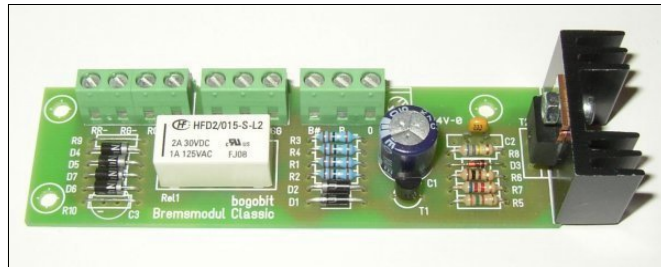
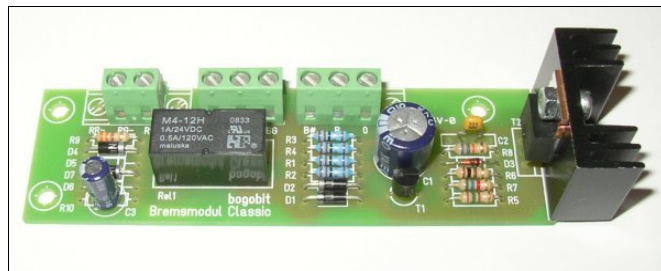


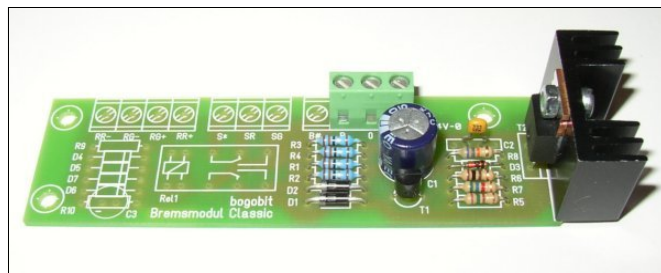
Bogobit Bremsmodul Classic – Manual



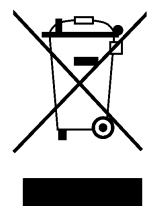
Hardware Version "bistabil"



Hardware Version "monostabil"



Hardware Version "Bremsgenerator"



1 Introduction

Please read the instructions completely before using the product. Observe all operating and safety instructions!

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2 Intended Use

The Bogobit Bremsmodul Classic is a brake module for digitally controlled model railways. The module generates a “brake voltage”. This lets locos brake smoothly if they are equipped with a suitable decoder. It can be used on model layouts with center stud tracks (Märklin H0), and for most applications also with two-rail tracks. It can be used on digitally controlled model railways using the Märklin/Motorola/mfx protocol and, depending on decoder characteristics, also with the DCC protocol.

This product is no toy. It is not suitable for children up to 14 years of age.

Any use other than that described before is not permitted.

The product may not be modified or reassembled.

3 Safety Instructions

3.1 General

In case of damage incurred by disregarding these operating instructions, the warranty claim is void. Liability for any and all consequential damage is excluded!

We do not assume any liability for damage to property or personal injury caused by improper use or the failure to observe the safety instructions! The warranty is voided in these cases.

- For safety and licensing reasons (CE), it is not permitted to change or modify the product. Only use original or equivalent replacement parts for repair.
- Ensure that all electrical connections and connection cables conform to the regulations and comply with the operating instructions.
- Upon sudden change of climatic conditions (e. g. transfer from a cold place to a warm room) water may condense on the device, which may lead to damage. Allow approx. 2 hours to acclimate before powering on the device.
- Do not operate the device near easily inflammable objects, liquids or gases. Danger of explosion!
- Do not expose the device to high temperatures, strong vibrations, high humidity or chemically aggressive environment.
- Operate the device only in dry indoor rooms (below 80 % humidity, non condensing) and at normal room temperature (0 °C to 40 °C).
- Do not operate the device unattended.

- When in doubt about safety, or the connection or operation of the device, which is not explained in these operating instructions, please contact us or a recognized expert.

