

Optimal Distance between Ground and Spray Nozzle

Inertial Measurement Unit F99
Controls Boom Inclination in
Agricultural Machinery

At a Glance

- Precise positioning of the booms for maintaining exact distance to the ground
- Rugged design for outdoor use in harsh conditions
- Resistant to dust, dirt, moisture, and extreme temperatures
- Inclination, acceleration, and rotation rate measurement along three axes
- Adjustable compensation range for adjusting angular accuracy



The Application

In agriculture, machines with long booms are used to apply liquid fertilizers and pesticides. One of the aspects that affects the optimal distribution of these fertilizers and pesticides is the distance between the boom and the ground. Ideally, it will always remain the same within a minimum tolerance range. This also ensures that only the required amount of liquid gets onto the field and that the product is used as sparingly as possible. The longer the boom, the more area is treated per run. At the same time, deviations in the distance between the ground and the nozzle increases due to uneven surfaces. The distance between the boom segments and the ground is measured using ultrasonic sensors.

The Goal

The distance between the nozzle and the ground must be kept as constant as possible during the run. The inclination of the boom is adjusted accordingly during the run. This requires continuous control over the tilt of the boom. It must function reliably at all times despite constant vibration, in all weather conditions, and in spite of dirt and dust.

The Solution

The inertial measurement unit F99 continuously measures the inclination of the boom and outputs the angle according to the dynamic application. The inclination of the boom can be determined regardless of the position of the chassis. The device measures acceleration and the rotation rate, and relays the calculated dynamic inclination angle of the boom to the controller.

The Benefits

The sensor's fusion algorithm reliably compensates for external accelerations by intelligently linking the acceleration sensor and gyroscope. Unlike comparable devices, the compensation range can be adjusted. This allows the angular accuracy to be customized to the specific movement profile of the agricultural machine. The sensor has been especially developed for outdoor use, has a degree of protection of IP68/IP69K, and can also be used in public traffic due to E1 approval.

Technical Features

- Inclination, acceleration, and rotation rate measurement along three axes
- Adjustable compensation range
- Degree of protection: IP68/IP69K
- Temperature range of -40 °C to $+85\text{ °C}$
- Housing withstands mechanical impact up to 100 g
- Interface for parameterization
- Output formats and values can be selected
- Suitable for dynamic applications
- E1 approval

