

Issue no. 01/2019

Mechanical overload due to starting when the engine is coming to a stop

When an engine is shut off, it continues to run in the same direction for several seconds, depending on its size, mass, and add-on part (e.g., generator). Due to compression in the respective cylinders, it also swings back and forth just before coming to a stop—that is, opposite the normal running direction. If the engine is started again at precisely this point in time, then these forces also act on the starter motor. Depending on the engine and design, this mechanical overload can lead to deformations, cracks, and fractures of individual components (e.g., pinion, shaft, flange, and free-wheel clutch).

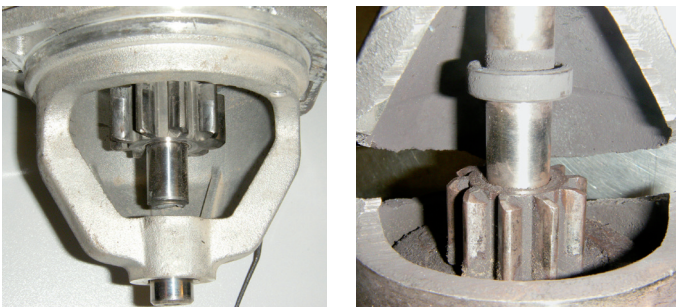


Figure 1: Broken starter motor components: left, shaft; right, flange

To prevent the engine from being started while it is still running or coming to a stop, the installation of a starting/blocking relay is recommended. It is installed between the ignition switch and terminal 50 of the starter motor and connected to the alternator at W.

Actuating the ignition switch supplies operating current to the relay and control current to the starter motor at terminal 50. As soon as the engine reaches the point of self-sustained operation, the alternator also starts to generate current and sends a signal via W to the relay. The control current to terminal 50 is thus cut off so that the starter motor cannot be actuated for too long.

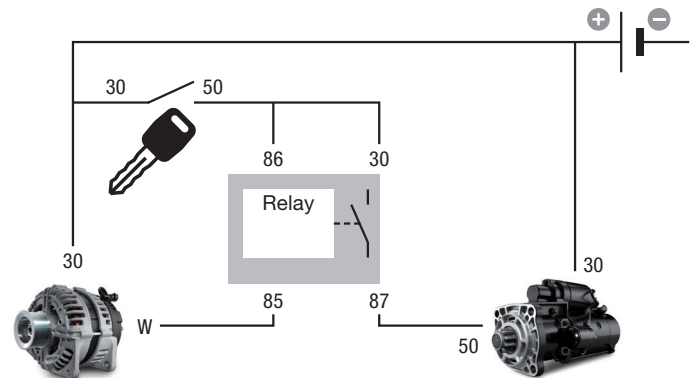


Figure 2: Wiring diagram for the starting/blocking relay

Because the relay receives a continuous signal from the alternator during operation, it is not possible to start while the engine is running. An integrated delay timer also prevents a connection to terminal 50 for several seconds after the motor is shut off. This ensures that the engine can only be started again after it has reached a full stop.

→ **IMPORTANT!** *Without a starting/blocking relay, the starter motor may be actuated for too long despite a successful starting process, or while the engine is still running or coming to a stop!*

» See also Issue no. 02/2017: Starter motor failure due to overload