3.2 Electrical Safety

- Operate the module only with low voltage according to the specifications in the technical data chapter. Only use power supplies, such as transformers or digital control stations, that are certified for use in model railway applications. Connection of higher voltages (e.g. 230 V mains voltage) is not permitted, also not on relay contacts. There is danger to life through an electric shock and a risk of fire!
- Adhere to the limits on maximum allowable current according to the specifications in the technical data chapter. Exceeding the limits leads to overload and destruction of the device and bears the risk of fire or electric shock.
- Switch off the power supply before working on the electrical connections.
- Pay attention to appropriate wire cross sections (rule of thumb: 0,1 mm² per 1 A maximum possible current, e. g. 0,5 mm² cross section for 5 A maximum current).

3.3 Heat Generation

Electronic components on the product may heat up significantly during operation.

- When mounting the product, ensure sufficient air circulation around the device to prevent heat build-up and overheating. This especially applies when installing the board in a housing.
- When mounting the product, keep sufficient distance to heat sensitive and inflammable objects (e. g. wood or plastic surfaces, cable insulation).
- When touching the product, there is danger of skin burn.

4 Function of the bogobit Bremsmodul

4.1 General Function

The Bogobit Bremsmodul Classic is a brake module for digitally controlled model railways. The module generates a “brake voltage”. This brake voltage, when applied to the track, lets locos brake smoothly if they are equipped with a suitable decoder. It can be used on model layouts with center stud tracks (Märklin H0), and for most applications also with two-rail tracks. It can be used on digitally controlled model railways using the Märklin/Motorola/mfx protocol and, depending on decoder characteristics, also with the DCC protocol.

It is the characteristic feature of the Bremsmodul Classic that it only needs a single isolated track section, i. e. a single isolated center stud section in the case of center stud track, or a single one-sided track section in the case of two-rail track. There is no technical need for transition sections or stop sections. This minimizes installation effort.

The Bremsmodul Classic has two operational states: “proceed” and “brake”. In the proceed state, the unmodified digital voltage is applied to the track; in the brake state, a “brake voltage” is ap-

plied to the track instead. The brake module has a control input to set either state. The implementation of the control input varies between the different hardware versions of the Bremsmodul Classic.

The brake voltage is basically just negative DC voltage. This working principle is known to märklin users as the “märklin brake module” and to DCC users as “brake on dc”. It works with most of the original märklin decoders and most compatible decoders. It also works with many DCC decoders, some of which need special configuration (CV programming) to support it.

In some DCC decoders the voltage polarity is evaluated to achieve direction dependent braking. Thus, for two rail track applies: From the driver's perspective moving forward, the *right* rail of two rail track is equivalent to the center studs of Märklin three-rail track.

The brake voltage is output through an electronic current-limiting circuit. Therefore, when driving over a track isolation gap, no short circuit occurs and there is no disruption of service.

4.2 Hardware versions of the brake module

The Bogobit Bremsmodul Classic is available in different versions. They differ in the electronic components on the module, in their function, and in their connections. The following versions are available:

1. The version „Bistabil“ is the most common version. Two input terminals, either of which has to be activated for a short moment, allow to set the states “proceed” or “brake”, respectively (this is like a turnout drive with double solenoid). For this purpose, the brake module is equipped with a bistable (latching) relay.
2. The version „Monostabil“ uses a monostable (ordinary non-latching) relay. If a (permanent) control voltage is applied to the input terminal, the brake module is in state „proceed“. If no control voltage is applied, the brake module is in state “brake” (this is like a light on – light off function).
3. The version „Bremsgenerator“ does not have a relay and no control input. The brake module is merely a brake voltage generator, permanently providing a negative DC brake voltage. The layout control electronics must provide a single pole double throw switch so that – depending on the switch position – either ordinary digital voltage, or brake voltage from the Bremsgenerator can be fed to the track.

5 Connection and Operation

5.1 Handling

The product consists of sensitive electronic components. Improper handling may destroy them. Prior to handling the board, please discharge yourself from electrostatic charge. To do this, touch a metal object (earthed), e.g. a metal PC casing. Try to touch the board only at the edges and avoid touching any electronic components or copper routes on the board.

