



**Characteristics:**

- **Reduced heating of the regulator and stator winding!**
- Input AC voltage: 15..280VAC (protection is activated at 300VAC)
- Voltage regulation: **14.45VDC**
- Minimum battery voltage to start charging: 6VDC
- Maximum output current: **10A/15A@5m/s** air flow
- LED indicator: turns off when it reaches the set voltage
- Ambient temperature: -25..+45°C (installation outside the engine compartment)
- Temperature protection: automatic shutdown, if heated above 70°C
- Power consumption at rest: 0.6Ah per year
- Massive cooler 100\*88\*25mm (A) and 100\*88\*35mm (B)
- **Connection: 80 cm cable with 4 wires without connector**
- It is possible to connect it to 4 or 5 wires (without Ignition+) instead of the original regulator/rectifier
- Fastening: **required drilling holes through the AL heatsink**
- Warranty: **3 years**

The 14V-1FHV-10A-A/B-LI regulator uses the serial principle of battery charge regulation. The regulator is supplied in A (h=25mm) and B (h=35mm) heatsinks.

**The original regulators for outboard motors are also of the series type** and it is not recommended to replace them with a parallel type of regulator due to increased heating of the stator windings of the AC generator. Heating of the regulator and stator winding is proportional to the output current of the regulator, i.e. consumption, which reduces unnecessary heating of the regulator and stator winding when the generator is able to provide more current than the consumption (at a higher number of revolutions).

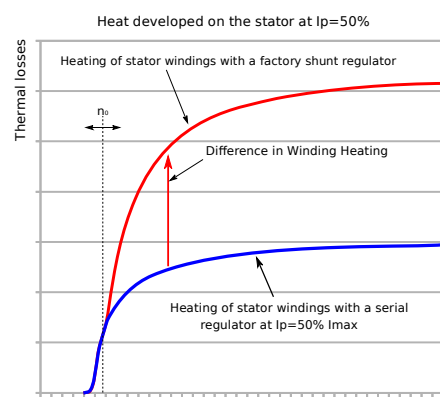
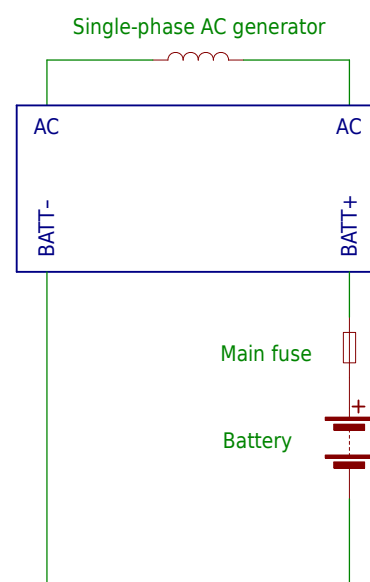
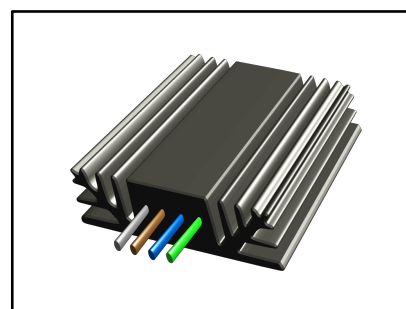
Reducing the current consumption from the stator windings reduces the motor load with unnecessary losses resulting in lower fuel consumption or faster acceleration.

Temperature protection protects the regulator from destruction due to overheating. The temperature sensor is placed next to the thyristors of the series rectifier. If overheating occurs, the controller will stop working until the temperature falls below the limit. We do not recommend installing this regulator in the engine compartment because the ambient temperature there is over 45°C. For installation in the engine compartment, the modified regulator must have a temperature limit of 100°C and then there is no warranty period.

The regulator has standard connections (2 input wires, plus, minus). If there is a Ignition+ wire on the installation, it does not connect.

The built-in LED indicator turns off when the regulator reaches the set voltage at its output terminals. Then the voltage on the battery is checked and it must be from 13.9 to 14.4VDC @20°C for the battery to be fully charged. As boats have relatively large batteries in relation to the power of the generator, the turning off of the LED indicator will not happen immediately when the rpm increases, but it takes a long time for the voltage on the battery to rise.

