Conquering markets.
Mastering the elements.
Simplifying installation.

Inclination and Acceleration Sensors

Your automation, our passion.

PEPPERL+FUCHS

Absolute Precision – in Any Environment

Whether they are leveling cranes, controlling elevators, or monitoring front-loader tilt, inclination and acceleration sensors from Pepperl+Fuchs ensure precise measurements—even in harsh outdoor conditions.

Unique, Protective Mounting Concept

Based on a two-piece concept, F99 series sensors consist of the sensor module and a rugged metal mounting bracket. The bracket provides impact protection while also allowing easy assembly with an integrated screw. This increases the sensor's resistance to vibration and shock and allows quick and easy replacement without the need for adjustment or calibration.

International Approvals and Simple Parameterization Open Up a Range of Applications

The inclination and acceleration sensors from Pepperl+Fuchs can be individually adapted to suit an application. Special software filters and a variety of parameters can be set quickly and easily, equipping the sensor to handle the task at hand.

To help you get the job done anywhere in the world, our inclination and acceleration sensors have E1 approval for use on public roads and GL approval for marine applications.

IP68 IP69 Maximum tightness

EMV Increased EMC interference immunity: ISO 7637 and ISO 11452

+85 °C / –40 °C Extended temperature range

Increased resistance to mechanical shock and vibration up to 100 g

E1 E1 approval

The Right Sensor for Any Requirement

Every application places different demands on sensors. With Pepperl+Fuchs' broad portfolio of inclination and acceleration sensors, you can select from a wide variety of features to find the best fit for your application requirements.

For monitoring a wind turbine installation, for instance, a dual-axis **F99 acceleration sensor** would be suitable. When a set mechanical vibration limit is exceeded, the turbine monitoring system can take action to avoid damage.

When leveling a mobile work platform, a single- or dual-axis **F99 inclination sensor** could be used. The sensor constantly monitors the platform's incline and indicates when a readjustment is necessary.

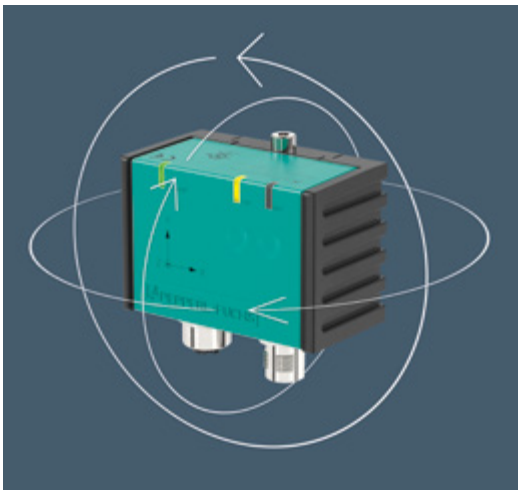
The six-axis **F99-Fusion** compensates for external acceleration and can provide 360° of precise inclination and acceleration data. This makes it perfect for dynamic off-road and marine applications.

	Acceleration sensor	Inclination sensor	Inertial measurement unit F99-Fusion
Order reference	**AC*-F99***	**IN*-F99***	**IMU360-F99***
Acceleration measurement on multiple axis	Single- and dual-axis		Three-axis
Inclination measurement on multiple axis		Single- and dual-axis	Three-axis
Suitable for outdoor applications including E1 and GL approvals	■	■	■
Parameterizable via interface		■	■
Selectable measurement outputs			■
Suitable for applications in motion			■

Select the right sensor for your application at:
www.pepperl-fuchs.com/f99

Maximum Precision for Dynamic Applications

For the first time, the F99-Fusion makes error-free inclination detection possible in applications where there is dynamic movement. The innovative combination of an acceleration sensor and gyroscope compensates for external acceleration to increase performance and open up new possibilities.



