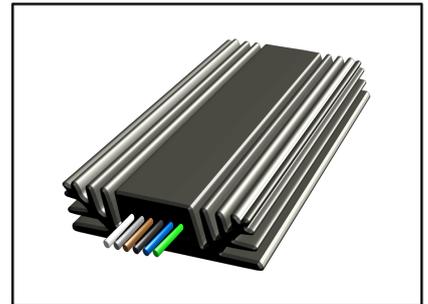




Characteristics:

- **Reduced heating of the regulator and stator winding!**
- Input AC voltage: 15..200VAC (protection activates at 280VAC)
- Voltage regulation: **14.45V/14.7VDC**
- Minimum battery voltage for charging start: 6VDC
- Maximum output current: **15A/30A@5m/s** air flow
- LED indicator: turns off when the target voltage is reached
- Ambient temperature: -25..+45°C
- Temperature protection: automatic shutdown if overheated above 70°C
- Overvoltage protection on output: at $U_{iuz} > 40VDC$ in milliseconds
- Standby current consumption: 0.6Ah per year (**1.2Ah@Ignition+ connected to Batt+**)
- Massive heat sink: 142*88*25mm (AX) and 142*88*35mm (BX)
- **Connection: 80cm cable with 6 wires without connectors**
- Can be connected to 5, 6, 7, and 8 wires instead of the original regulator
- **Mounting: requires drilling holes through the AL heat sink**
- Warranty: **4** years for AX and **5** years for BX housing
- It can replace Shindengen SH847 up to 30A current

14V-3FHVSP+30A-AX-KS-LI
14V-3FHVSP+30A-BX-KS-LI



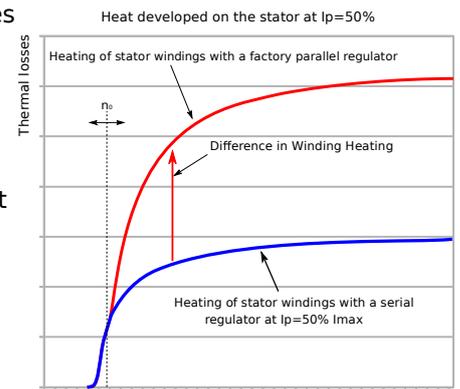
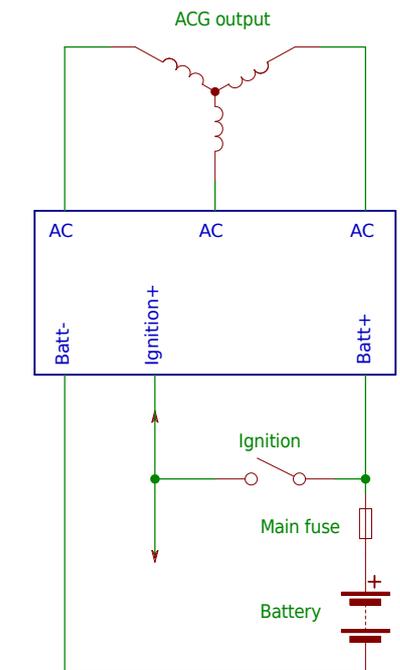
The 14V-3FHVSP+30A-AX-KS-LI regulator uses a serial principle of battery charging regulation in combination with a parallel (shunt) protective regulator, allowing it to work seamlessly even at high engine speeds. The heating of the regulator and stator winding is proportional to the output current of the regulator, i.e., consumption, which reduces unnecessary heating of the regulator and stator winding when the generator is capable of providing more current than consumption (at higher rpm).

Temperature protection protects the regulator from destruction due to overheating. The temperature sensor is placed next to the thyristors in the serial operating mode. If overheating occurs, the serial regulator will stop working until the temperature drops below the limit.

The combined 3FHVSP regulator consists of a serial regulator and a parallel(shunt) protective regulator that activates at an increased battery voltage (+0.25V). The serial three-phase regulator, due to the inductance of the winding at high frequencies, cannot turn off one of the thyristors due to the overlap of the rectified DC currents in the remaining two phases, and the voltage on the battery begins to rise. The activation speed of the parallel (shunt) regulator is in milliseconds. As soon as the battery voltage drops, the serial regulator resumes regulation. The regulator is supplied with a 42% longer A and B heat sink (AX and BX designation).