**14V-1FHV-10A-A-LI**  
**14V-1FHV-10A-B-LI**



**Important**

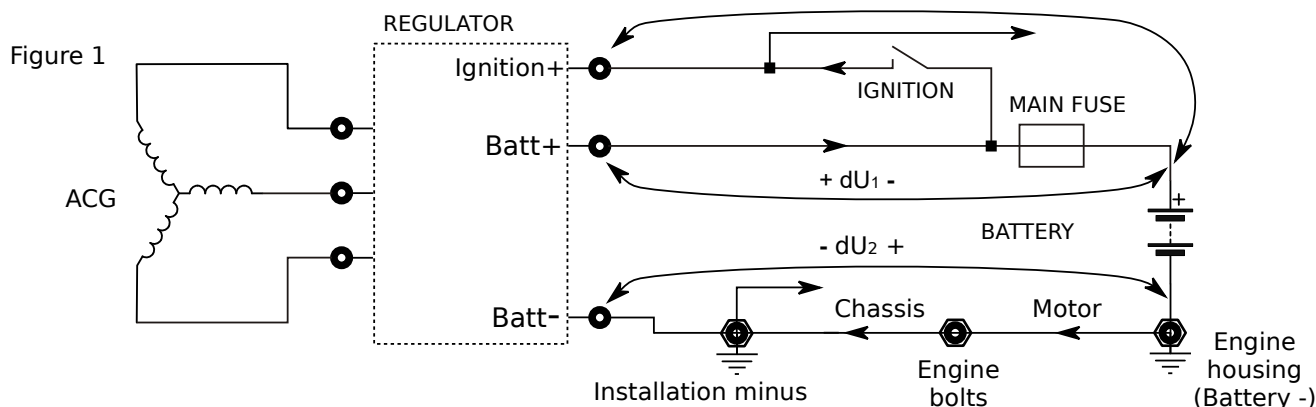
- The battery must be in good condition and able to accept current from the generator.
- Regulator must be installed in a well-ventilated area where they are not exposed to hot air (from the engine, radiator, or exhaust) and water, mud, and small rocks from the wheel.
- The rated current of the regulator must be equal to or greater than the generator's production capacity.
- Never disconnect the battery while the engine is running (i.e., while the generator is producing voltage)!
- When washing, **do not use a high-pressure washer** to clean the regulator, as water under high pressure can enter the regulator and cause failure.
- Be careful not to unnecessarily overload the 12V installation with new loads, as this can cause voltage problems.
- Failure to follow these measures can cause damage to electronic components connected to the battery or the regulator itself, and the warranty will not be honored.

**Conditions for installation and maintenance of the charging system**

- The battery must be fully charged on a charger (as before the start of the riding season)
- Check the **battery connections, fuse, and negative installation connections to the chassis and connectors** through which charging takes place.
- A low voltage on the battery is the result of increased voltage loss on poor connections in the installation from the generator to the regulator and to the battery. There may also be connector burnout carrying current to the regulator. It is necessary to check the voltage drop  $dU_1$  and  $dU_2$  with a DC voltmeter, especially during increased gas. See Figure 1. It must be less than **0.26VDC ( $dU_1$ )** in the positive circuit and less than **0.06VDC ( $dU_2$ )** in the negative circuit. This error is common with smaller cross-section wires in the

installation.

- Another sure way to confirm the problem with poor connections from the regulator's plus and minus to the battery's plus and minus is to temporarily connect the plus and minus of the regulator directly to the plus and minus of the battery with a 2.5mm<sup>2</sup> wire. The existing plus supply (installation) to the regulator should be left unconnected and isolated. A problem may arise if the regulator has a Ignition+ wire. It should also be temporarily connected to the battery plus. Connections must be secure, as connection loss while the generator is running can destroy the regulator. If the regulator works well with direct connections, then it is necessary to resolve the transition resistances in the installation or leave the direct connection with the installation of an additional 30A fuse in the battery plus circuit. If there is a Ignition+ wire, it is possible that leaving it on the permanent plus will create battery discharge. It should be considered that factory regulators usually measure battery voltage on that wire. In the case where the Ignition+ wire is left on a poor installation (high  $dU_3$  voltage), it can signal to the regulator that the voltage is too low, which will then cause the battery voltage to rise. And a voltage above 15V will surely destroy the battery.
- Check that the generator does not have a connection to the housing (methods are described on [www.regulator-rectifier.sper.hr/troubleshooting.html](http://www.regulator-rectifier.sper.hr/troubleshooting.html)). The generator (ACG) must not have an electrical connection to the housing (which is possible in the event of a fault). It is best to test the insulation at 1000VDC relative to the housing. The insulation should be greater than 10MR and independent of the test voltage and polarity. The insulation resistance can decrease with heating, so the resistance can fall from 1000MR to 100MR (measured with 1000VDC).
- Check that all generator windings have the same resistance and voltage (three-phase generator).
- The generator must provide at least 15VAC at idle throttle (measured between wires).



## Before mechanical installation, check if the regulator works properly (without shortening the cable length)

- Connect the regulator well to the provided wires (**BLUE=Battery+**, **YELLOW-GREEN=Battery-**, **BROW and GRAY wires to the AC generator**) - connection to 4 wires (ie to 7, if it is double plus and minus) - figure 2. If the installation has a ignition+ wire, it does not connect.
- The measured voltage during operation when the regulator is charging should be **13.9..14.7V** depending on the throttle. At idle throttle, the voltage will be lower because the generator provides too little power.