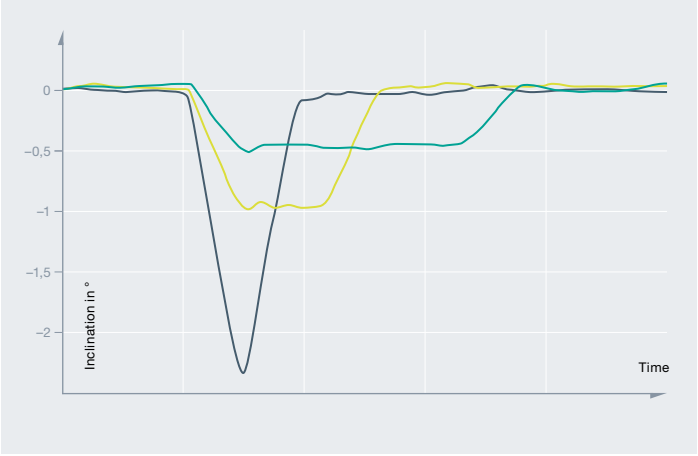
Compensation for External Acceleration

Conventional inclination sensors are based on the principle of gravitational acceleration measurement and provide information about the angular alignment of the sensor. This measuring principle is stretched beyond its limit as soon as forces other than gravity act on the sensor, such as acceleration, braking, or turns. This results in measurement errors, which can reduce accuracy and application performance.

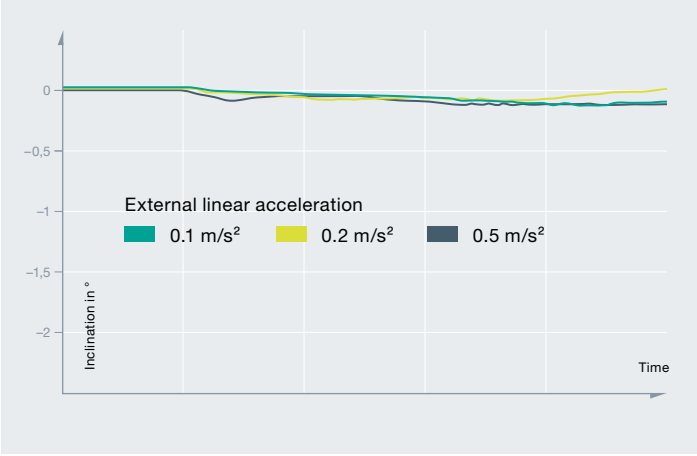
The F99-Fusion has been specially engineered to compensate for external acceleration and to provide precise inclination measurement, even when there is multidirectional motion.

Acceleration Sensor and Gyroscope in One Device

The F99-Fusion combines an acceleration sensor and a gyroscope into a single device for the first time. An intelligent Sensor Fusion Algorithm links the two sensor elements to optimize overall performance of the system. External accelerations are compensated, and the user receives precise inclination data, even when the system moves, accelerates, or brakes.



Conventional inclination sensor: measuring error caused by linear acceleration



Compensation for external acceleration by F99-Fusion

360° Measurement on Six Axes

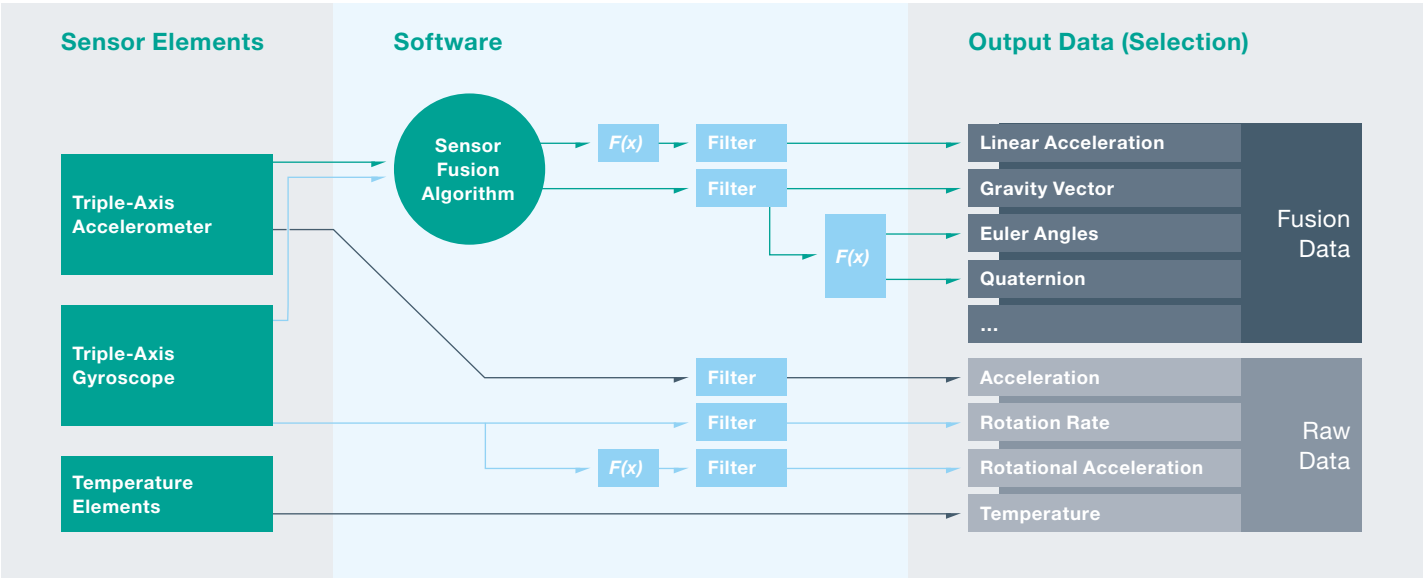
With two integrated three-axis sensor elements, all data can always be measured in the X, Y, and Z directions, and a 360° angular value can be calculated. As a result, applications that previously required multiple devices can now be solved with only one F99-Fusion sensor. This saves time and money, both in selecting and in integrating the sensor.