5.2 Mounting

Mount the module properly to the model railway framework. The module has holes with 3 mm diameter for mounting. Use of wood screws with 3 mm diameter and a flat pan head is recommended. Use spacers (little plastic tubes) between circuit board and mounting surface. Tighten the screws carefully, so that the circuit board does not warp. Also consider the instructions related to heat generation in chapter 3.3.

5.3 Connections – Version “Bistabil”

This section describes the version “Bistabil” of the Bogobit Bremsmodul. Section 5.4 describes the version “Monostabil”, and section 5.5 the version “Bremsgenerator”.

5.3.1 Wiring Terminals

All external connections of the brake module are labelled on the board and explained in the table below:

Label	Function
0	digital track voltage input center stud track: B is the red wire to the center studs, 0 is the brown wire to the rails ground.
B	two-rail track: B is the wire to rail on the right hand side (only this right rail has the isolated track section), 0 is the wire to the continuous rail on the left hand side. Note: the color code or polarity of the electrical track connection is irrelevant, essential is right and left rail as seen when approaching the signal.
B#	(brake track section) voltage output to be connected to the isolated track section. (The '#' character shall represent rails and sleepers).
B1	brake voltage generated by the module. Not meant for external connection.
SG	(signal green) one pole of the relay's single pole double throw contact. This is the throw position in state “proceed” = green. Can also be used for wiring of a stop track section.
SR	(signal red) other pole of the relay's single pole double throw contact. This is the throw position in state “brake” = red.
S*	throw's common pole of the relay's single pole double throw contact.

RG+	(relay green) control input (positive and negative terminal) for state "proceed" = green
RG-	
RR+	(relay red) control input (positive and negative terminal) for state "brake" = red
RR-	

5.3.2 Notes on Wiring

For a layout with center stud track (Märklin H0) applies:

- "B" has to be connected with the center stud terminal ("B") of the digital control unit.
- "0" has to be connected with the rails terminal ("0") of the digital control unit.
- "B#" has to be connected with the center studs of the isolated track section. A center stud isolation must be inserted at both ends of the track section.

For a layout with two-rail track applies:

- on one rail (herein called the right rail) two cuts have to be made to form an isolated section between. The other rail (herein called the left rail) is not cut but remains a continuous rail.
- "B" has to be connected with the terminal of the digital control unit that goes to the right rail.
- "0" has to be connected with the terminal of the digital control unit that goes to the left rail.
- "B#" has to be connected with the right rail inside the isolated track section

Generally applies:

- Only a single isolated track section is necessary. No so-called transition sections or stop sections, as is customary with many other brake modules, are electrically required. However, a stop section might be reasonable for operational reasons, if it cannot be ensured that any loco will come to a stop within the brake section. Such a stop section is realised by another track section that is wired via the terminals "S*" and "SG" and connected with "B".
 - The control inputs for the relay red input, "RR+" and "RR-", and for the relay green input, "RG+" and "RG-", have to be connected to a conventional turnout control box (two momentary push switches) or to a digital turnout decoder.
 - Polarity of the control inputs "RR+" and "RR-", and "RG+" and "RG-" must be obeyed. Typically:
 - either the positive terminals "RR+" and "RG+" are wired together (common anode) and the negative terminals "RR-" and "RG-" are the two control inputs,
 - or the negative terminals "RR-" and "RG-" are wired together (common cathode) and the positive terminals "RR+" and "RG+" are the two control inputs.
- If AC voltage is used together with a conventional (manual) control box, any of these two variants will work. If a digital turnout decoder is used, the proper variant might be found by trial and error. Turnout decoders k83 by Märklin or 5211 by Viessmann have a common cathode, whereas other manufacturers typically have a common anode.

- "S*", "SG", and "SR" are terminals of an unused single pole double throw relay contact. It can be used, e. g., to operate a light signal, or to operate a stop track section.

Graphical wiring diagrams can be found in a separate document [1].

