

## Position sensors and the variety of mobile hydraulic applications Temposonics used by Diverto BV

*Linear position sensors installed in mobile hydraulics machinery are frequently exposed to the most difficult conditions and harsh environmental influences. Due to its well-proven cylinder integration, the sensor is protected optimally. Using the right sensor for the right application in mobile hydraulics is extremely important. In this article, Reinier Smallegange, sales manager at Diverto Technologies BV, describes how sensors supplied by Temposonics are used in a multifunction machine.*



Fig. 1: Diverto's QS100 with excavator setup.

“Our QS100 is the perfect agricultural and construction machine of its class”, Mr. Smallegange explains. “Due to the diverse variations offered by the machine, QS100 can be used as an excavator, lift truck, mower, crane, snowplow, etc. Moreover, our customers come and ask if it wouldn't be possible to do this and that with the machine. And then we project, construct and test it and finally, we offer it to our customers.”

The QS100 machine has been developed by Diverto since 2009 and is sold since 2014. Mr. Smallegange remembers: “When we started planning long time ago, our intention was to develop a sort of super tool carrier machine platform. An equipment combining many features and facilitating the operator's everyday life.”

### **The importance of the sensor system**

At that time, Diverto approached Temposonics, since the innovative machine concept requires position measurement sensor technology in the hydraulic cylinder as a prerequisite for intelligent programming of the control system. The sensors of the Temposonics® MH-Series have been developed for direct position measurement in hydraulic cylinders. These sensors are integrated completely into the cylinder, where they are protected excellently against environmental conditions and electromagnetic interference.

“Fourteen cylinders are required in one QS100. Not all of these fourteen cylinders contain sensors from Temposonics. In total, eight MH position sensors per machine are integrated – most of them fitted in the hydraulic cylinders for the articulated arm. The other cylinders are, for example, intended for the trailer function, where we have installed other sensor types, because these must satisfy other requirements than those in the articulated arm”, Mr. Smallegange explains.

Depending on the application for which QS100 is used, the MH transducers must measure different positions, in order to ensure that the cylinder stroke is only within the range of movement intended for this application. In an excavator, the sensor settings must be different from those of a lift truck. And conversion of the QS100 into a mower also requires different sensor settings.

The software adjustments for controlling the various sensors are accomplished during production at Diverto. Thus they can be sure that an operator just needs to press a single button to adapt QS100 exactly to the relevant application. Mr. Smallegange explains: “Our target is to make the work and the user experience as easy and trouble-free as possible. When the driver is in the machine, he can make all required settings without changing position. He can select one of the various QS100 versions by just pressing a button, connect the suitable front component and start working directly. And if he needs to change over to a different application, this can be done as quickly as everything else, provided that he has the front component for replacement.”

