automatically switched on as soon as the track signal is present (the control unit is set to "GO") and the track voltage at the booster output has not been switched off with the STOP-GO button before. If, on the other hand, the track voltage at the booster output was switched off with a switch setting command, it is automatically switched on again when a track signal is present.

The autostart function does not take effect if the booster has been switched off due to overheating or by triggering the watchdog.

If the autostart function is set to inactive, the automatic switching on of the track voltage at the output of the B-6 is prevented (e.g. after manually setting the control unit to "GO" or after eliminating a short circuit on the layout). In this case, the RGB LEDs light up yellow (→ section

6.1.2 "Display and RGB LEDs"). The track voltage must then always be switched on by pressing the STOP-GO button (several times if necessary).

6.3.3. Automatic switching off of the track voltage

The Booster B-6 automatically switches off the track voltage at the output in the following cases in order to prevent damage to the booster, connected digital devices, vehicles and/or tracks:

Short circuit on the tracks

The internal short-circuit cut-off ensures that in the event of a short-circuit on the tracks, the track voltage is automatically switched off at the track output. The short circuit is indicated by:

- Display: Sh.
- RGB LEDs: flashing of the LEDs in violet and red.

If the short circuit is eliminated within the set time, the booster automatically switches the voltage on the track output back on.

You have the following setting options (→ section 5.2 "Main track programming"):

- Restart time after short circuit: 4 ... 10 seconds (input values for CV 7: 34 ... 40).
- Maximum track current (cut-off current in case of short circuit): 2 ... 6 A (input values for CV 7: 42 ... 46). To effectively prevent damage in the event of a short circuit, the short-circuit sensitivity must not be set too high (→ section 5 "Recommendations for settings").
- Restart time after 5 times short circuit: 0 ... 90 seconds (input values for CV 7: 100 ... 109).
- Time until the short-circuit cut-off responds: 20 ... 200 ms (input values for CV 7: 110 ... 119)

If the short-circuit feedback line is connected, the B-6 sends a short-circuit feedback to the DCC control unit, which switches off the track voltage at the output of the booster (and possibly other boosters) in case of a short-circuit.

Overheating of the booster ("excess temperature")

The booster can overheat if it cannot dissipate the heat generated during operation to the environment. Therefore, keep a distance of at least 20 cm between the side surfaces, the top and the rear sides to surrounding surfaces. Also ensure that the booster is not exposed to very high ambient temperatures or direct sunlight.

Triggering the watchdog

When the watchdog is activated, the central unit (usually controlled by PC software) sends a DCC turnout setting command to a turnout address assigned to the B-6 at intervals of approx. 5 seconds. As soon as the booster no longer receives these commands, it automatically switches off the track voltage.

6.4. Reset

Restart

You can trigger a restart of the booster with the STOP-GO button (→ section 6.1.2 "Display and RGB LEDs"). Keep the STOP-GO button pressed until the blue flashing of the RGB LEDs changes to a violet rise and fall and "rE" is shown in the display. After the reset, the B-6 automatically switches back to standard operation.

Reset with resetting the default values

To reset all CV settings to the factory settings (default values), you must perform a reset with the main track programming (POM) (→ section 5.2, input value for CV 7: 7).

6.5. Driving operation

Make sure that locomotives or trains do not bridge separating points between two booster circuits for a longer period of time. This will connect the outputs of the two associated boosters and the boosters may be damaged. A short-circuit message is usually not given in this situation.

6.6. Operation with BiDiB

If you use the B-6 booster together with a digital control unit with integrated BiDiB interface or a special BiDiB interface, you can use the corresponding PC control software to

- set the configuration variables of the B-6
- control and monitor the B-6
- perform a software update on the B-6

BiDiB-Identify

By pressing and holding the button on the B-6, you identify the booster to the PC control software ("BiDiB-Identify").

→ Section 6.1.1 "Functions of the STOP-GO button".

Installing the B-6 at the end of the BiDi bus line

For the BiDiB device installed at the end of the BiDi bus line (i.e. from which only an RJ 45 cable runs), a terminating resistor must be set. Otherwise, interference in the data transmission may occur due to the deformation of the electrical signal.

If you have subsequently connected further devices to the BiDi bus line, the terminating resistor must be removed from the device that was previously installed last in the bus line. Otherwise, data transmission may break down.

There is no risk that devices connected to the bus line will be damaged by a missing or incorrectly set terminating resistor.

If possible, the B-6 booster should not be installed at the end of a BiDi bus line in a BiDiB-controlled system, as setting a terminating resistor for the B-6 is comparatively complex compared to other BiDiB devices (stationary decoders, feedback devices). If it is not possible to avoid installing the B-6 at the end of the bus line and problems with data transmission occur during operation, please contact our Technical Hotline.

7. Update

In order to adapt the booster to new developments, a software update can be carried out for the B-6 via BiDiB.

Required accessories

You will need a BiDiB interface (e.g. ZEUS) or a digital control unit with integrated BiDiB interface (e.g. mc²) as well as PC control software that supports BiDiB and the update function. Alternatively, free BiDiB add-on programs are available with which updates can be carried out (e.g. BiDiB Monitor or BiDiB Wizard).

