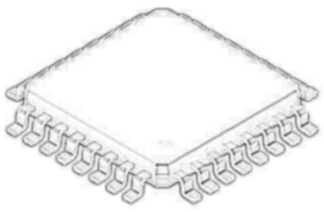
MANUAL

MERF 3.2™

Advanced MOSFET Unit



Upgrade for Automatic Electric Gun

Product installation instruction
Last update in 2011 Nov 14

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www.gatee.eu

GATE

Contents:

I. Overview

Third generation of Mosfets. **MERF 3.2** is programmable by trigger. It has new innovative functions and even smaller dimensions of PCB.

Main Functions

- MOSFET
- Active Brake
- Protections for Li-Poly/Li-Ion/$LiFePO_4$/NiCd batteries
- Short-circuit protection
- Over temperature protection
- Rate Of Fire Control
- 3-rd Burst
- Smart Trigger
- Operating modes
- Programming

Features

- The system works correctly in a wide range of voltages 3.2 - 15V
- Compatibility with the strongest AEG replicas.
- Simple installation
- Full protection
- Very low current consumption in stand-by (**0.15mA**)
- Very low resistance ~**2,4mΩ**
- Compatible with all types of GearBox
- 4 LED Display
- DEANS-T Connectors

Operating Limits

Battery Voltage	**7,2 – 12,8 V**
Battery Type	**NiCd, NiMH, Li-Ion, Li-Poly, $LiFePO_4$**
Spring	**M170, M210**

Absolute Maximum Ratings:

Supply Voltage	**3,2 – 15 V**
Maximum continuous current	**35A**
Maximum current (3 min)	**50A**
Resistance	**2,4mΩ**

II. Functions

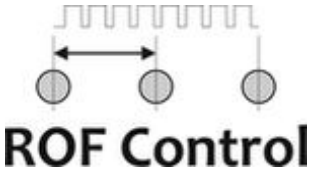
In simple mode: It eliminates arcing of the contacts.
In enhanced mode: It eliminates any loss of energy which occurs while mechanical contacts touch each other. It also makes sure they won't burn unavoidably - the average life of mechanical contacts is 1 year. Thanks to this electronic circuit the battery energy is not lost while burning contacts but directed straight to the motor. In this way we get bigger rate of fire which results in quicker reaction of the trigger.

Active Brake works only in enhanced mode.

Active Brake
The motor and gears at work gather in the kinetic energy. This energy depends mainly on their speed. The maximum speed is reached after 4 shots. For this reason when you release the trigger, the motor will not stop immediately - the energy which is accumulated in it, depending on the amount, allows on few extra shoots.

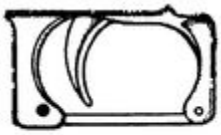
Active Brake functions:
1. In the sniper rifles, and during the shooting on SEMI, **the brake will not allow to compression spring after the shot**. The piston will always stop at the front position, so that will increase gearbox lifespan.

2. **To rise of realism.** After releasing the trigger in real guns extra bullets are not fired, as happens in AEG replicas. We do not waste ammunition.



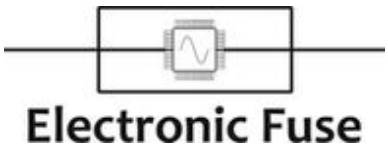
ROF Control

Allows for lossless rate of fire adjustment. Adjustment is possible in the range from 30 to 100%.



Smart Trigger

Allows for faster trigger response. It cooperates with the ROF Control system. During the first shot Smart Trigger sets ROF Control to 100%. After the first shot it is set of pre-programmed value, eg 30%. As a result, the first shot is fired with full rate of fire, and next shots with a reduced ROF. The best effect can be achieved using a battery with higher voltage than the standard. Then we will get faster trigger response at the same rate of fire as in case of standard battery.



Electronics Resettable Fuse

Supports protection:

SCP – *Short Circuit Protection* In the case of short-circuit installations, in milliseconds the system disconnects the battery. **This is necessary for the protection of the Li-Poly.** Shorting Li-Poly battery can cause permanent damage, destruction or even explosion of cells!

OTP – *Over Temperature Protection* Built-in thermometer measures the temperature of the system. If it exceeds a critical value, the system shuts down to prevent its destruction.

UVP – *Under Voltage Protection* Protects rechargeable Li-Ion: Li-Poly / LiFePO4 and NiCd against excessive discharge.

The fuse is reset immediately after the trigger is released. After another of his press, in milliseconds, executes a series of measurements, which determine whether the battery can be safely connected to the replica.

BURST mode allows you to save ammo and make rise of realism.

