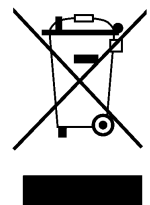# Bogobit Bremsmodul Classic – Manual

1 Introduction

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

All brand, product and company names used herein may be trademarks of their respective owners.

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 characterstics, 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.

3 Safety Instructions

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

For safety and compliance reasons (CE), it is not permitted to change or modify the product.

3.1 General

- Do not operate the device unattended.

- 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 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.

- 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 damage the device. Allow approx. 2 hours to acclimate before powering on the device.

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!

- Switch off the power supply before working on the electrical connections.

- 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.

- Pay attention to appropriate wire cross sections. Wiring must be rated for maximum possible current continuously under any fault condition.

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.

- 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 characterstics, 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 applied 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. The differ in the electronic components on the module, in their function, and in their connections. The following version 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 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 contains 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. Avoid touching any electronic components or copper routes on the board where possible.

5.2   Mounting

Mount the module properly, but not overly tight, to the model railway framework.

If the module has an enclosure: Use the four holes at the corners (3 mm diameter) of the board for mounting. Use self tapping screws with pan head, head diameter 6 mm maximum. Tighten the screws carefully, so that the circuit board does not warp.

If the module is a bare board without enclose: For mounting use the four outer holes at the corners. These holes have 3 mm diameter. Use self tapping screws with pan head, head diameter 6 mm maximum. 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).
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∗	(signal common) throw's common pole of the relay's single pole double throw contact.
RG	(relay green) control input for state "proceed" = green
RR	(relay red) control input for state "brake" = red
R∗	(relay common) control input, common pole with respect to RG and RR

5.3.2 Notes on Wiring

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

–   Create an isolated track section. A center stud isolation must be inserted at both ends of the track section.

–   "B" has to be connected with the center studs ("B") of the regular track outside the isolated section.

–   "B#" has to be connected with the center studs of the isolated track section.

–   "0" has to be connected with the rails ("0"). Make this wiring just between the brake module and the track.

For a layout with two-rail track applies:

–   Create an isolated track section: 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 right rail of the regular track outside the isolated section.

–   "B#" has to be connected with the right rail inside the isolated track section.

–   "0" has to be connected with the left, continuous rail.

Generally applies:

–   The control inputs for the relay operation, RR, R∗ and RG, have to be connected to a conventional turnout control box (two momentary push switches) or to a digital turnout decoder. The polarity of the control voltage is irrelevant.
    –   if the voltage is applied to RR and R∗, the module goes to state "brake"
    –   if the voltage is applied to RG and R∗, the module goes to state "proceed"

–   SR, S∗ and SG 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.

–   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".

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).
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∗	(signal common) throw's common pole of the relay's single pole double throw contact.
RG	(relay green) control input.
R∗	Voltage is applied = "proceed", no voltage = "brake"
RR	not internally connected

The terminal assignment is very similar to the version "Bistabil", only the terminal "RR" is unused. The (non-latching) relay is controlled by the switched voltage at terminals "RG / R∗".

5.4.2 Notes on Wiring

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

–   Create an isolated track section. A center stud isolation must be inserted at both ends of the track section.

–   "B" has to be connected with the center studs ("B") of the regular track outside the isolated section.

- "B#" has to be connected with the center studs of the isolated track section.
- "0" has to be connected with the rails ("0"). Make this wiring just between the brake module and the track.

For a layout with two-rail track applies:

- Create an isolated track section: 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 right rail of the regular track outside the isolated section.
- "B#" has to be connected with the right rail inside the isolated track section.
- "0" has to be connected with the left, continuous rail.

Generally applies:

- The control inputs for the relay, "RG" and "R∗", 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 any 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".
- SR, S∗ and SG 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.
- 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".

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.
B#	brake voltage output, generated by the module.

5.5.2   Notes on Wiring

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

–   Create an isolated track section. A center stud isolation must be inserted at both ends of the track section. Use a suitable, external, single pole double throw contact and wire it such that in one position the center studs of the isolated track section are connected to the regular digital voltage "B", and in the other position the center studs of the isolated track section are connected to the module's terminal "B#".

–   "B" has to be connected with the center studs ("B") of the regular track outside the isolated section.

–   "0" has to be connected with the rails ("0"). Make this wiring just between the brake module and the track.

–   "B#" is the brake voltage output. It has to be connected with the center studs of the isolated track section via an external switch as explained before.

For a layout with two-rail track applies:

–   Create an isolated track section: 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. Use a suitable, external, single pole double throw contact and wire it such that in one position the right rail of the isolated track section is connected to the regular right rail digital voltage "B", and in the other position the right rail of the isolated track section is connected to the module's terminal "B#".

–   "B" has to be connected with the right rail of the regular track outside the isolated section.

–   "0" has to be connected with the left, continuous rail.

– "B#" has to be connected with the right rail inside the isolated track section via an external switch as explained before.

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

5.5.3 Use of Version "Monostabil" as "Bremsgenerator"

Alternatively, a brake module version "Monostabil" can be used as a "Bremsgenerator". The brake module is permanently operated in the state "brake". The terminals are used as follows:

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 voltage output, generated by the module.
	no connections are made to any other termimals

Wiring is done as explained in section 5.5.2.

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 25 V AC voltage.

7.2 Control Input

7.2.1 Version Bistabil

The control voltage applied to the input RR, or RG resp., may be DC voltage or AC voltage. The control inputs have a rectifier circuit, DC polarity is not relevant.

DC, AC: 13 – 24 V

minimum pulse duration: 20 ms

A permanently applied control voltage is acceptable, but voltage must not be applied to both control inputs simultaneously.

With a control voltage of 16 V, the current is approximately 13 mA.

7.2.2 Version Monostabil

The control voltage applied to the input RG may be DC voltage or AC voltage. The control inputs have a rectifier circuit, DC polarity is not relevant.

DC, AC: 13 – 24 V

With a control voltage of 16 V, the current is approximately 13 mA.

7.2.3 Version Bremsgenerator

This version has no control input.

7.3 Other Data

Dimensions (module with case):   73 × 73 × 28 mm

Terminal – wiring cross-section: 0,14 – 1,5 mm²

Mounting hole diameter: 3,2 mm

8 Further Notes

8.1 CE Marking

The following declaration only applies to products that are manufactured by Bogobit.

The product Bogobit Bremsmodul Classic complies with the following directives:

- EU Directive 2014/30/EU on electromagnetic compatibility
- EU Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment

To demonstrate compliance with EU Directive 2014/30/EU, the harmonised standards
EN 55014-1:2017 + A11:2020, EN 55014-2:1997 + A1:2001 + A2:2008, and the other standards
EN 55014-2:2015 are applied.

The manufacturer keeps the EU declaration of conformity and corresponding technical documentation and provides this to a competent national authority upon a reasoned request.

8.2 Disposal
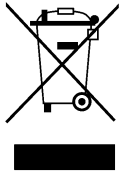
The manufacturer complies with the EU Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), implemented in Germany through the Elektro- und Elektronikgerätegesetz (ElektroG).

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.

8.3 Address of Manufacturer

bogobit – Siegfried Grob
Burgstr. 8
89192 Rammingen
Germany

E-Mail: anfrage@bogobit.de

9 References

The following documents have further information on putting into service:

[1]   Wiring schemes (German: Anschlussbeispiele) Bogobit Bremsmodul Classic, see:
http://bogobit.de/bremsmodul/classic
chapter „Weiterführende Informationen"

[2]   Website on recommended decoder settings:
http://bogobit.de/bremsmodul/decodereinstellung