## Choose a well-ventilated installation location that is not exposed to water and mud

- Holes for mounting can only be drilled through the ribs (or threaded), while nothing should be drilled through the cast part. See Figure 4.
- Do not install the regulator by attaching it to flat plastic surfaces, as this will reduce airflow and cooling. Make a few millimeters of clearance. We recommend placing a 3mm thick rubber pad with a diameter of 20mm under the regulator to prevent bending that could cause the cast mass to detach from the heat sink.
- After mounting, shorten the wires and connect them. If the connector from the previous regulator is good, we recommend using it.
- You can protect the connector from the outside with silicone to prevent water from entering the wires and connector.

## Maintenance

- Ensure that the battery can accept current from the generator, i.e., it is not completely empty. Test the battery state with lights. If the motor uses an electric starter, this is not necessary.
- A completely empty battery must be charged on a charger first. Do not start the motor through cables, as this can destroy the voltage regulator.
- The battery needs to be replaced when you notice that the light intensity starts to decrease rapidly at idle (because the capacity is significantly reduced and the internal resistance is increased).
- Do not disconnect the regulator and battery while the motor is running, as this will destroy the regulator.
- Check the battery and regulator connections.
- The regulator must maintain a voltage of **13.9 to 14.7V** for proper battery charging.

## Lifespan

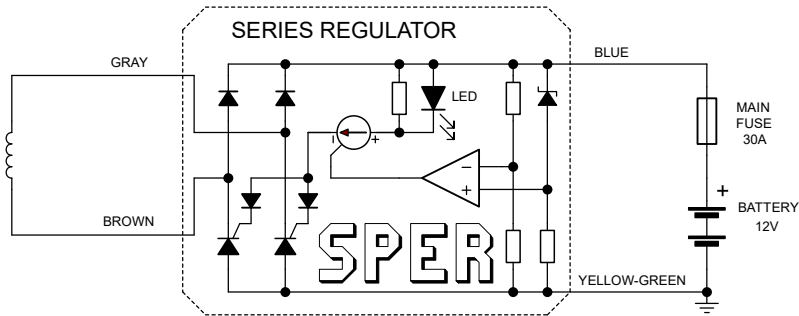
- With regular maintenance (obligatory at the beginning of the season or after a long break) and installation in a well-ventilated location, the regulator should work well for a long time (there are no components with a short lifespan).
- The warranty will not be honored if the regulator is incorrectly connected, if there is a disconnection from the battery, if it is clogged with dirt, or if it is mechanically bent. We can reliably determine the cause of failure due to these errors by inspection.

## Built-in LED Indicator

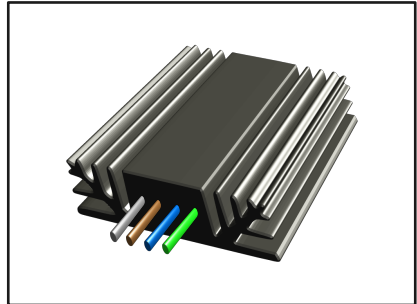
The built-in LED indicator on the regulator provides information:

- If the generator does not provide AC voltage, the LED should not light up. If lit, there is a fault in the generator, wiring, or there is a load connected to one of the AC generator wires to ground. This is most often the case with motorcycles that have a relay for automatic lighting, and in that case, along with the installation of the regulator, the installation must also be modified. If it is a wiring or alternator fault, the battery charge will be poor and the battery will discharge while the motorcycle is not running.
- If the generator provides AC voltage, but the battery does not reach 14V, the LED will light up permanently. If the voltage does not rise, perhaps the generator is damaged, the gas is too small, the resistance of the installation to the regulator (plus and minus) to the battery is too high, one phase is interrupted or the voltage is too low, i.e. perhaps the phenomenon is related to a low number of revolutions or a higher load (additional lights, fuel pump draws too much current, battery draws too much current, etc.).
- If the generator provides AC voltage and the battery reaches 14V, the LED will be off. This is also a sign that the minimum voltage has been reached and that charging is ok. on the regulator terminals. It is also necessary to check whether the battery voltage is then **13.9 to 14.5 VDC** (at medium engine speed). A battery charge voltage **below 13.9V @20°C will not ensure a full charge of the battery**, which can cumulatively drain and damage the battery after some time. Lead-acid batteries are damaged when operating at less than 70% charge. A lead-acid battery lasts longer, if the charging voltage is closer to 13.9VDC, but the charging time is then slightly longer.

Figure 2 - Regulator connection (4 wires):



**14V-1FHV-10A-A-LI**  
**14V-1FHV-10A-B-LI**



Wire	Sper regulator	
Battery +	blue	
Battery -	yellow-green	
AC generator	gray	
AC generator	brown	
Ignition+	no connect	

Figure 3

