

Draw-Wire Sensors for Telescopic Supports & Booms



More Precision



**Decisive benefits
of draw-wire sensors:**

- Price/performance ratio
- Low space requirements (telescopic)
- Simplified mounting (including retrofitting)
- Various measuring ranges and output types
- Measuring ranges up to 15m
- Ambient temperature -40° ... $+80^{\circ}\text{C}$
- Robust sensor design

Elevating work platforms and mobile cranes are used for numerous different tasks. The available load torque plays a major role, as this determines which loads can be raised over which (lateral) range. Exceeding the permissible load torque may lead to serious accidents caused by the crane tipping over.

Therefore, load torque limiters monitor the maximum permitted load that can be moved. In the limit area, the load torque limiter must automatically recognize whether the crane must be shut down. One important factor for the maximum permissible lifting capacity is the current support displacement and the extension range of the boom.

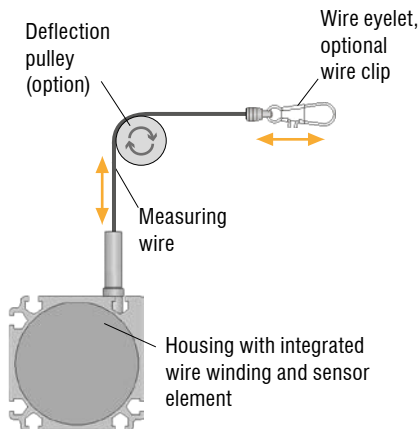
However, cranes and elevating work platforms are used in confined spaces where the support cannot be fully extended so that only a reduced load torque is permitted.

Fully variable support now makes it possible to determine and approve the maximum load torque for any support displacement considering the current extension range.

The position of the support displacement and the booms is automatically measured using suitable sensor technology. The support displacement is measured using draw-wire sensors with typical measuring ranges of 1,500mm to 4,000mm, with booms ranging between 5,000mm and 15,000mm.

The connection of the sensors to the vehicle's electronics can be either analog or digital via fieldbuses. In particular, the telescopic capability and simplified mounting (retrofits are also possible) make draw-wire sensors the ideal choice for these applications.





Draw-wire measuring principle

Draw-wire displacement sensors measure linear movements using a highly flexible steel wire. The wire drum is connected to a sensor element, which produces a proportional output signal. Measurements are performed to a high accuracy and dynamics. Due to their high quality components, the sensors benefit from a long service life and high operational reliability.

1 Safety in cranes

In addition to the functional and technical characteristics of the crane and the sensor technology, the "functional safety" is also a critical factor. Many national and international standards and regulations must be adhered to. The primary goal is to avoid personal injury.

This is achieved by determining the default probability of each component and taking the latter into account when evaluating the whole system. Ultimately, the default probability of the crane must correspond to a certain performance level or SIL class. However, this is not compulsory for the individual components.

Intelligent evaluation and plausibility checks of (redundant) sensor signals provide maximum safety without having to execute costly qualifications and certifications at component level.

We also provide key figures such as B10 or MTBF for evaluating the respective application.

2 Draw-wire sensors in outdoor applications

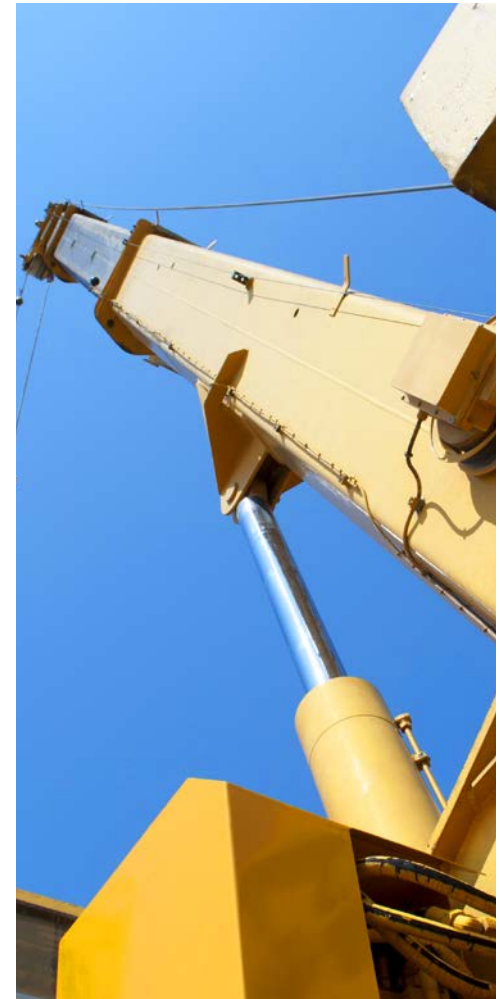
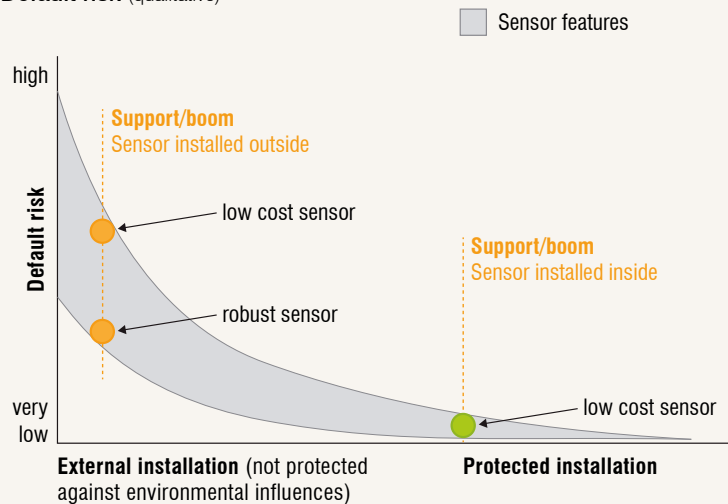
Shocks, vibrations, heat, water, ice, dirt, stone chippings - outdoor applications are subject to harsh conditions that may impair the use of draw-wire sensors.

