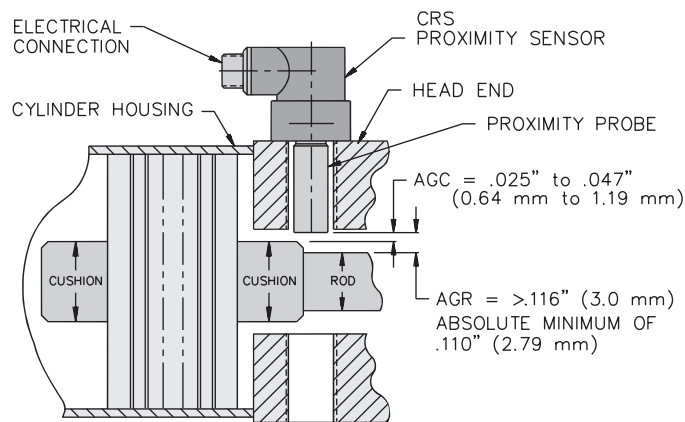


Inductive Cylinder Position Sensors

CRS Inductive Sensors

Figure 1



TURCK's CRS sensors are designed to be mounted into the head end or cap end of hydraulic and pneumatic cylinders. They operate at 1500 psi and mechanically withstand 3000 psi of continuous pressure.

AGC - Air Gap Cushion

This dimension is recommended to allow for mechanical tolerances and wear.

AGR - Air Gap Rod

The rod-to-cushion step must be large enough to allow the sensor to turn off when the piston leaves. If the step is too small, the sensor will lock-on due to the hysteresis of the sensor.

For more information on inductive sensors refer to the Operating Principles in Section B.

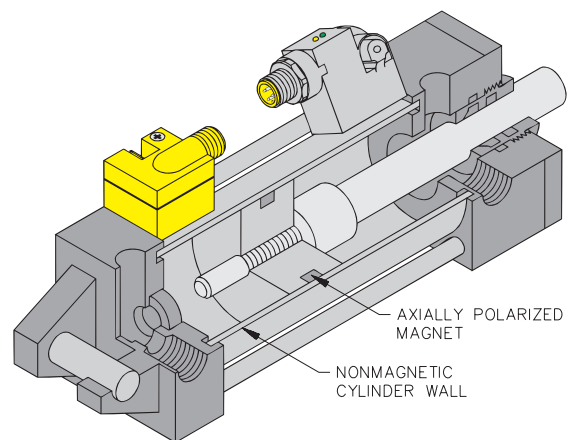
permaprox Inductive Magnet Operated Sensors

TURCK's *permaprox*[®] cylinder sensors are used for detection of magnet equipped pistons on pneumatic cylinders through a nonmagnetic cylinder wall.

A patented electronic magnetic circuit involving new state-of-the-art materials forms the basis of operation for these sensors.

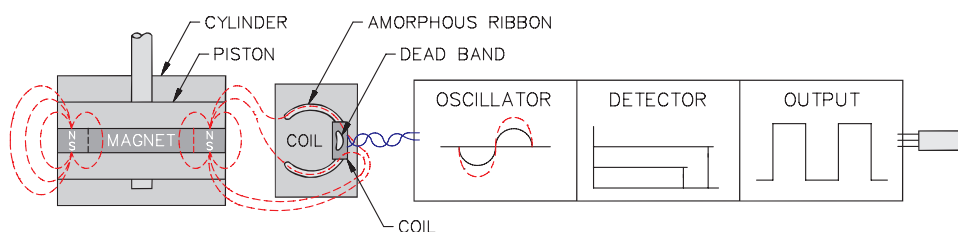
The characteristics of this innovative technology have decided advantages over Hall effect switches and reed devices. Specific sensors no longer have to be matched to specific magnet strengths. Other features are extremely high repeatability and the elimination of multiple actuation points.

Figure 2



Operating Principle

Figure 3



As the axially polarized magnet-equipped piston approaches the sensor, its magnetic field saturates the highly permeable amorphous ribbon and causes a precise movement of the dead band (an area with no magnetic flux where the magnetic field leaves the ribbon). This results in a change in the oscillator current. The detector circuit monitors this change and sends a signal to the output when the current change reaches a specific level.

Figure 4

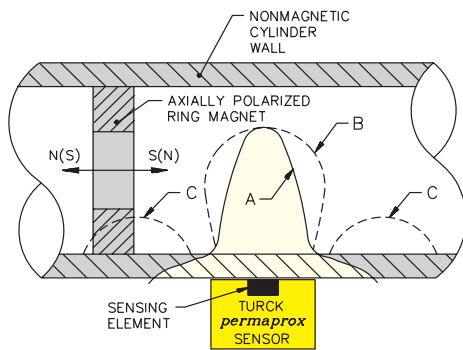
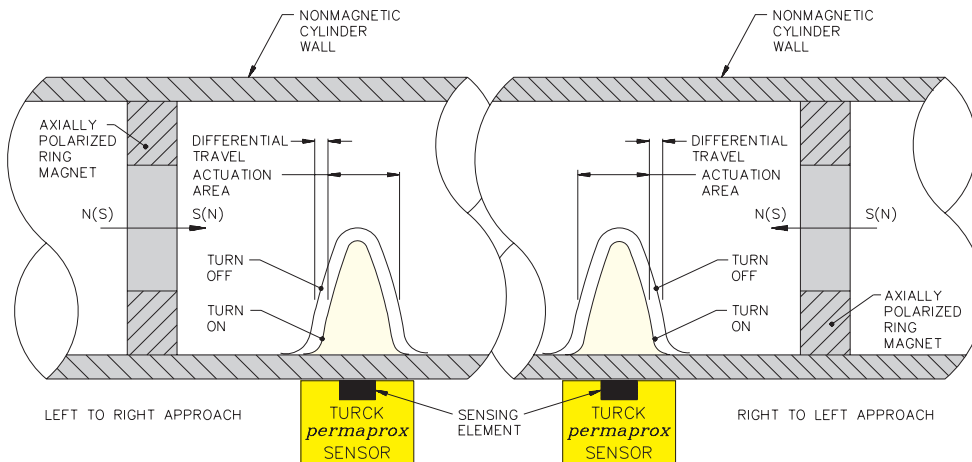


Figure 4 curve definitions:

- A) Typical actuation area of **permaprox**® sensors
- B) Typical primary actuation area for reed switches
- C) Typical secondary actuation area for reed switches

The **permaprox** sensors, unlike most magnet operated sensors, respond to only one component of magnetic induction, namely the component parallel to the cylinder. Figure 4 shows the typical actuation area of a **permaprox** sensor compared to that of reed switches. It is a common problem for reed switches to have more than one actuation area. Since these switches operate on a narrow range of magnetic field strengths, mismatching often causes multiple switching points. The **permaprox** sensors, however, reliably operate over a range of 20-350 gauss (2-35 mT).

Figure 5



The actuation area will depend on the width and field strength of the magnet. As shown in **Figure 5**, the actuation point will differ depending on the direction of piston travel. These points are not the same, but are very repeatable.

permaprox® Weld Field Immunity

All **TURCK permaprox** sensors that have the "S34" suffix in the part number are resistant to AC weld fields. If the field is pulsing, as with AC resistance welders, the sensor locks the output in its last known stable state. When the pulsing field subsides, the sensor updates its output accordingly.

The sensors are not immune to constant magnetic fields, such as permanent magnets or DC resistance welders, and will change state.

Cylinder