5.4 Connections – Version “Monostabil”

This section describes the version “Monostabil” of the Bogobit Bremsmodul.

The version “Monostabil” uses a monostable (non-latching) relay.

This version is suitable if a on-off-voltage is available. This can be provided, e. g., by the switch contact built into the solenoid drive of a light or semaphore signal (originally intended to switch off track voltage). It is also suitable, if a digital decoder provides a switchable voltage (e. g. as used to switch the lights of a building).

5.4.1 Wiring terminals

All external connections of the brake module are labelled on the board and explained in the table below:

Label	Function
0	digital track voltage input center stud track: B is the red wire to the center studs, 0 is the brown wire to the rails ground.
B	two-rail track: B is the wire to rail on the right hand side (only this right rail has the isolated track section), 0 is the wire to the continuous rail on the left hand side. Note: the color code or polarity of the electrical track connection is irrelevant, essential is right and left rail as seen when approaching the signal.
B#	(brake track section) voltage output to be connected to the isolated track section. (The '#' character shall represent rails and sleepers).
B1	brake voltage generated by the module. Not meant for external connection.
SG	(signal green) one pole of the relay's single pole double throw contact. This is the throw position in state “proceed” = green. Can also be used for wiring of a stop track section.
SR	(signal red) other pole of the relay's single pole double throw contact. This is the throw position in state “brake” = red.
S*	throw's common pole of the relay's single pole double throw contact.
RG+	(relay green) control input (positive and negative terminal).
RG-	Voltage is applied = “proceed”, no voltage = “brake”
RR+	not internally connected
RR-	

The terminal assignment is very similar to the version “Bistabil”, only the terminals "RR+/-" are unused and the relay is controlled by the terminals "RG+/-".

5.4.2 Notes on Wiring

For a layout with center stud track (Märklin H0) applies:

- "B" has to be connected with the center stud terminal ("B") of the digital control unit.
- "0" has to be connected with the rails terminal ("0") of the digital control unit.
- "B#" has to be connected with the center studs of the isolated track section. A center stud isolation must be inserted at both ends of the track section.

For a layout with two-rail track applies:

- on one rail (herein called the right rail) two cuts have to be made to form an isolated section between. The other rail (herein called the left rail) is not cut but remains a continuous rail.
- "B" has to be connected with the terminal of the digital control unit that goes to the right rail.
- "0" has to be connected with the terminal of the digital control unit that goes to the left rail.
- "B#" has to be connected with the right rail inside the isolated track section

Generally applies:

- Only a single isolated track section is necessary. No so-called transition sections or stop sections, as is customary with many other brake modules, are electrically required. However, a stop section might be reasonable for operational reasons, if it cannot be ensured that any loco will come to a stop within the brake section. Such a stop section is realised by another track section that is wired via the terminals "S*" and "SG" and connected with "B".
- The control inputs for the relay, "RG+" and "RG-", have to be connected to a conventional switch control box (on-off-switch) or any other switched control voltage. The control voltage may be AC voltage, digital voltage, or DC voltage of correct polarity. Function is as follows:
 - If a voltage is applied, the relay is activated and the brake module is in state "proceed"
 - If no voltage is applied or if the voltage is too low, the relay is released and the brake module is in state "brake"
- "S*", "SG", and "SR" are terminals of an unused single pole double throw relay contact. It can be used, e. g., to operate a light signal, or to operate a stop track section.

Graphical wiring diagrams can be found in a separate document [1].

5.5 Connections – Version „Bremsgenerator“

This section describes the version “Bremsgenerator” of the Bogobit Bremsmodul.

5.5.1 Wiring terminals

All external connections of the brake module are labelled on the board and explained in the table below:

Label	Function
0	digital track voltage input center stud track: B is the red wire to the center studs, 0 is the brown wire to the rails ground.
B	two-rail track: B is the wire to rail on the right hand side (only this right rail has the isolated track section), 0 is the wire to the continuous rail on the left hand side. Note: the color code or polarity of the electrical track connection is irrelevant, essential is right and left rail as seen when approaching the signal.
B1	brake voltage output, generated by the module.

