

## Window lifters

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### Function

Most modern vehicles feature electric window lifters (power windows) alongside manual lifters. Electric window lifters are controlled using buttons in door trim panels. For central control, there is usually a panel featuring buttons for all electric window lifters in the vehicle in the driver's door. Occasionally there are also controls located in the centre console.

Electric window lifters on more recent vehicles are fitted with what are known as convenience functions. These include:

- Automatic full up or down of the window lifter when the switch is pressed once
- Linking of the window lifter function to the central locking so that when the car is locked, all of the windows that were previously open close automatically.
- Safety functions such as "anti-trap protection"

### Functional principles of window lifters

Window lifters work according to four functional principles:

#### 1. Cable window lifters

This technology is the most commonly used. A cable drum is moved powered by an electric motor with a worm gear/spur gear. Two ends of a steel cable are fastened to this drum so that when the drum rotates one end is wound in and the other end is let out. The pull cable pulls the window fastening, which runs in a guide rail, up or down via a Bowden cable and a deflection roller. The end of the cable without pull is wound back onto the drum in parallel.

#### 2. Dual-cable window lifters

The operating principle is the same as that of cable window lifters but this system is fitted with a second guide rail. The dual-cable window lifter is the latest and most innovative technology.

#### 3. Scissor system

With this principle, the window is moved by two lifting arms arranged like scissors which are powered by servomotors. When the scissor arms are "closed", the window is pushed to the highest position.

When the "scissors" open, the window slides down.

#### 4. Cable system

This system is primarily used for industrial vehicles and reverse windows. A single cable moved by a central motor sets the position of the window.

### Safety

"Anti-trap protection" is the most important safety function in a window lifter system. It ensures that neither objects nor body parts can become trapped between door frame and window when a window is closing. In more basic systems, this is implemented using mechanical means with a slip or friction clutch. Electronic window lifters with comfort closing in particular are fitted with a more complex safety function. When a resistance is registered during closing, the movement of the window is reversed automatically so that it opens immediately. An electronics unit which is attached directly to the engine and detects any resistance due to a trapped object usually takes care of this function.

### Depreciation

Window lifters in new vehicles are reliable products. Should a fault occur, it usually affects the mechanics, which can be replaced separately from the engine.

### Bilder

### Hersteller



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Quelle:

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