

## CORRECT INTEGRATION OF HARDWARE AND SOFTWARE

Scissor lifts are work machines that carry both human and specified capacities to heights in terms of different usage areas, and safety should be at the highest level. There is a relevant international standard, and most scissor lift manufacturers meet at a minimum common denominator. Here, the working conditions given by the manufacturers also determine the safety equipment used. Asutay, an electronic system that meets the standards and takes extra precautions is used in all vehicles as standard. The harmonious use of many sensors is also directly related to the use of the right software. The following electronic components are standard on the vehicle and all these electronic products work in coordination with our own security software. Asutay uses the electronic security system as standard both on platforms with electric motor walking system and platforms with hydraulic motor walking system. Some products and ways of working are mentioned below.

The load on the platform is limited by the Pressure Transmitter, and when a load is made above the specified load capacity, the electronic system will only allow downward movement to the vehicle's platform, not upward or forward-backward movements. Sensor outputs are 4-20 mA.

Thanks to the scissor angle sensor, the vehicle will only be able to move at the specified heights and at the specified speeds. Safe use is ensured by maintaining the heights and speeds specified by the standards. Sensor communications can be Can Open, 4-20mA and 0.5~4.5V.

With the tilt sensor, the angles in x and y coordinates of the vehicle with the ground are determined analogously, and it is used within safe working limits. In cases where the operating limits are exceeded, the functions of the vehicle are limited, only safe downward movement is allowed and safe operation is ensured. Sensor communications can be Can Open, 4-20mA and 0.5~4.5V.

By means of the wheel angle sensors, the angle of the steering system is determined analogously in the forward and backward movements of the vehicle, the wheel rotation speeds are adjusted according to each other, and the vehicle is ensured to turn safely without drifting. Sensor communications can be 4-20mA, 0~10V and 0.5~4.5V.

Safe elevation and use of the platform within the framework of standards by means of inductive sensors is ensured by opening the pothole pit protection system and activating the security system of the sensors.

The successful operation of all these security systems is ensured by the harmonious operation of the following components.

The screen, electronic processor system and driver of electric motors used in the system are products produced for mobile applications and CANBUS is used for communication. All devices and Can Open sensors communicate with the display via the CANBUS line.

The electronic processor, as a Can Open slave module, performs the input and output management with CANBUS communication with the information it receives from the screen where the main software is running. The screen performs the main software cycle of the machine and the display process. The software language of the screen is C++, data recording and storage is done with SQL.

The electric motor driver drives the right and left travel motors and the hydraulic pump. While the driver drives the hydraulic pump according to the data he receives from the screen, the right and left walking motors manage the two motors by taking forward and backward speed information from the screen and processing the signal from the steering angle sensor.

In addition, electronically turns also perform the differential operation by adjusting the speeds of the right and left wheels. The software language of the driver is VCL (Vehicle Control Language). Apart from software, the driver also has significant vehicle-specific parameter adjustments.

Parameter settings can be adjusted either with Curtis hand terminal or CIT software via canbus.