

Temposonics®

Magnetostrictive, Absolute, Non-contact
Linear-Position Sensors



Integrating the Model RD4 Detached Electronics with Magnetostrictive Linear Position Sensors

Document Part Number
551375 Revision A

Technical Article

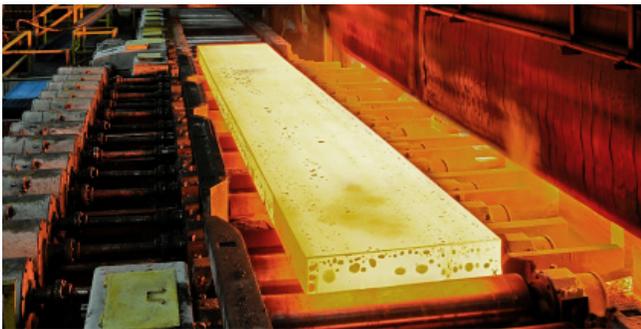


Model RD4 detached electronics linear position sensor

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DETACHED ELECTRONICS FOR HARSH ENVIRONMENTS

A magnetostrictive linear positioning sensor has many advantages when used in harsh environments where shock, vibration, temperature and other adverse conditions could impact precision measurement and damage products. Magnetostrictive sensors use an absolute signal, meaning there is never any need for recalibration, and the sensor element does not come into direct contact with any moving parts, reducing wear and tear. Additionally, the size and shape of the sensor allows for the use of advanced housing solutions, further protecting the electronics from outside influence. For these reasons, linear positioning sensors made with this technology are among the most durable products in the market.



The same cannot be said for most electronics used to read the signal provided by the sensor, however. While major advances have been made in developing computer systems for harsh environments, size, location and budget limit what manufacturers can install effectively on industrial equipment in these applications. Dust, temperature, moisture, magnetic interference – these are all factors that can affect precision electronics. Historically, the result has been frequent replacements of very expensive components.

To address this concern, a new design was developed that allows the bulkier and more expensive electronics to reside further away from the actual sensing environment. Traditional magnetostrictive sensors require the electronics to reside with the sensing element in order to produce the precision required in advanced manufacturing processes. In addition, the detached electronics can now be replaced in an application without having to replace the sensing element rod. This reduces the downtime required for replacement if an issue occurs.



With the R-Series Model RD4 sensor, the sensing element is connected to the electronics via a cable and pipe. A Model RD4 interconnection cable exits the head of the sensor rod and connects to the electronics housing. Currently, the electronics housing, along with its mounting block, can be configured with either a side-entry cable connection or a bottom-entry cable connection. Side cable connections work with many different threaded rod styles. This flexibility of design allows for easy sensor installation into standard threaded port opening on the top of the cylinder end cap. The bottom cable connection is for use with the pressure-fit rod style. Proper design and careful sensor installation is required to assure the correct fit and sealing, resulting in more resilient electronics that provide the benefits (i.e., precision and reliability) of traditional magnetostrictive systems with significantly lower risk of product damage.

The R-Series Model RD4 sensor provides a variety of commonly accepted electrical interfaces including: EtherNet/IP™, Synchronous Serial Output (SSI), ProfiBus, CANbus, DeviceNet, EtherCAT and analog. By detaching the bulkier electronics, the sensor can also be installed in tight spaces such as clevis mount cylinders. These factors not only provide less likelihood of failure, they significantly increase the potential application areas for magnetostrictive technologies in applications where compatibility or dimensional restrictions previously excluded them.

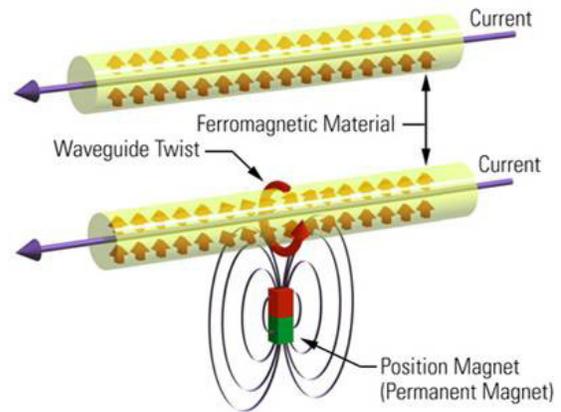


To date, manufacturers across many different industries have begun using the R-Series Model RD4 sensor to improve their operations and reduce downtime associated with failures and environmental factors. Early adopters include manufacturers in the fluid power, steel production, woodworking, linear actuators and other, similar, industries. Detached electronics offer solutions to meet a wide range of operating specifications that couldn't be addressed with more traditional systems. Especially in applications where environmental factors are prevalent, the detached electronics model provides unique advantages and value. The Model RD4 allows for more stable and reliable implementation of advanced sensor technology across many different applications that we have yet to see. It is an innovation that will open new doors and help manufacturers address issues that have plagued the industry for decades.

HOW MAGNETOSTRICTION WORKS

Magnetostrictive-based sensors work by inducing a sonic strain pulse in a specially designed magnetostrictive waveguide by the momentary interaction of two magnetic fields. One field comes from a movable permanent magnet which passes along the outside of the sensor tube, the other field comes from a current pulse or interrogation pulse applied along the waveguide. This interaction produces a strain pulse, which travels at sonic speed along the waveguide until the pulse is detected at the head of the sensor.

The magnet's position is determined with high precision by measuring the elapsed time between the application of the interrogation pulse and the arrival of the resulting strain pulse. Consequently, accurate non-contact position is achieved with absolutely no wear to the sensing components.



ABOUT MTS SENSORS:

MTS Sensors, a division of MTS Systems Corp., is the global leader in the development and production of magnetostrictive linear-position and liquid-level sensors.

MTS Sensors Division is continually developing new ways to apply Temposonics® magnetostrictive sensing technology to solve critical applications in a variety of markets worldwide. With facilities in the U.S., Germany, Japan, and China, MTS Sensors Division is an ISO 9001 certified supplier committed to providing customers with innovative sensing products that deliver reliable position sensing solutions.

Document Part Number: 551375, Revision A 01/13

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