Carrying out an update

Switch off the track voltage (B-6 to "STOP").

Start the corresponding programme item and follow the instructions.

While the update is being executed, the RGB LEDs light up in violet and the displays change: | || and - -

The B-6 automatically switches back to standard operation after the update. The CV settings are reset to the factory settings during the update.

Problems during an update

In rare cases, the update may not complete correctly and the B-6 may not return to standard operation. In this case, the complete software of the B-6 must be deleted and reloaded.

If the update with the BiDiB Wizard software fails, the boot loader is started automatically. If you use another software that does not start the bootloader automatically, proceed as follows:

- Turn off the power to the B-6.
- Press and hold the STOP-GO button and switch the power back on.

Now the boot loader is started and the complete software of the B-6 is deleted. Then carry out an update via BiDiB.

Update without BiDiB

If you cannot carry out the update yourself, send us your B-6 for an update (free of charge for you). You only have to bear the costs of sending it back and forth.

8. Checklist for troubleshooting and error correction

The RGB LEDs under the top of the enclosure indicate the operating status and the occurrence of a short circuit or overheating. → Section 8.1.1 "Display and RGB LEDs".

Warning: If you notice a strong heat development or if the booster has switched off the track voltage due to overtemperature, disconnect the B-6 from the supply voltage immediately. **Fire hazard!** If the overheating is not caused by external influences (obstruction of air exchange, sunlight), send the B-6 in for inspection.

8.1. Automatic shutdown

The voltage at the booster's track output is switched off, the RGB LEDs flash red-purple or flicker yellow-orange.

- Cause: The booster has switched off the voltage at the track output due to a short circuit or overtemperature. → Section 8.1.1. "Display and RGB LEDs".

After a turnout command, the voltage at the track output of the booster is switched off.

- Possible cause: The turnout address in question has been assigned to the function "Switch off with DCC turnout command". à Avoid using the turnout address in question or assign another turnout address to the function.

8.2. No short circuit switch-off

The control unit does not switch off in case of a short circuit although the short circuit feedback of the booster is connected.

- Possible cause when using the DCC-compliant interface: The connections C, D and E are connected to the interface the wrong way round. → Check the connections and change them if necessary.
- Possible cause when using the BiDiB connection: The digital control unit is not able to evaluate the short-circuit feedback via BiDiB or is not configured accordingly. → Check with the instructions for the central unit whether it is possible to evaluate the BiDiB message of the booster and if so, the configuration of the central unit.

8.3. Problems with control via the BiDi bus

The booster cannot be switched on or it transmits faulty signals (locomotives do not react as desired).

- Possible cause: The booster is installed at the end of a BiDi bus line, there is no terminating resistor. → Change the position of the booster in the bus line and install a terminating resistor at the then last BiDiB device in the line. If this is not possible, contact our hotline about the design of the terminating resistor for the B-6.

8.4. Problems with the Watchdog Function

The watchdog function is not active after switching on the booster, although a switch address has been assigned to it.

- Possible cause: The watchdog function is only activated after switching on when the setting command "turnout straight ahead" has been sent for the assigned turnout address.

8.5. Technical Hotline

If you have any questions about the use of the booster, our technical hotline will help you (telephone number and e-mail address on the last page).

8.6. Repairs

You can send us a defective B-6 or a defective power supply unit for inspection / repair (address on the last page). Please do not send us your return freight collect. In the event of a warranty or guarantee claim, we will reimburse you for the regular shipping costs.

Please enclose the following with your shipment

- proof of purchase as evidence of any warranty or guarantee claim
- a brief description of the defect
- the address to which we should return the product(s)
- your email address and/or a telephone number where we can reach you in case of queries.

Costs

The inspection of returned products is free of charge for you. In the event of a warranty or guarantee claim, the repair and return are also free of charge for you.

If there is no warranty or guarantee case, we will charge you the costs of the repair and the costs of the return. We charge a maximum of 50% of the new price for the repair according to our valid price list.

Carrying out the repair(s)

By sending in the product(s), you give us the order to inspect and repair it. We reserve the right to refuse the repair if it is technically impossible or uneconomical. In the event of a warranty or guarantee claim, you will then receive a replacement free of charge.

Cost estimates

Repairs for which we charge less than € 25.00 per item plus shipping costs will be carried out without further consultation with you. If the repair costs are higher, we will contact you and carry out the repair only after you have confirmed the repair order.