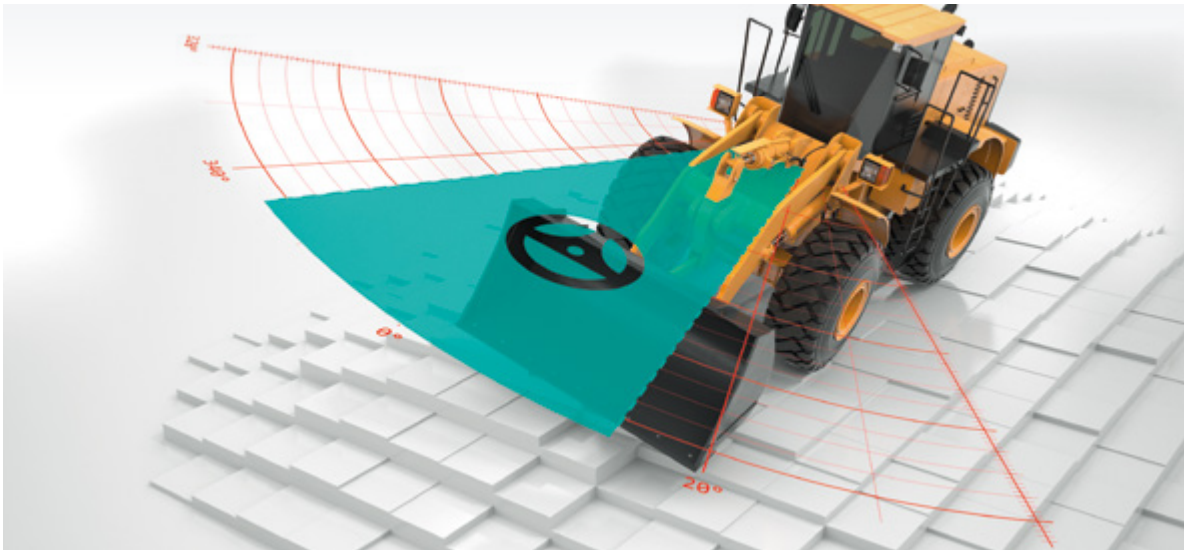
Installation is also much easier than before: regardless of position and alignment, the sensor always delivers precise data under any mounting orientation.

Variety of Measurement Outputs for Complete Flexibility

In addition to customer-configurable filters, the F99-Fusion also allows you to select the appropriate output to fit the requirements of your application.

Both the raw data from the individual sensor elements, as well as preconfigured output data are available to the user. Thanks to the intelligent Sensor Fusion Algorithm, data is calculated in real time and can be output immediately.





Improving Existing Applications and Creating New Ones

Inclination sensors are used in a range of industries. With F99-Fusion technology, existing applications can be handled more efficiently, and completely new applications can become a reality.

