

Removing and fitting the car battery to the vehicle

- switch off the engine and all electrical appliances in the vehicle
- use insulated tools to avoid possible short circuits
- first disconnect the negative pole - MINUS, then the positive pole – PLUS
- loosen the battery retention system in the vehicle, remove the battery and insert a new one, fixing it properly
- when installing the new battery, make sure to observe the correct polarity, first connect the positive terminal - PLUS, then the negative terminal - MINUS
- battery terminals and poles must be clean, lightly lubricated with petroleum jelly and fit together with the whole surface to make the connection well conductive - otherwise high transient resistance, poor car battery performance at start-up or up to melting of the car battery contacts
- for vehicles with a 24 V system - install 2 identical batteries, always replace both batteries with new ones, it is not recommended to combine a new battery with an older one - the new car battery will be overcharged and the older one will not recharge - shortening the service life

Car battery maintenance, operation and charging

Car battery operation

- the new car battery is already filled from the factory with electrolyte (H₂SO₄ solution) with a density of 1.28g/ml³ and fully charged for immediate use.
- the car battery is normally charged by the vehicle's alternator in the range from 13.8V to 14.6V - when the engine is running, the car's appliances and the engine draw power from the alternator, not the car battery, and the car battery is recharged at the same time
- if we drive up to 30km a day and start 3 or 4 times, light up etc. the car battery is not enough to recharge and needs to be recharged once every two months. Otherwise, the battery is deeply discharged and sulphated, which reduces the life of the battery.
- check the charging and state of charge of the battery at least twice a year, if it is possible to check the electrolyte level of the car battery, do so.

• TRUCK TRANSPORT

- note that this is a starter battery, not a traction battery.
- if car batteries are used as a source of energy when drivers stay overnight (heating, TV, coffee machines, computer and other appliances), they need more frequent maintenance.
- Car batteries should be removed from the vehicle and recharged at least once every three months - the electrolyte density should be 1.28 g/ml³ (100%). You will be rewarded for your care with a significantly longer battery life.

Charging the car battery

- if the car battery voltage drops below 12.5V, the battery must be recharged
- before charging, remove the battery from the vehicle and place it in a well-ventilated area
- check the electrolyte level, which must be 10 mm above the plates if the level is lower, top up with distilled water - never exceed the maximum marked electrolyte level - in **operation there is a risk of electrolyte leakage outside the battery.**
- ATTENTION!!! Highly explosive gas is formed during charging and an explosion may occur!
- if the voltage drops to 12.2V, recharge the battery with the charger
- when the voltage drops to 11V, it is very difficult to charge Ca/Ca batteries properly, they require special procedures of subsequent charging, which cheap hobby chargers are not capable of. In the case of a deep discharge to 10.5V, they are usually completely destroyed.
- Connect the charger to the car battery first and then to an AC power source. Disconnect it in reverse order
- when charging, the electrolyte must not leak from the cells. The temperature of the car battery must not exceed 40°C. When the charging temperature reaches this temperature, discontinue
- check the electrolyte level at the end of charging and refill with distilled water if necessary
- systematic overcharging or undercharging of the car battery is harmful and shortens the service life.
- charge the battery with a current of 0.1 capacity to full state (example charge a 44Ah battery with 4.4 A - charge the battery for 10 (4.4A * 10h = 44Ah capacity)
- fully - deeply discharged battery must be recharged in the shortest possible time, otherwise the battery will be irreversibly damaged - a battery permanently maintained in an insufficiently charged state is destroyed (sulphated), its full capacity cannot be restored, nor can the full capacity of a battery that has been operated at a low electrolyte level, below the minimum point
- for a charged battery we measure more than 12.6 V with a voltmeter, the electrolyte has a density of 1.28 g/cm³
- full state of charge is confirmed if the density and voltage values obtained remain unchanged after a further two hours of measurement

Ca/Ca car batteries must be charged with an automatic charger which adjusts and monitors the charging current level by itself

- AGM, GEL batteries can only be charged with chargers that have a mode for charging AGM/GEL batteries

Checking the state of charge of the car battery – measuring voltage and electrolyte density

Leave the battery at rest, i.e. measure it for several hours after driving or charging. Use a voltmeter/hydrometer and measure the car battery voltage at rest/electrolyte density. Then we follow the attached table.

Charge state	100%	70%	50%	25%
Electrolyte density	1,28 g/cm ³	1,23 g/cm ³	1,19 g/cm ³	1,14 g/cm ³
Battery voltage	More than 12,6V	12,4 - 12,54V	12,24 - 12,4 V	11,88 - 12,18V