Although the list of influencing factors is long, corrective measures can be taken. In order to optimize reliability, close collaboration between the sensor provider and crane manufacturer is required, particularly during the concept design and qualification phase.

The fewer environmental factors affect the sensor, the more reliable the measurements during operation will be. Experience shows that the best solution is to install the sensor in the support or in the boom, where it is protected. If the sensor is installed in such a protected environment, customers can profit from low cost sensor designs.

If the sensor is installed outside (e.g. with retrofitting), additional sensor features (e.g. pulley, integrated heating, higher spring forces etc.) can increase reliability (see illustration).

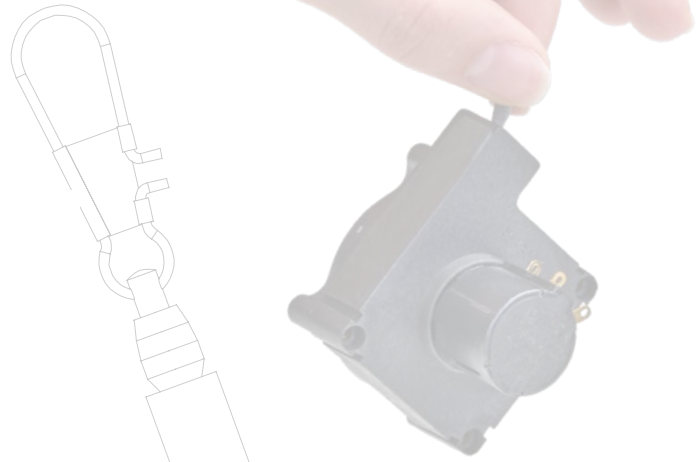
Default risk (qualitative)



3 Available sensor series:



wireSENSOR MK60/MK88



Different

HTL

P Potentiometer

E Incremental encoder

A Absolute encoder

TTL

Example: customer-specific sensor in fully variable support

- MK88 series
- Integrated plastic deflection pulley
- High spring force
- IP67 / -40°C... +80°C
- Robust plastic housing



Customer-specific designs

More than 120 draw-wire sensors with different designs, measuring ranges and output signal types cover a wide range of applications. For special requirements that are not met by standard models, the draw-wire sensors can be suitably modified. A commercial implementation can already be achieved with medium-sized quantities.



wireSENSOR P60/P96

output types

- SSI
- Profinet
- U Voltage
- Profibus
- I Current
- CANopen



wireSENSOR P115



Draw-wire sensors measure the lifting height in forklift trucks

Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



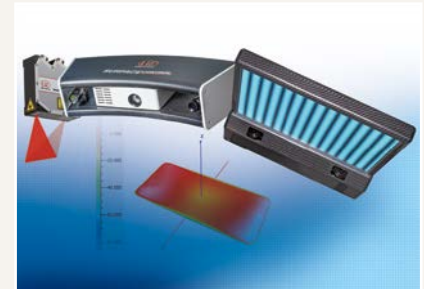
Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection

More Precision

Whether it is for quality assurance, predictive maintenance, process and machine monitoring, automation or R&D – sensors from Micro-Epsilon make a vital contribution to the improvement of products and processes. High precision sensors and measuring systems solve measurement tasks in all core industries – from machine building to automated production lines and integrated OEM solutions.



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