Reducing the current consumption from the stator windings reduces the stator winding temperature and regulator temperature, reducing the motor load with unnecessary losses, resulting in reduced fuel consumption or faster acceleration. Therefore, this regulator is the best choice for all engines that operate at high speeds (sports motorcycles).

In addition to standard connections (3 input wires, plus, minus), the regulator has a Ignition+ input that activates the serial regulator. The Ignition+ wire of the regulator must be connected to the permanent plus (Battery+) when not provided for in the installation. The Ignition+ wire must be obligatorily connected to the Ignition+ (Ignition) installation when the motorcycle has any load (e.g., automatic headlight ignition) connected to one of the AC generator wires to prevent battery discharge when the motorcycle is not in use. The built-in LED indicator turns off when the regulator reaches the target voltage on its output terminals. Then, the voltage on the battery must be between 13.9 and 14.4VDC @20°C for the battery to be fully charged.



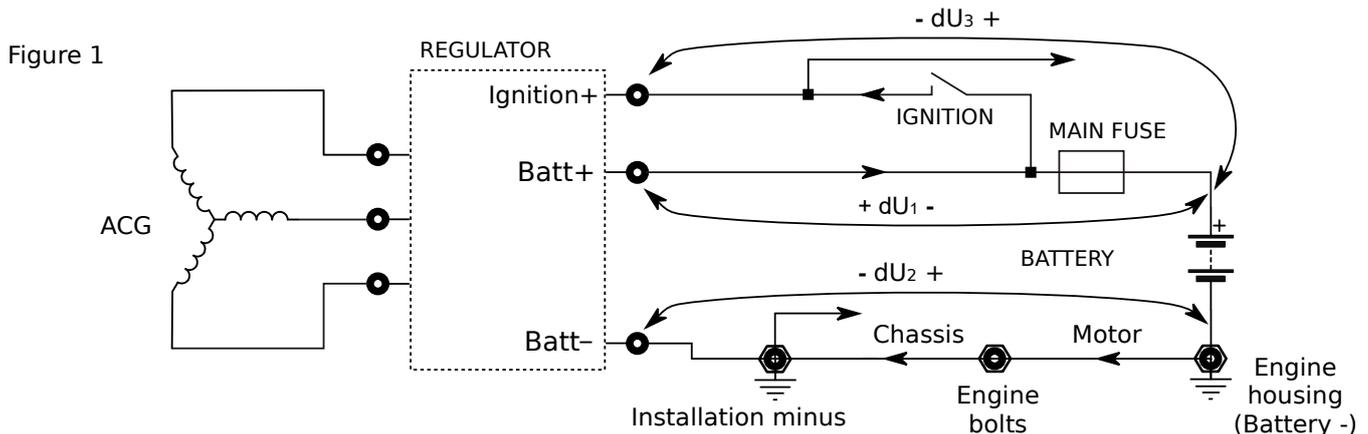
Important

- The battery must be in good condition and able to accept current from the generator.
- Motorcycle regulators 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 2.5mm² 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). 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 gas (measured between wires).

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

- Connect the regulator to the designated wires (**WHITE=Ignition+**, **BLUE=Battery+**, **YELLOW-GREEN=Battery-**, **3 wires to the generator**) – connection to 6 wires (or 8 if there is a double plus and minus) – see Figure 2. If the installation does not have a ignition+ wire (WHITE on the regulator), then **connect WHITE to BLUE** according to Figure 3. **The WHITE wire must not be left unconnected!**
- 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.