Monitoring Steering-Angle Limit on Inclines

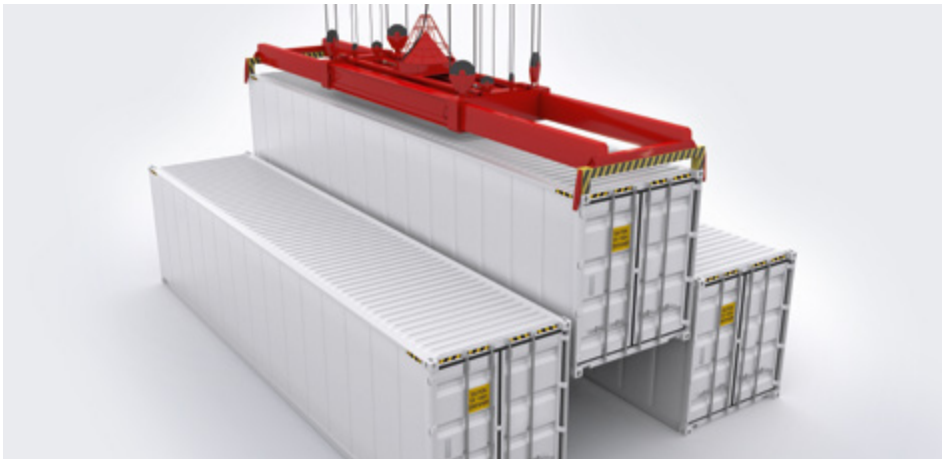
The ability to compensate for external acceleration opens up a host of new applications. One example is monitoring steering-angle limits on inclines. When heavy vehicles like wheel loaders or dump trucks take a turn too sharply on an incline, they can easily tip over. Forklifts have the same problem, especially when the forks are extended.

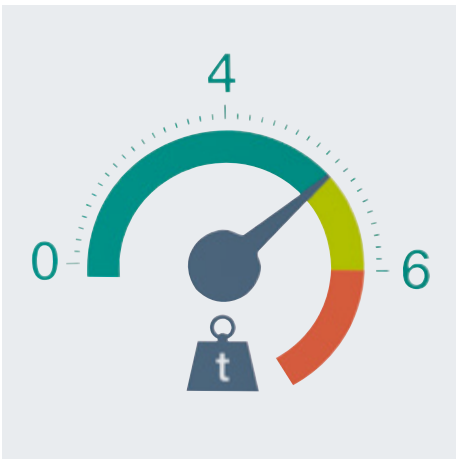
The F99-Fusion provides 360° monitoring of the vehicle's inclination. Using the data provided by the sensor, the steering angle can be limited to prevent tilting. With this unique technology, the measurement is not affected by changes in speed or direction—making it applicable to a wider range of mobile equipment applications.

Making Onboard Scales More Efficient

In onboard scales on heavy equipment such as trucks, trailers, and forklifts, weight is often calculated directly on the vehicle. In these systems, external acceleration can cause measurement errors, which can only be corrected after the fact—if at all—with complex calculations.

In modern wheel loaders, for example, the weight of the material being loaded is detected directly in the bucket. Existing solutions would require a delay in order to take exact measurements, and because any lost time is costly, measurement errors are often accepted.





Weight calculation in port cranes is similar. In order to ensure an even weight distribution while large freighters are being loaded, the weight of each container is measured as it is being lifted. Delays are not an option in this environment, so conventional cranes often do not provide onboard weighing.

Because the F99-Fusion compensates for external acceleration, weight calculations can be made immediately during the loading or unloading process. With this feature, weight can also be calculated while a freighter is underway, dramatically increasing the efficiency of the overall process.

Further information is available at:
www.pepperl-fuchs.com/F99-Fusion

Highlights

- Compensation of multidirectional acceleration enables quick, precise, and dynamic inclination measurement
- Variety of measurement outputs for complete application flexibility
- Combination of accelerometer, gyroscope, and inclination technology in a single device allows six-axis, 360° measurement and mounting in any orientation
- IP68/69 rating and protective mounting bracket provide maximum durability for outdoor use
- E1 and GL approvals allow a wide range of applications, including off-road and marine

Your automation, our passion.

Explosion Protection

- Intrinsically Safe Barriers
- Signal Conditioners
- Fieldbus Infrastructure
- Remote I/O Systems
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement
- Purge and Pressurization Systems
- Industrial Monitors and HMI Solutions
- Electrical Explosion Protection Equipment
- Solutions for Explosion Protection

Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

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