

## Measurement technology in mobile hydraulics – Status Quo? Technical Bulletin

*What are the trends in mobile sensor technology? What role do other measured variables and machine safety play in mobile applications and what will future sensors look like? Thomas Schmale, Application Engineer Mobile Hydraulics, explains these and other questions to us.*



Fig. 1: Thomas Schmale, Application Engineer Mobile Hydraulic Position Sensors

**With a view to Industry 4.0, a wide variety of bus systems are currently being used for sensors in the industrial environment. What is the situation with sensors for mobile machines? What are the requirements here in terms of interfaces?**

Bus systems such as CANbus and ISObus are still established for mobile machines. If you take a closer look at the communication between the machines, you will see that this takes place at the controller level and will remain at this level in the medium term. In the long term, sensor technology will become ever more powerful and ever faster. Functions such as autonomous driving, remote control, machine and process networking are the buzzwords that are increasingly becoming the focus of development.

**Where do you see further trends in sensor technology for mobile applications?**

In general, we can say that the trend for sensors in mobile applications continues unabated. We see more and more sensors being used at various points in the applications to make measurements that are even more precise and thus automate more and more machine functions. The results of this trend are improved safety concepts, increased comfort for the user through automation, less wear and tear and energy expenditure, and an overall increase in the efficiency of mobile machines.

**The biggest challenge with sensors in outdoor use are the harsh environmental conditions - extreme temperatures, dirt, and water. What are your recommendations in terms of design and composition to ensure that the sensors prove themselves for as long as possible?**

Our mobile sensors work with the magnetostrictive Temposonics technology, which measures without contact and therefore works wear-free. Therefore, compared to other technologies, they have a theoretically unlimited service life and are characterized by higher reliability even in harsh working environments. The Temposonics technology detects absolute instead of relative positions, which means that a recalibration of the sensor is not necessary.

**What is the special feature of the technology, apart from the fact that it measures absolute instead of relative positions?**

The special feature of our magnetostrictive measuring technology is its high resistance to interference from environmental influences. Displacement encoders of the Temposonics® MH-Series are therefore characterized by particularly high shock and vibration resistance, temperature resilience and interference resistance against electromagnetic fields. The sensors are specially developed for installation in hydraulic cylinders and do not require any additional installation space. At the same time, hydraulic cylinders offer the best possible protection against the rough influences in the mobile working world.

**Speaking of long service life: predictive maintenance is becoming more and more common in industrial plants. What is the situation with condition monitoring or predictive maintenance for sensors for mobile machines?**

Our mobile sensors play an important role in predictive maintenance, similar to condition monitoring. Our sensor technology prevents overload conditions and load peaks, which means that the maintenance intervals for mechanical and hydraulic components can be extended. Furthermore, our sensors can be used to determine the frequency of load cycles, which in turn can be used as a basis for condition monitoring, which is the precursor to predictive maintenance. As research and development in this field is ongoing, we can assume that sensor technology will become even more application-specific in the near future. Furthermore, the interaction and communication between the sensors will be further optimized so that even more precise machine condition monitoring can be achieved.

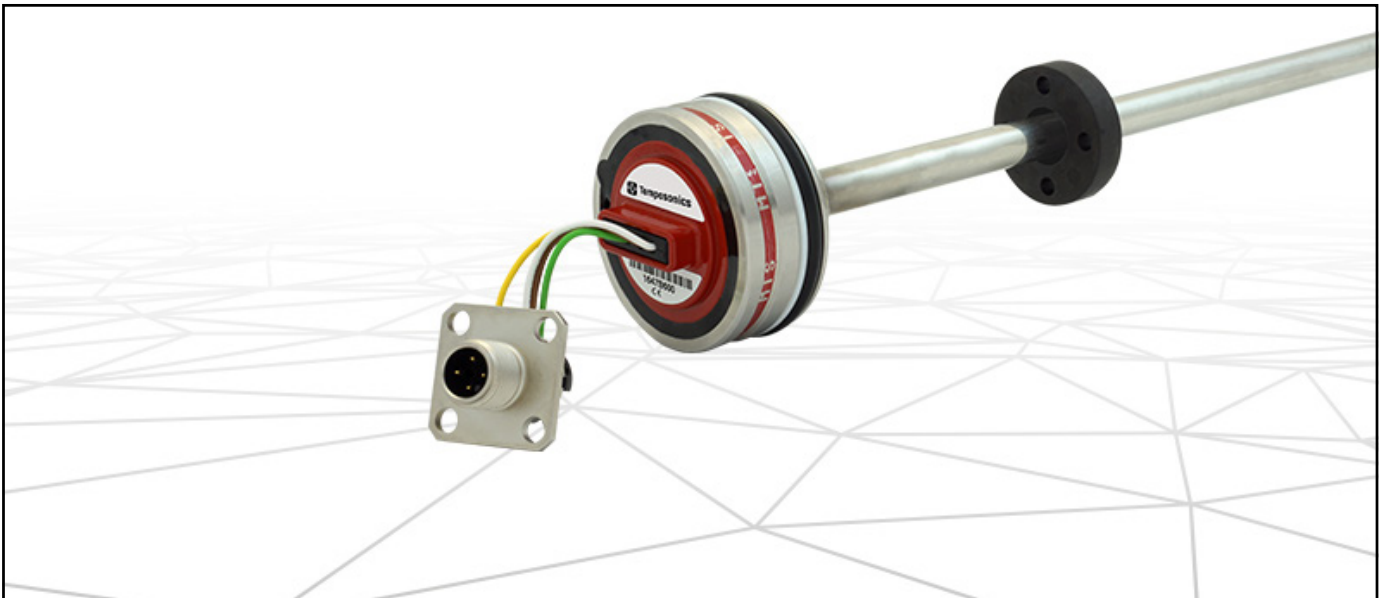


Fig. 2: MH-Series MH position sensor designed for mobile hydraulic applications

**Which functions of your position sensors contribute to optimal measurement and process reliability?**

To answer this question precisely, I would like to use the example of our Temposonics® MH-Series position sensors. These sensors have self-diagnostic capability, which contributes to the functional safety of the application. An example of this is the load moment limitation on load hoists or work platforms. By monitoring the position of hydraulic cylinder during operation, the sensors can prevent the system from moving to a position that would reduce stability or exceed tolerances in order to ensure the safety of the user.

**Attempts are being made to integrate more and more electronics into the sensor while at the same time demanding miniaturization. Is this development always sensible?**

This development makes sense and Temposonics is a leading supplier in this field. Miniaturization of sensors means less weight, less installation space with the same or improved measurement, which in turn means machines that are more efficient. Miniaturization also makes it possible to revise the entire machine design in order to reduce consumption and wear.

**If you had to describe a position sensor in the middle of the 21st century, what would it look like and what functions would it have on board?**

Position sensors in the middle of the 21st century will combine even more functions. They will be even more strongly networked with each other, and the user interfaces will become simpler and more intuitive which will make them more accessible to the novice operator. Furthermore, more and more comprehensive diagnostic functions will be implemented in order to operate machines even more reliably and safely. The development of mobile sensor technology still offers a lot of potential. It will be very exciting to exploit this potential with the focus on making mobile applications simpler, safer and as efficient as possible.

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