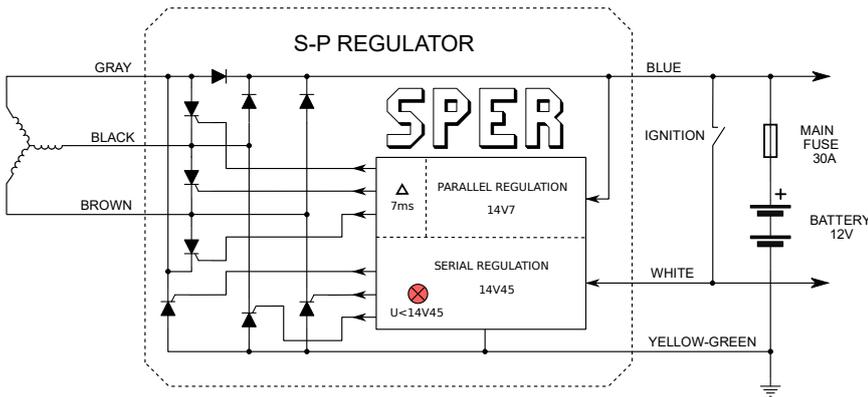
Built-in LED Indicator

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

- If the generator does not provide AC voltage, the LED diode should not light up. If it does, the error is in the generator, wiring, or there is a load connected to one of the AC generator wires to the mass. In the latter case, we recommend connecting the WHITE wire (Ignition+) to the Ignition+ of the motorcycle installation. This is usually the case with motorcycles that have a relay for automatic headlight ignition. If it is a wiring or generator error, battery charging will be poor, and the battery will discharge when the motorcycle is not running.
- If the generator provides AC voltage but the battery does not reach 14V, the LED diode will light up continuously. If the voltage does not rise, it may be that the generator is damaged, the throttle is too low, the resistance of the installation from the regulator to the battery is too high (plus and minus), one phase is broken, or it provides too little voltage, i.e., it may be related to a low number of revolutions or 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 diode will be off. This is also a sign that the minimum voltage has been reached and that charging is OK on the regulator's terminals. It is necessary to check if the voltage on the battery is **13.9 to 14.4VDC** (at medium engine rpm). A charging voltage **below 13.9V @20°C will not ensure full battery charging**, which can cumulatively drain and damage the battery over time. Lead-acid batteries are damaged when they operate at a charge level below 70%. Lead-acid batteries last longer if the charging voltage is closer to 13.9VDC, but the charging time is then slightly longer.

Universal three-phase serial-parallel 30A regulator/rectifier for motorcycles

Figure 2 - Connection with Ignition+ (Ignition) wire in the installation (6 wires):



14V-3FHVSP+30A-AX-KS-LI
14V-3FHVSP+30A-BX-KS-LI

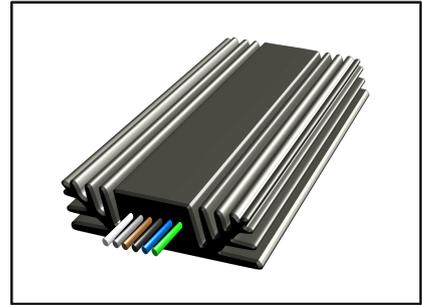
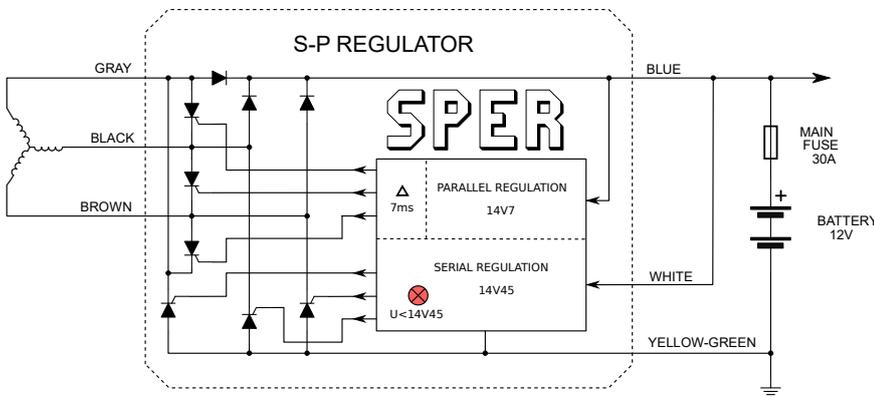


Figure 3 - Connection without Ignition+ wire in the installation (5 wires):



Wire	Sper regulator	
Battery+	blue	
Battery-	yellow-green	
AC generator	gray	
AC generator	black	
AC generator	brown	
Ignition+ (Ignition switch)	white	

Figure 4