5.5.2 Notes on Wiring

Graphical wiring diagrams can be found in a separate document [1].

6 Maintenance and Care

The product does not require maintenance. If cleaning is necessary, the product should only be cleaned with a dry cloth or a brush to remove dust etc. Do not use aggressive cleaning agents or chemical solutions.

7 Technical data

7.1 Operating Voltage and Current

The power supply (connections B and 0) of the device shall be the digital track voltage generated by a digital control unit that is supplied from a transformer of max. 18 V AC or from a power supply with max. 25 V DC.

The track output (B#) maintains the digital track voltage (B) when in „proceed“ state, or a current-limited DC voltage when in „brake“ state. The max. allowed current is 2 A.

The maximum relay switching capacity is 2 A current and 30 V DC or AC voltage.

7.2 Control Input

7.2.1 Version Bistabil

The control voltage applied to the input RR+ and RR- , or RG+ and RG- resp., may be DC voltage (properly polarized) or AC voltage. The voltage must be within an allowed range. If the voltage is too low, proper function is not reliable or not possible. If the voltage is too high, the relay may be destroyed due to overload and overheating. The allowed range depends on the properties of the relay used and a corresponding series resistor.

With a bistable relay of type Hongfa HFD2/015-S-L2 and no further series resistor applies:

- min. recommended voltage: 12 V DC (or equivalently approx. 8.5 V AC)
- max. recommended voltage if applied for a short time (few seconds) only: 30 V DC or AC

To have effect it is sufficient to apply the control voltage only for a very short time (20 ms). A permanently applied control voltage is acceptable, but will lead to a certain rise of temperature in the relay. A permanently applied control voltage should not considerably exceed the relay nominal voltage of 15 V (rule of thumb: do not exceed by more than 50 %, or approx. 22 V).

Under no circumstances apply a control voltage to both control inputs simultaneously.

7.2.2 Version Monostabil

The control voltage applied to the input RG+ and RG- may be DC voltage (properly polarized) or AC voltage. The voltage must be within an allowed range. If the voltage is too low, proper function is not reliable or not possible. If the voltage is too high, the relay may be destroyed due to overload and overheating. The allowed range depends on the properties of the relay used and a corresponding series resistor. Typically applies:

- min. recommended voltage: 12 V DC or AC
- max. recommended voltage: 24 V DC or AC

7.2.3 Version Bremsgenerator

This version has no control input.

8 Further Notes

8.1 CE Declaration of Conformity



The electromagnetic compatibility (EMC) according to harmonized European standards EN 55014-1 and EN 55014-2 is met through the design of the device. The requirements of the Directive 2004/108/EC on electromagnetic compatibility are fulfilled. The product complies with the regulatory requirements and standards on CE conformity and therefore carries the CE mark. The manufacturer holds the EC declaration of conformity and corresponding technical documentation at the disposal of the competent authorities.

8.2 Hazardous Substances, Disposal



The product complies with the Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment, implemented in Germany through the Elektro- und Elektronikgerätegesetz (ElektroG).



The manufacturer complies with the Directive 2002/96/EC on waste electrical and electronic equipment (WEEE), implemented in Germany through the Elektro- und Elektronikgerätegesetz (ElektroG).

Electrical and electronic devices must not be disposed of with domestic waste. Please dispose of the device at the end of its service life in accordance with legal regulations, e. g. return the device to public collection points.

8.3 Address of Manufacturer

For technical enquiries please contact:

bogobit – Siegfried Grob
Burgstr. 8
89192 Rammingen
Germany

E-Mail: anfrage@bogobit.de

9 References

The following documents have further information on connecting the device:

- [1] Wiring schemes (German: Anschlussbeispiele)
- [2] Website on recommended decoder settings:
<http://bogobit.de/bremsmodul/decodereinstellung>

The following documents have further information on building the kit:

- [3] Kit building instructions (German: Bausatz Bogobit Bremsmodul Classic – Bauanleitung)
- [4] Bill of material (German: Stückliste)