Assured sensing range s_a

Distance from the active area where actuation of the proximity switch is assured under defined conditions:

$0 < sa \leq 0.81 \cdot s_n$

Repeatability R

Repeat accuracy is the change in the actual sensing range s_r, measured over a period of eight hours at a housing temperature of 23 ± 5 °C (73 ± 9 °C), any level of relative humidity, and a supply voltage of Ue ± 5% or any voltage within the rated operational voltage range ± 5%:

$R \leq 0.1 \cdot s_r$

Hysteresis H

Hysteresis is the distance between the switching points when the measuring plate approaches and moves away from the proximity sensor. This value is specified relative to the actual operating distance s_r, measured at an ambient temperature of 23 ± 5 °C (73 ± 9 °C), and the rated operational voltage:

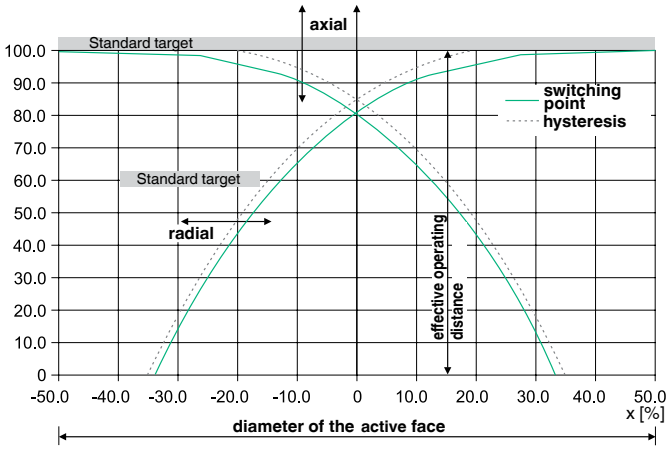
$H \leq 0.2 \cdot s_r$.

Switched off

A proximity sensor is switched off with certainty when the distance between the target and the active sensor face is at least three times the rated sensing range s_n.

Laterally/radially approaching objects

In addition to an axial approach, target objects can approach a proximity sensor radially, through the active zone. When targets approach radially, a different sensing range is obtained depending on the axial distance. This relationship is described by the response curves shown.



Different target sizes

Inductive sensors are often activated by machine parts. These very rarely have the same size and shape as the standard measuring plate to which the sensor's technical data applies. The real application sensing range depends on the size of the metal used to attenuate the sensor.

Generally, the sensing range increases only marginally with a larger object surface, but reduces significantly for smaller objects.

If the application target is different in size to the standard measuring plate, it is recommended that you verify the sensing range of the selected sensor.

Different actuator materials

In addition its dimensions, the material composition of the target is also important. This is described by the reduction factor. The reduction factor specifies by what factor the operating distance reduces based on different materials compared to steel FE 360 (St37) for inductive proximity sensors and against a grounded plate for capacitive proximity sensors. The lower the reduction factor, the shorter the sensing range for the material in question. Since the reduction factor for inductive proximity sensors depends upon the housing and shielding material, this factor vary from type to type. Please use the value in the respective data sheet.

For inductive proximity sensors, the conductivity/permeability ratio of the target is the parameter for the reduction factor. Some typical reduction factor values are provided below:

Material	Reduction factor
Construction steel	1
Aluminum foil	1
Stainless steel	0.85
Aluminum	0.4
Brass	0.4
Copper	0.3

Step 3: Mounting conditions

Inductive and capacitive sensors can be flush mounted or non-flush mounted.

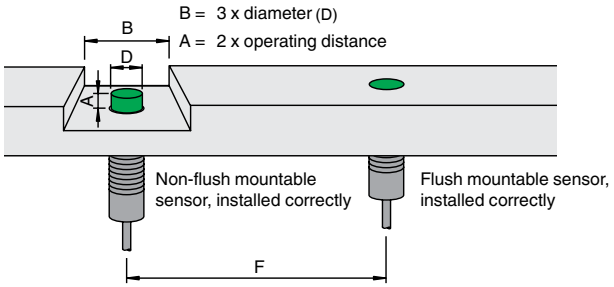
Sensors that cannot be flush mounted

Non-flush proximity sensors have the greatest sensing range relative to sensor diameter. The coils used to generate electromagnetic fields in inductive proximity sensors are placed in a ferrite core to produce a directed field. But for non-flush sensors, a portion of this field is radiated laterally. A lateral effect can also be observed in capacitive proximity sensors.

In order to prevent these high-range products from being damped by their environment, a metal-free space must be left around the sensor element. The space must conform to the minimum requirements shown below.

Sensors that can be flush mounted

Flush inductive and capacitive proximity sensors can be installed without leaving a distance between the mounting surface and the sensor face. The advantage is that they are better mechanically protected and less prone to errors than non-flush types. The flush mounting is possible because of the addition of an internal shield designed into the sensor. Flush sensors are generally called flush mountable or embeddable sensors.



Further details on the mounting conditions are included in the technical data for the sensors.

Refer to General Notes Relating to Product Information
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