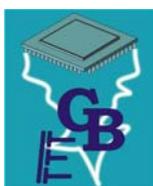


## Operating Manual

# Mini Speed Controller MFR-1210



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## Description

The small but versatile mini speed controller MFR-1210 is perfect to control smooth forward and backward movements of auxiliary drives, as well as the complete drive of small models.

Possible examples of motor movements are trailer supports, crane arm movements, tilt function or the movement of a tank tower.

The MFR-1210 is suitable for brushed motors with up to 10 A. It includes a short circuit protected BEC with 5V. With a PWM frequency of 20 kHz, there are no disturbing noises audible.

With the EMF motor brake the model can actively be stopped. The brake starts as soon as the throttle stick is in neutral position (center). When rolling out, the engine is continuously decelerated to a complete stop. When accelerating, the motor brake automatically releases.

For a gentle operation of the engine and battery, the engine speed is continuously monitored. This is especially important when changing between forward and backward drive. Before polarity reversal, the motor is decelerated to a complete stop and then accelerated in the other direction.

The speed controller requires no additional teaching of the transmitter. The fix zero point (center) position of the gas channel is suitable for almost all remote controls at 1.500 ms.

The MFR-1210 involves several protection features. With acoustic signals it warns in case of over-temperature, over-current and missing gas channel signal from the receiver.

The speed controller MFR-1210 has following characteristics:

- Mini speed controller for brushed DC motors
- Perfect for auxiliary drives and the complete speed control for small models
- Supply voltage: 6 - 16 V
- Max. current of motor: 10 A
- BEC with 5,0 V and 0,5 A
- PWM frequency of 20 kHz
- Smooth EMF motor brake
- Soft polarity reversal through permanent monitoring of motor speed
- Control of temperature, current and correct signals from receiver
- Small size: 26 x 19 x 6 mm

## Safety notes

- Please read this operating manual carefully and keep it for future use!
- The integrated circuits on the speed controller are sensitive to electrostatic charge. Therefore it is important that you don't touch these components, before discharging yourself (e.g. through a grip onto a grounded device).
- Under certain circumstances unfavourable placement and wiring of the speed controller in the model may lead to restriction of transmitter range (mainly with 35/40 MHz transmitter).
- The speed controller should only be used with supply voltages that are given in the technical data.
- Always switch off power before connecting the speed controller!
- The speed controller is not suitable for children under 14 years.

## Technical data

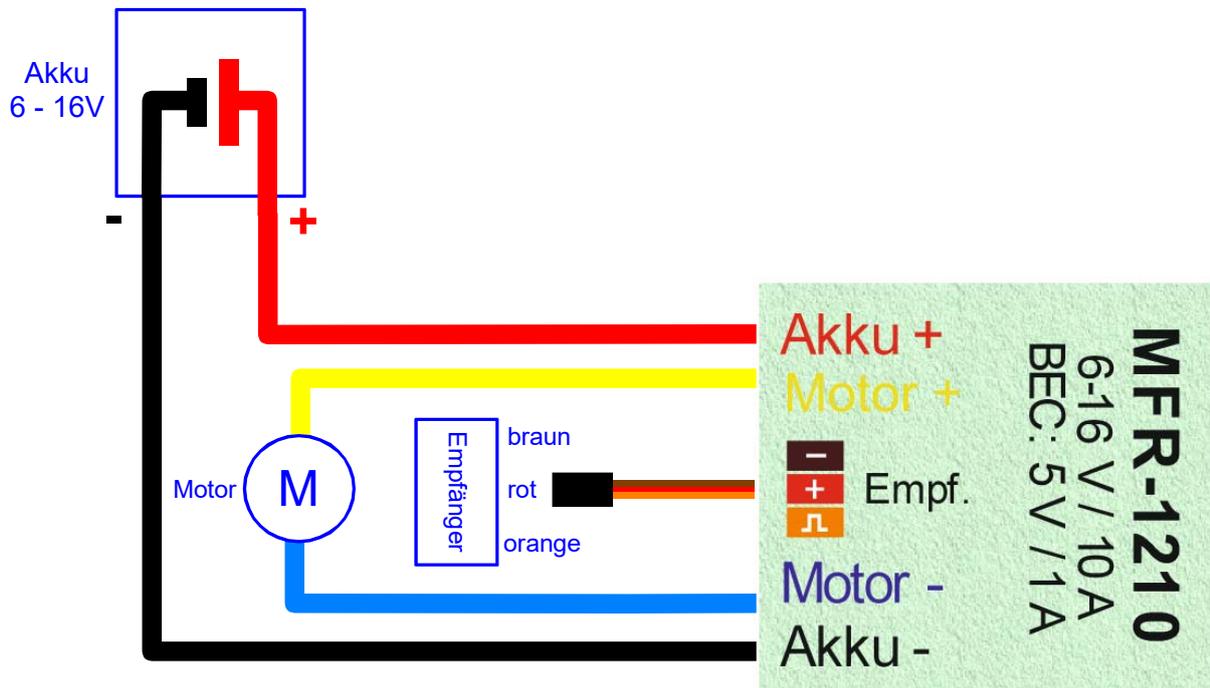
<b>Supply voltage (U<sub>b</sub>):</b>	6 – 16 V DC
<b>Power consumption:</b>	Stand by current: approx. 3 mA
<b>Motor current:</b>	Max. 10 A
<b>BEC voltage:</b>	5,0 V
<b>BEC current:</b>	Max. 0,5 A, short-term current 1 A
<b>PWM frequency:</b>	20 kHz
<b>Protection features:</b>	<ul style="list-style-type: none"> <li>• Short circuit protection at motor output stage</li> <li>• Short circuit protection at BEC</li> <li>• Temperature monitoring</li> <li>• Failsafe for proportional inputs</li> </ul>
<b>Connection cables:</b>	<ul style="list-style-type: none"> <li>• For battery: 2 x 2,5 mm<sup>2</sup>, length approx. 25 cm</li> <li>• For motor: 2 x 2,5 mm<sup>2</sup>, length approx 25 cm</li> <li>• For receiver: servo patch 3 x 0,14 mm<sup>2</sup>, length approx. 30 cm</li> </ul>
<b>Permitted ambient temperature:</b>	0 – 60° C
<b>Permitted humidity:</b>	Max. 85 %
<b>Size:</b>	26 x 19 x 6 mm
<b>Weight (cables included):</b>	17 g

