



# Power Electronics

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**Assembly instruction 1-Phase - Controller 5Step  
with generator lamp and charging curve  
13V-14V 33A**

E\_F4123

(c)09.2019

## MASSEMBLY INSTRUCTION

## AC alternator controller 2-wire with controller 14V 33A 5Step

The electronic box is a contactless controller and power rectifier in one housing.  
The modern concept using micro-chips enables connection to all common Alternators in which permanent magnets are used.  
The special voltage regulation allows to use lead batteries and LiFePo4 batteries from 5Ah to 30Ah.  
However, they must be of a type suitable for the application (do not use no-name batteries).

### PRECAUTIONS :

- Please read the assembly instructions completely and carefully.
  - Only work when the motor is not running
  - Only plug in the cables without voltage
  - Disconnect all electronics from the vehicle electrical system during welding work.
  - Start aid only 1 min. with max. 15V operate
  - When charging the battery, disconnect the plus from the on-board power supply.
  - Operation without battery or WITHOUT COOLING leads to failure
  - The alternator voltage can be up to 80V -> danger to life !
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- The installation of the controller requires specialist knowledge and tools.
  - Warranty, replacement or recourse claims refer only to the delivered module.

### COOLING :

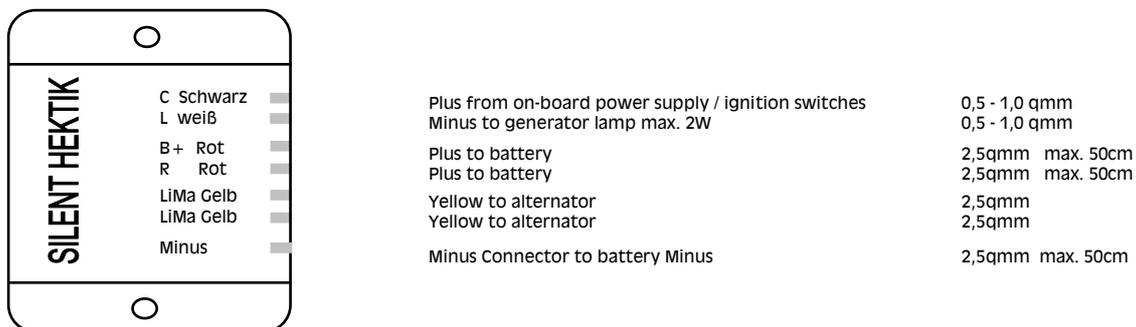
During operation of the alternator controller up to 35W heat is generated. In order to ensure safe continuous operation the heat must be dissipated by the airstream. Without airstream or in slipstream comes it to failure. Under all operating conditions, 55°C should not be exceeded in the long term.

Under no circumstances should the controller be mounted next to an exhaust manifold, in the cabin or cockpit. because the electronics there heat up too much.

### BATTERY - on-board voltage - 5Step - loading control :

The on-board voltage is regulated in five stages. First the battery is pre-charged with 13.2V and then in approx. 25 minutes gently up to 14.2V 1% ready to use. After 90 minutes the charge is switched to trickle charge. This allows lead batteries as well as LiFePo4 rechargeable batteries can be used.  
With increasing age of the battery and with unsuitable battery types (cheap goods) the full board voltage is usually not reached. If the batteries are damaged, excessive voltage happend.  
The generator lamp goes out as soon as the alternator generates sufficient energy.  
Use maximum one 12V 2W bulb or one 12V LED. The alternator controller switches the minus .  
With different injection models a charge of the battery can be reached absolutely only over 3000U/min.

### CONNECTIONS for the version with combination plug:



The minus cable in 2.5 qmm (blue) from the controller to the battery is essential.  
Replace all rubber buffers, rubber washers or rubber nuts with metal parts.  
A fuse between alternator controller and battery can lead to total failure in case of "loose contact".  
Crimp connectors made of phosphor bronze must be used; e.g. from Tyco. When using inferior Do-it-yourself store crimp connectors it will lead to problems or failure and it will void the warranty.  
Please protect all connectors only with plug grease order no. M5103 ; NO battery pole grease ! NO copper paste !  
Technical changes & errors excepted - All data without guarantee 59425 Unna Germany EU

**5Step IUU Charging Management:**

The F4123 controller can be used for lead batteries, but especially for modern LiFePo4 batteries, due to the 5Step charging technology.

