

Operating Distance (Sensing Range) Considerations

The operating distance (S) of the different models is basically a function of the diameter of the sensing coil. Maximum operating distance is achieved with the use of a standard or larger target. Rated operating distance (Sn) for each model is given in the manual. **When using a proximity sensor the target should be within the assured range (Sa).**

Standard Target

A square piece of mild steel having a thickness of 1 mm (0.04 in) is used as a standard target to determine the following operating tolerances. The length and width of the square is equal to either the diameter of the circle inscribed on the active surface of the sensing face or three times the rated operating distance Sn, whichever is greater.

Operating Distance = S

The operating distance is the distance at which the target approaching the sensing face along the reference axis causes the output signal to change.

Rated Operating Distance = Sn

The rated operating distance is a conventional quantity used to designate the nominal operating distance. It does not take into account either manufacturing tolerances or variations due to external conditions such as voltage and temperature.

Effective Operating Distance = Sr 0.9 Sn ≤ Sr ≤ 1.1Sn

The effective operating distance is the operating distance of an individual proximity sensor at a constant rated voltage and 23°C (73°F). It allows for manufacturing tolerances.

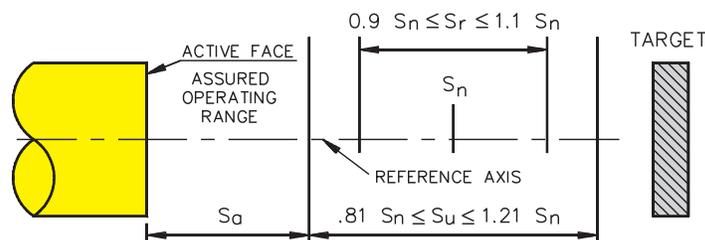
Usable Operating Distance = Su 0.81 Sn ≤ Su ≤ 1.21Sn

The usable operating distance is the operating distance of an individual proximity sensor measured over the operating temperature range at 85% to 110% of its rated voltage. It allows for external conditions and for manufacturing tolerances.

Assured Operating Range = Sa 0 ≤ Sa ≤ 0.81Sn

The assured actuating range is between 0 and 81% of the rated operating distance. It is the range within which the correct operation of the proximity sensor under specified voltage and temperature ranges is assured.

Figure 6



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These correction factors apply to standard inductive sensors when a nonferrous target is being detected. The correction factors are nominal values. Deviations may be due to variations in oscillator frequency, alloy composition, purity and target geometry.

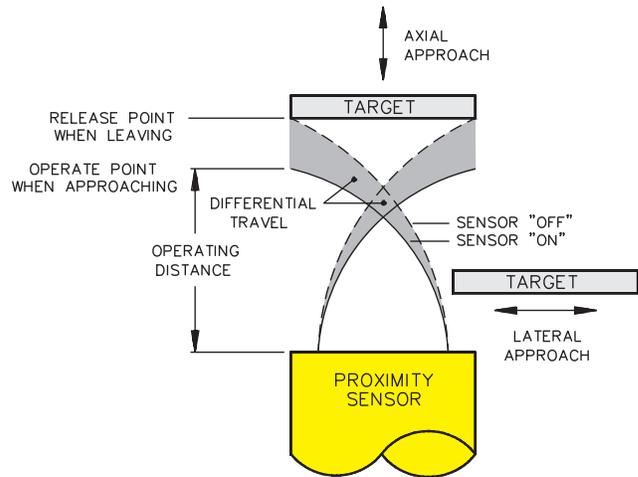
Aluminum foil	1.00
Stainless steel	0.60 to 1.00
Mercury	0.65 to 0.85
Lead	0.50 to 0.75
Brass	0.35 to 0.50
Aluminum (massive)	0.35 to 0.50
Copper	0.25 to 0.45

- Correction factors do not apply to TURCK **Uprox**® sensors. These sensors see all metals at the same range.
- TURCK also manufactures “nonferrous only” sensors. These sensors will selectively detect nonferrous targets at the rated operating distance. They will not detect ferrous targets; however, ferrous targets positioned between them and a nonferrous target may mask the nonferrous target. The rated operating distance of these sensors is not subject to the correction factors that apply to standard inductive sensors.

Differential Travel (Hysteresis)

The difference between the “operate” and “release” points is called differential travel (See shaded area in Figure 7). It is factory set at less than 15% of the effective operating distance. Differential travel is needed to keep proximity sensors from “chattering” when subjected to shock and vibration, slow moving targets, or minor disturbances such as electrical noise and temperature drift.

Figure 7



Actuation Mode

Inductive sensors can be actuated in an axial or lateral approach (See Figure 7). It is important to maintain an air gap between the target and the sensing face to prevent physically damaging the sensors.