## Cable assignment

Connections at MFR-1210:

<b>Akku / Battery +</b>	Red
<b>Akku / Battery -</b>	Black
<b>Motor +</b>	Yellow
<b>Motor -</b>	Blue
<b>Servo cable</b>	Proportional input: connection to receiver (Empfänger)

## Connection plan



## Connection of mini speed controller

**Always switch off power before connecting the module!**

### Connection of supply voltage (battery):

The mini speed controller is suitable for 6 – 16 V DC. In order to connect the power supply the red cable is connected to the positive pole of the battery and the black cable to the negative pole of the battery.

**Pay attention to a correct connection of the supply voltage poles! A wrong connection destroys the speed controller immediately!!!**

### Connection of motor:

The yellow cable is used to connect the positive pole and the blue cable the negative pole of the motor.

In case the driving direction is wrong (forward and backward are opposite), you can change the connection cables of the motor.

**Connection to receiver:**

The servo cable at the MFR-1210 is connected directly to the RC receiver.

With a fix zero point at 1,500 ms, the MFR-1210 setting is suitable for most of the radios. There is no need for an additional teaching process. Full throttle (forward) is at 2,000 ms and full throttle (backward) at 1,000 ms. If necessary, the values must be adjusted in the radio settings.

The mini speed controller comes with a 5 V BEC power supply, suitable for a BEC current of 0,5 A. An extra receiver battery is therefore not necessary. The BEC system is short circuit protected and it is suitable for a current of up to 1 A for a short time.

If more than one or a stronger servo (more than 0,5 A) are used, an additional BEC is necessary.

In case the BEC voltage of the MFR-1210 should not be used, the red cable from the servo cable must be disconnected.

**Motor brake**

With the MFR-1210, the model is smoothly decelerated by the EMK motor brake and prevented from rolling away, e.g. on a slope. The brake starts as soon as the throttle stick is in neutral position (center). When rolling out, the engine is continuously decelerated to a complete stop. When accelerating, the engine brake automatically releases.

However, the EMF brake is not as effective as a proper mechanical brake. With a stronger slope, the model can still roll away.

**Soft polarity reversal**

For a gentle operation of the motor and battery, the engine speed is monitored continuously. This is especially important when changing between forward and backward drive. Prior to a polarity reversal, the motor is stopped and then accelerate in the opposite direction. Current peaks at the motor and the battery can be avoided.

**Protection and warning functions**

In order to ensure maximum safety when using the mini speed controller, it emits acoustic warning and status signals via the motor.

When switching on the supply voltage, a motor beep sounds once.

If no correct signals are received from the receiver throttle channel two warning beep

sounds every 10 seconds and the mini speed controller stops the engine for safety reasons (failsafe).

In case an over current or short circuit is detected at the motor output stage, the motor is switched off immediately and three motor beepers sound every 10 s.

The MFR-1210 has a temperature sensor that continuously measures the temperature. If the temperature rises above approx. 80 ° C, four beeps are emitted every 10 seconds and the motor is switched off for protection. Thus, overheating and a defect of the speed controller can be reliably prevented.