In **simple mode** the system can replace standard SAFE/SEMI/AUTO selector on:

a) SAFE/SEMI/**BURST**

In **enhanced mode** on:

a) SAFE/SEMI/**BURST**

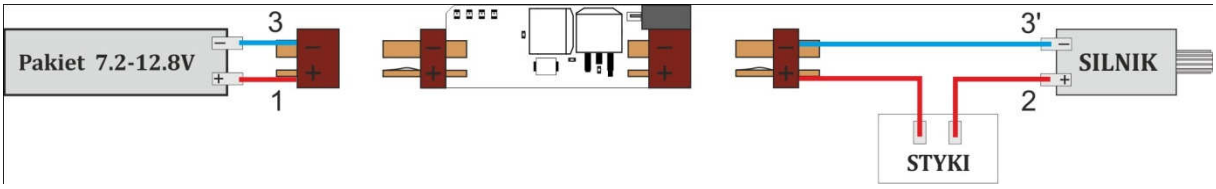
b) SAFE/**BURST**/AUTO

If you release the trigger before end of 3-rd BURST, you can do 1-rd or 2-rd. BURST time is set in menu with **4ms** (0,004s) resolution. The system will actively increase the preset time with a decrease rate of fire caused by discharging the battery.

III. Installation

Thanks two operating modes, system works with **standard** and **modified** installation.

1. Simple installation: *(No modification to your AEG is required.)*

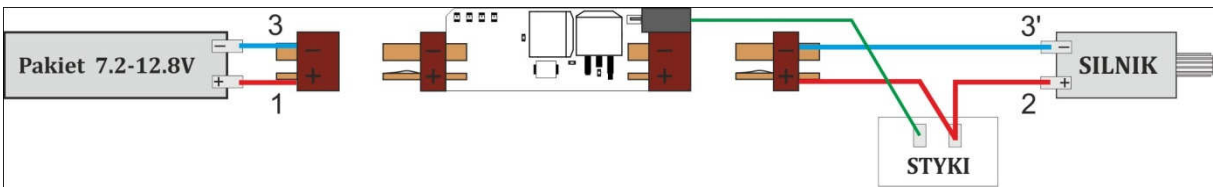


In simple mode, we have just connect system between battery and AEG. We can make configuration using programming button from the kit.

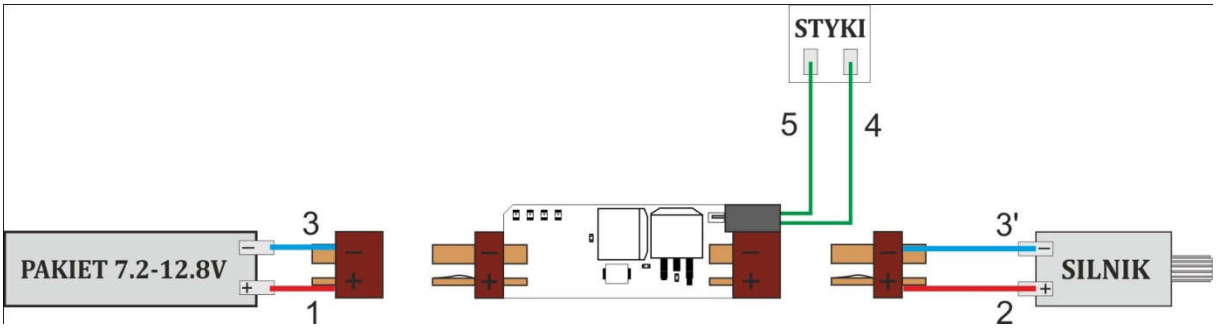
2. Enhanced installation:

To adapt the standard installation AEG to work with MERF3.2 in enhanced mode we have to get to the trigger contacts. In the case of GB v2 contacts are located inside a gearbox. With GB v3 it is simpler because the contacts are located outside of gearbox. If you have never had disassembly gearbox, ask your friend for help.

a) Installation of MERF3.2 without replacement wires. We keep the original wiring, only modifying it. In Tokyo Marui standard to contacts are connected 2 wires – positive from battery and positive to motor. We have to connect them together. For this, we have to desolder one of them from contact and solder to another. In plece of desoldered wire, we have to solder single signal wire from kit. Now, we have just connect system between battery and AEG. Don't forget about signal wire. Connect it to top pin.



b) Replacing the standard for low-resistance wiring in conjunction with a MOSFET allows for maximum efficiency. We recommend the use silicone cable 1.5 mm^2. To contacts we have to solder dual signal wire from kit.



IV. Menu navigation

The system is operated with a trigger or programming button from kit. Recognizes the long and short press.