9. Technical data

9.1. Booster B-6

Digital protocols

Data formats	Motorola-I and -II DCC (according to NMRA and RCN standard) m3 and mfx (limited to the control of mfx decoders)
Formats for the automatic registration of vehicle decoders	DCC-A This function is not yet available (Status: 04/2023).
Feedback format	RailCom (RailCom cutout can be switched off) integrated global RailCom detector

Interfaces

For the connection the digital central unit or further boosters	BiDiB (RJ45) or DCC-compliant ("CDE"
For the connection of of a BiDiB PC interface	BiDiB (RJ45)
Track output	Main track

Electrical properties

Power supply	24 volts direct current Note: Only the power supply unit included in the scope of delivery is permitted as power supply for the mc² including integrated booster!
Maximum output current	2.0 to 6.0 A adjustable in 1 A steps
Current consumption (without consumer)	max. 100 mA
Output voltage	8 to 22 volts digital voltage (regulated) adjustable in 1 V steps
Output signal	symmetrical
Power consumption	max. 132 watts

Protection

Protection class	IP 20 Meaning: Protected against solid foreign bodies with a diameter ≥ 12.5 mm and access with a finger. No protection against water.
Overload	100 ~ 110% of the rated output power Protection: Switching off the voltage at the track output
Overtemperature	Switching off the voltage at the track output
Short-circuit protection	automatic switch-off in case of overload ("short-circuit shutdown") Short-circuit sensitivity: 10 - 200 ms (adjustable)

Environment

	For use in closed rooms Note: To allow unhindered air exchange and to predect the unit from overheating, a distance of at least 20 cm must be maintained between the side, top and rear surfaces and surrounding surfaces.
Ambient temperature during operation	0 ~ + 60 °C
Permissible relative humidity during operation	10 ~ 85% (non-condensing)
Ambient temperature during storage	- 10 ~ + 80 °C
Permissible relative humidity during storage	10 ~ 85% (non-condensing)

Other features

Dimensions (approx.)	118 x 122 x 47 mm
Weight (approx.)	371 g

9.2. Power supply unit

Manufacturer	MEAN WELL ENTERPRISE Co. Ltd.
Type designation	GSM160B24-R7B

Output

Output voltage	24 VDC
Rated current	6.67 A
Output current	0 – 6.67 A
Rated powerNennleistung	max. 160 watts

Input

Input voltage	80 ~ 264 VAC or 113 ~ 370 VDC
Frequency range	47 ~ 63Hz
Input current	90A / 115VAC or 110A / 230VAC
Efficiency	average: 93,5 % at low load (10%): 87.5 %
Power consumption at zero load	< 0,15 W

Protection

Protection **type**	IP 22 Meaning: Predected against solid foreign bodies with diameter ≥ 12.5 mm and access with a finger. Protection against falling dripping water when the enclosure is tilted up to 15°.
Protection class	 (= Protection class 2)
Overload	105 ~ 150% of the rated output power Protection mode: Hiccup mode, i.e. automatic recovery after elimination of fault condition
Overvoltage	105 ~ 135% of the rated output voltage Protection mode: Switching off the output voltage, switching on again for recovery
Overtemperature	Protection mode: Switching off the output voltage, switching on again for recovery

Environment

	For use in closed rooms Note: To allow unhindered air exchange and to predect the unit from overheating, a distance of at least 20 cm must be maintained between the side surfaces, the top surfaces and the rear surfaces to ambient surfaces.
Ambient temperature during operation	-30 ~ + 70 °C
Permissible relative humidity during operation	20 ~ 90% (non-condensing)
Ambient temperature during storage	- 40 ~ + 85 °C
Permissible relative humidityduring storage	10 ~ 95% (non-condensing)

Connections

Unit connection	Power supply connector 4-pole, R7B series
Mains connection	Mains cable socket 2-pole, IEC 320-C8

Miscellaneous

Dimensions (approx.)	175 x 72 x 35 mm
Weight (approx.)	660 g
Length of connection cable	1,200 mm $\pm$ 50 mm

10. Warranty, EU conformity & WEEE

10.1. 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-made module or device,
- if damaged by other persons,
- if damaged by faulty operation or by careless use or abuse.

10.2. EU Declaration of Conformity

CE This product fulfils the requirements of the following EU directives and therefore bears the CE marking.

2001/95/EU Product Safety Directive

2015/863/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

2014/30/EU on electromagnetic compatibility (EMC Directive). Underlying standards:

DIN-EN 55014-1 and 55014-2: Electromagnetic compatibility - Requirements for household appliances, electric tools and similar electrical appliances. Part 1: Emitted interference, Part 2: Immunity to interference

To maintain electromagnetic compatibility during operation, observe the following measures:

Only connect the supply transformer to a professionally installed and fused earthed socket.

Do not make any changes to the original components and follow the instructions, connection and assembly diagrams in this manual exactly.

Only use original spare parts for repair work.

10.3. Declarations on the WEEE Directive

This product is subject to the requirements of the EU Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE), i.e. the manufacturer, distributor or seller of the product must contribute to the proper disposal and treatment of waste equipment in accordance with EU and national law. This obligation includes

- registration with the registering authorities ("registers") in the country where WEEE is distributed or sold
- the regular reporting of the amount of EEE sold
- the organisation or financing of collection, treatment, recycling and recovery of the products
- for distributors, the establishment of a take-back service where customers can return WEEE free of charge
- for producers, compliance with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive.

The "crossed-out wheeled bin" symbol means that you are legally obliged to recycle the marked equipment at the end of its life. The appliances must not be disposed of with (unsorted) household waste or packaging waste. Dispose of the appliances at special collection and return points, e.g. at recycling centres or at dealers who offer a corresponding take-back service.

Further Information and Tips:

http://www.tams-online.de

Warranty and Service:

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