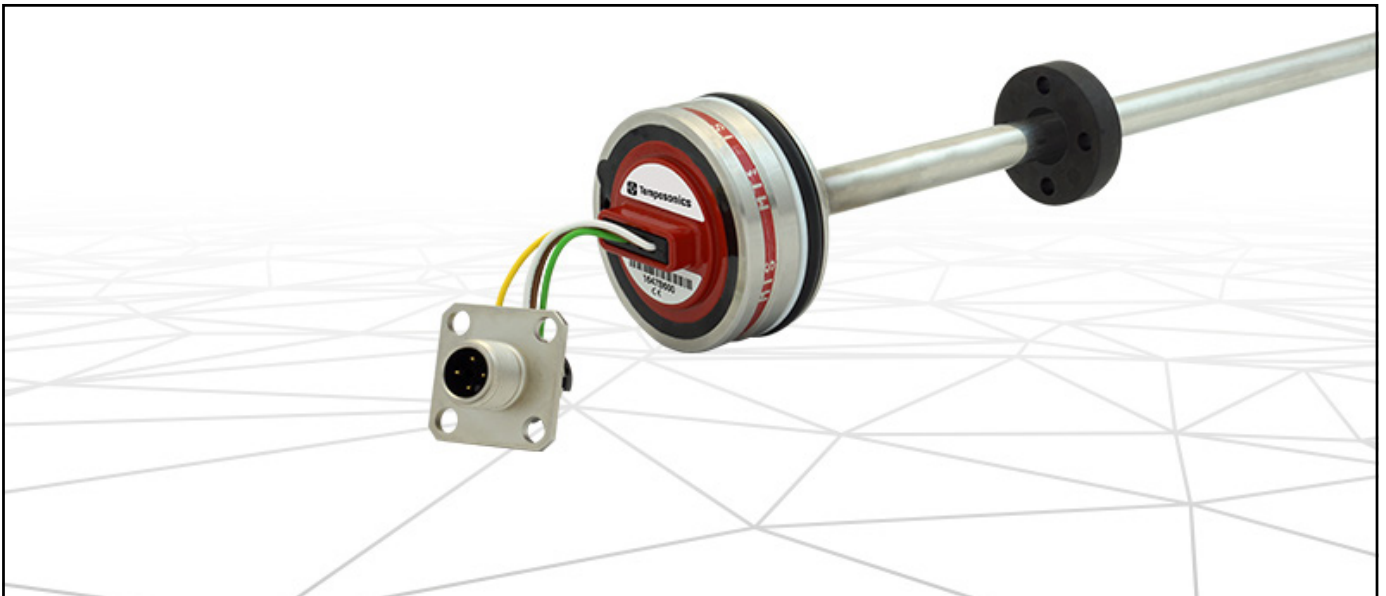


Fig. 2: Temposonics® MH-Series MH position sensor, which is installed in the hydraulic cylinders of the QS100.

### The right sensor for the right application

Magnetostrictive Temposonics technology makes the MH position sensors ideal measuring instruments for mobile hydraulics cylinders integrated by Diverto. The sensors consist of a ferromagnetic waveguide, a position magnet, a torsional pulse converter and sensor electronics for signal conditioning. A magnet fitted at the mobile machine part generates a magnetic field in its position on the waveguide. For position measurement, a short electric pulse is sent into the waveguide and generates a radial magnetic field. The short-term interaction of the two magnetic fields triggers a torsional pulse which travels along the waveguide. When reaching the end of the waveguide with the electronics, the ultrasonic wave is converted into an electric signal. The speed at which the wave is propagated is known. Hence the time elapsed between triggering of the electric pulse and arrival of the return signal is an exact, linear measure of the position, thus creating a reliable position measurement system with high accuracy and repeatability.

“From the very beginning, we had made a targeted decision in favor of Temposonics and, in particular, to integrate MH position sensors into the QS100. The sensors offer extremely high quality and permit exact position measurement, which is very important for us. Utmost sensor responsiveness is indispensable especially for interaction with

the software and changing between various applications”, says Mr. Smallegange. And he continues: “Moreover, the sensors are protected against external influences and almost wear-free due to contactless measurement, which ensures excellent durability. All these aspects spoke in favor of Temposonics. We are very satisfied with our choice and so are our customers, because QS100 proves to be a valuable tool for a wide range of applications and facilitates the operator’s task considerably.”

### Future projects

The market for agricultural and construction machines offers many perspectives for further development and sufficient opportunities for future cooperation with Temposonics. A first example are the plans for extension of the QS100 series. “No matter how versatile it is, one product is not sufficient and therefore we are already planning the next projects. For example, a tractor and a wheel loader based on QS100 are planned. These two machines will certainly be a bit less expensive than the original model, however, their functionalities will also be reduced accordingly or focused on only a single application”, explains Mr. Smallegange. “But the sensors will continue to be supplied by Temposonics. They are well-proven, no matter what the applications are and we don’t want to make compromises.”

**temposonics.com**

#### UNITED STATES

Temposonics, LLC  
Phone: +1 919 677-0100  
E-Mail: info.us@temposonics.com

#### GERMANY

Temposonics GmbH & Co. KG  
Phone: +49 2351 9587-0  
E-Mail: info.de@temposonics.com

#### ITALY

Branch Office  
Phone: +39 030 988 3819  
E-Mail: info.it@temposonics.com

#### FRANCE

Branch Office  
Phone: +33 1 58 4390-28  
E-Mail: info.fr@temposonics.com

#### UK

Branch Office  
Phone: +44 79 44 15 03 00  
E-Mail: info.uk@temposonics.com

#### SCANDINAVIA

Branch Office  
Phone: +46 70 29 91 281  
E-mail: info.sca@temposonics.com

#### CHINA

Branch Office  
Phone: +86 21 2415 1000 / 2415 1001  
E-Mail: info.cn@temposonics.com

#### JAPAN

Branch Office  
Phone: +81 3 6416 1063  
E-Mail: info.jp@temposonics.com