To restart the motor after an overcurrent or overtemperature warning, the supply voltage must be disconnected and reconnected.

Status/Problem	Motor beep	Frequency (every)
Start of program	1 x	
Overcurrent	3 x	10 s
Overtemperature	4 x	10 s

## Connection to BEIER-Modules

To control the motor movements and to equip it with the right sound, the speed controller can be connected to the servo outputs of following BEIER modules:

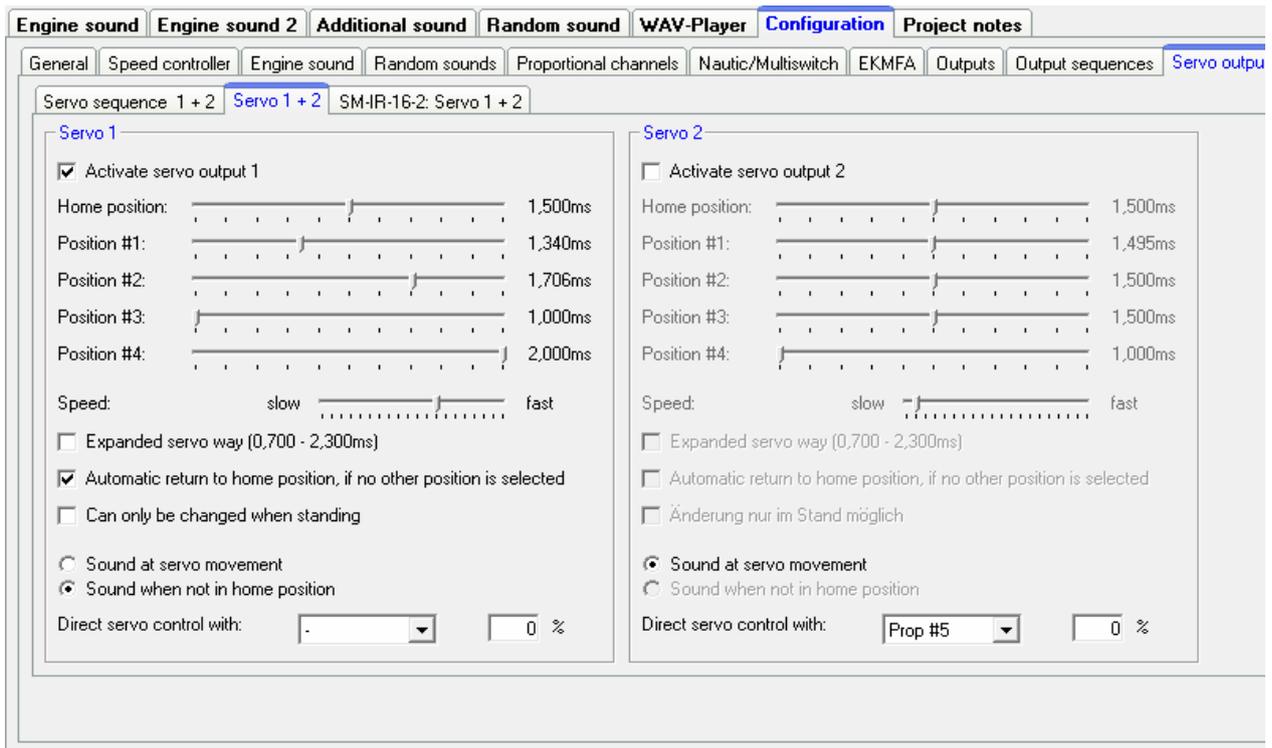
- Sound speed controller SFR-1
- Sound module USM-RC-2
- Infrared light module SM-IR-16-2
- Extension module EXM-2

All settings are made in the Sound Teacher. The servo cable is not connected to the receiver, but to the servo output of the BEIER module.

First, the servo output must be activated and set under "Configuration" and "Servo outputs".

The basic position indicates the state of the motor when the supply voltage is switched on. If the motor (which never occurs in practice) should turn in the neutral position, the slider must be moved to the left or right of 1.500 ms (motor off) in the basic position.