**The F4123 has the following protection functions:**

At >14.5V at B+ the overvoltage protection OVP switches off the alternator output to the battery.  
 At >70°C the generator lamp starts flashing.  
 As soon as the temperature falls below 70°C, the control lamp goes out again.

**Assembly and wiring:**

Less is more: The battery and the regulator belong with short 2.5qmm cables for plus and minus directly to an airy place next to the engine. Battery disconnectors and fuses are superfluous and can be a hazard. With very short cable lengths from the controller to the battery, the capacitor is not necessary. Saves weight and makes the wiring harness lighter and more reliable.

If the battery cables are longer than 50cm and/or have too small a cross-section, malfunctions can occur. Operation without battery minus leads to failure. The minus must always be made with a separate copper cable. Metal parts are not a replacement. During operation, the LiMa controller gets hot and must therefore be cooled by the airstream: Housing temperature <55°C. Only use Tyco phosphor bronze crimp connectors. Blue or red DIY store crimp connectors or brass plugs belong in the trash can and void the warranty.

**Incorrect connectors on the original alternator cables:**

The original alternator leads are provided with brass plugs. These inferior plugs are overstrained by the current and have only a small spring force, which leads to spark fire and failure. In any case, replace with Tyco Phosphor Bronze plugs.

**Malfunctions due to low-quality, cheap amperemeters**

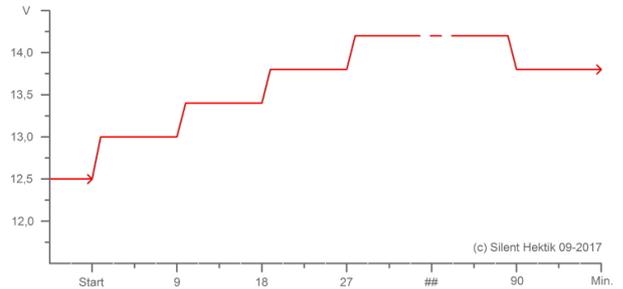
To measure in the past the charging current, resistors, shunts, were previously installed in the lead to the battery. At a typical shunt of 0.10hm a voltage drop of 1V occurs at 10A. Instead of the 14.2V only 13.2V arrive at the battery. Direct, precise voltage measurement on the battery is therefore no longer possible. Therefore, only modern, high-quality amperemeters with Hall sensors should be used, as these do not cause any losses. However, they should really be contactless Hall sensors that can be mounted around the charging cable like a pliers amperemeter.

**Battery disconnecter:**

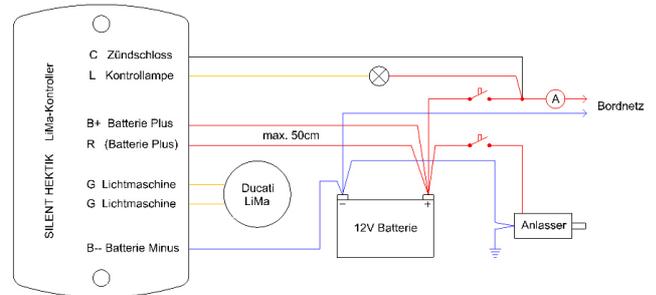
Billions of cars and motorcycles operate absolutely reliably without a battery disconnecter, because modern semiconductors in modern alternator regulators make this possible. Battery disconnecters are completely obsolete, actually only useless weight, and also pose a danger. When disconnecting, powerful voltage peaks occur which can destroy avionics and all electronics on board. With a smart wiring harness even the capacitor can be omitted and up to 1kg of weight can be saved. With a LiFePo4 battery even up to 7kg.

**Attention, mortal danger:**

Alternator regulators, no matter if our or other brands, as well as starter batteries must not be mounted in the cockpit of the cabin ! The regulator will inevitably become defective due to insufficient cooling and there is a risk of damage and/or burns and poisoning from sulphur gases and combustion residues. This applies to normal Pb, maintenance-free and LiFePo4 batteries. Alternator regulators always belong in the front, where they can be cooled by airflow. The starter battery belongs with short connections directly next to it. All other solutions, e.g. on the MCR-01, can be extremely dangerous for users and passengers.



5Step IUU charging technology for LiFePo4 und Pb



Installation in the front with good cooling by airflow and max. 50cm cable to the battery

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