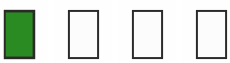
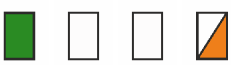
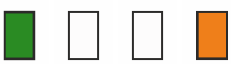
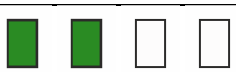
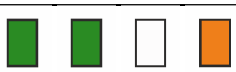
Short press – **NEXT**
Long press – **ENTER**

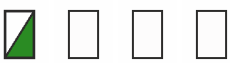
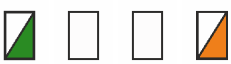
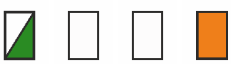
In simple mode to activate programming mode we have just make short press.
In enhanced mode, before programming, we have to disconnect **motor**. The system will recognize this and allow us to activate programming mode.

In the case of incorrect system configuration, we can activate programming mode **connecting battery with pulled trigger**.

Settings are stored in nonvolatile memory. The system remembers the settings after disconnecting the battery.

VI. Menu structure:

Battery	
NiCd 7,2V	
NiCd 8,4V	
NiCd 9,6V	
NiCd 10,8V	
NiCd 12V	
LiPoly 7,4V	
LiPoly 11,1V	
LiFePO4 9,6V	
LiFePO4 12,8V	
ROF Control	
30%	
40%	
50%	
60%	
70%	
80%	
90%	
100%	
Smart Trigger	
OFF	
ON	

Burst time approximately		
96ms		
128ms		
160ms		
192ms		
	224ms	
	288ms	
	352ms	
	416ms	
Burst time precisely		
+0ms	+0ms	
+4ms	+8ms	
+8ms	+16ms	
+12ms	+24ms	
+16ms	+32ms	
+20ms	+40ms	
+24ms	+48ms	
+28ms	+56ms	
Operating modes		
Enhanced mode **semi/auto**		
Enhanced mode **semi/burst**		
Enhanced mode **burst/auto**		
Simple mode **semi/auto**		

Simple mode **semi/burst**	
Save	

VI. Burst setting

MERF 3.2 allows you to use 3 rd burst firing mode. It supports automatic electric guns which rate of fire range is from 7 to 31 shots per second. To calibrate burst we have to set Time of burst in the menu.

The theoretical explanation

"Time of burst" is time of 3 shoots expressed per unit of time (milliseconds - 1ms = 0.001 seconds). We can set it up with a resolution **4ms** for times **96ms** - **220ms**, and with a resolution **8ms** for times **224ms** - **472ms**.

Approximately table:

Time of burst	Rate Of Fire in shoots per second
96ms	31 s/s
128ms	23 s/s
160ms	18 s/s
192ms	15 s/s
224ms	13 s/s
288ms	10 s/s
352ms	8 s/s
416ms	7 s/s

"Time of burst precisely" adds to **"Time of burst"** selected value.

Example 1:

Time of burst: 160ms
Time of burst precisely: +8ms / +16 ms
Result : 160ms+8ms=168ms

Example 2:

Time of burst: 224ms
Time of burst precisely: +8ms / +16 ms
Result: 224ms+16ms=240ms

We can set 64 different times of burst, on the display which has only 4 segments.

The practical explanation

Time of burst can be set for **hearing** or making a **measurement of rate of fire** by a microphone or chronometer.

a) Setting the burst on the ear if you don't know the rate of fire:

1. Set approximate **Time of burst** on 3 shoots
2. Reduce the approximate **Time of burst** one level
3. Check if your AEG gives 2 shots go to next step, if it does not go back to Step 2
4. Now go to the "Burst time precisely," and increase it by one level
5. Check if your AEG gives 3 shots go to next step, if it does not go back to Step 4
6. End

In this way, we set the burst on 3 shots, and we make that the piston will stops in the front position without causing stress in the gearbox.

a) Setting the burst if you know the rate of fire:

If we know the rate of fire of our AEG, we just have to type in a time of 3 shots to the menu.

We make the conversion in a simple way according to the formula:

Time of burst [ms] = 3000 / rate of fire [s/s]

Example for rate of fire 20 shots / second:

3000 / 20 = 150ms

III. GATE Limited Warranty Policy

1. The product must be delivered with proof of purchase and properly completed Form Guarantee. Installing the product is not considered as a warranty repair.

2. To receive a Guarantee form, please contact us at *service@gatee.eu*.

3. The warranty is valid for 24 months from date of purchase.

4. Repairs will be made as soon as possible, not exceeding 14 working days.

5. All repairs and structural modifications made by the purchaser will result in termination of a contract of guarantee.

6. The guarantee may be rejected if product failure is the result of improper operation, installation, maintenance, and damage to mechanical, thermal, chemical, water, pollution, atmospheric phenomena.

Airsoft Technology