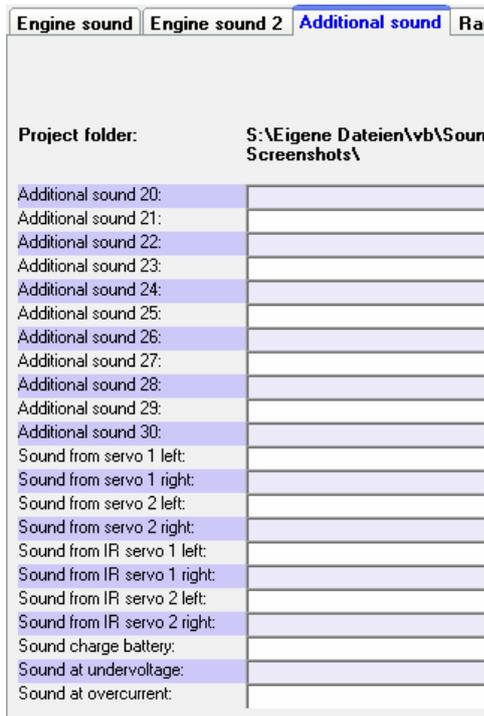
The values in ms along the lines behind the positions #1 - #4 indicate the maximum engine speed. At the value of 1,000 ms and 2,000 ms, the engine is running forward or backward at full throttle. At 1.500 ms the motor is off. The positions #1 - #4 can be used to set different maximum movement speeds and directions of rotation.



For #1 and #2, e.g. a crane arm will turn slowly to the right and left and at positions #3 and #4 quickly.

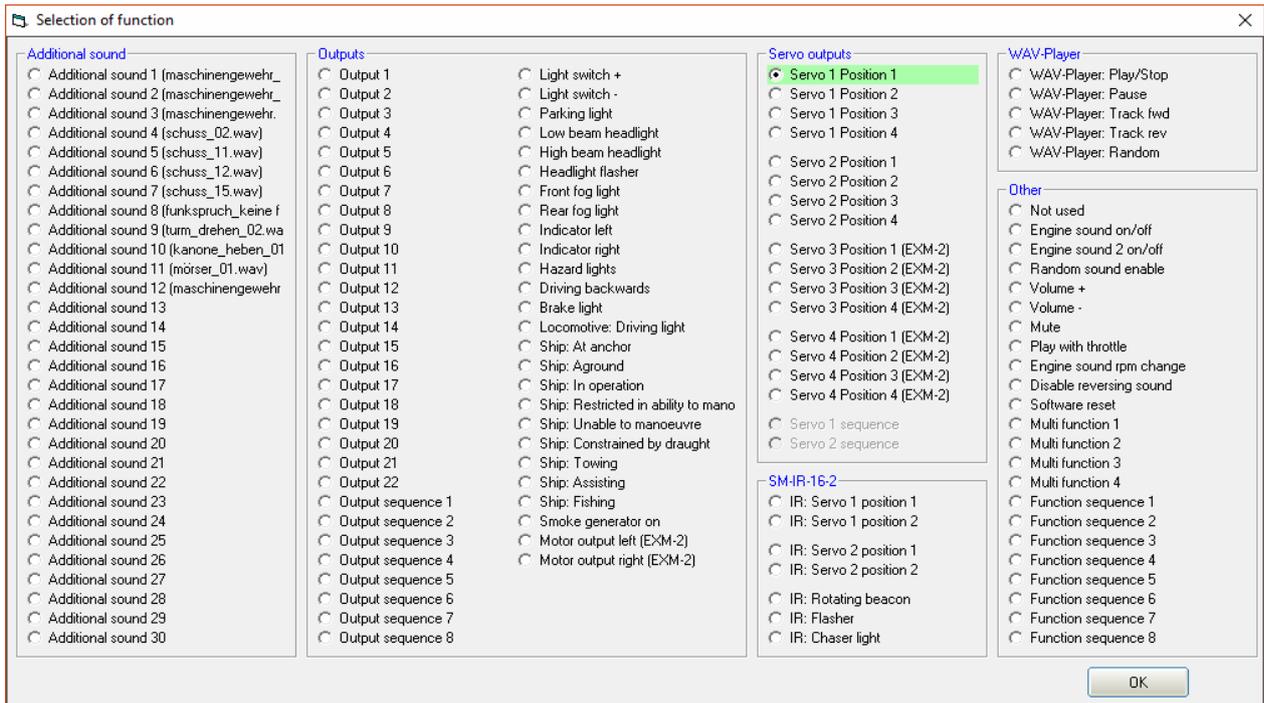
With "Speed" the acceleration (slow or fast) can be set from neutral (motor off) to the positions #1 - #4 (maximum rotation speed).

The motor can be operated proportionally with the direct servo control by a proportional channel.



If the field "Sound when not in home position" is activated, the sound will be played as soon as the motor runs. The motor sound must be set in the sound slots under "Additional sounds" and „Sound from Servo 1 left“, „Sound from servo 1 right“, etc.

Finally the motor movement (forward/backward) must be started. This can be done via a proportional channel or a nautic/multiswitch. If the servo outputs are activated, they can be used in the function selection.



If the movement is activated/deactivated with a proportional channel, we recommended to use the function under "In position (static)".

