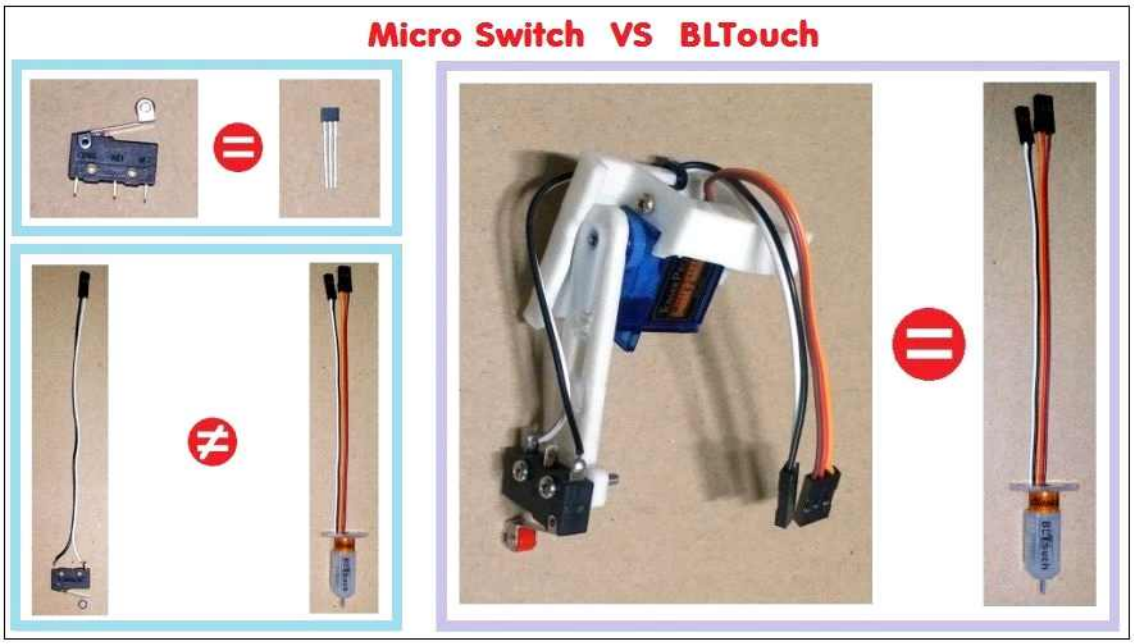
## ■ BLTouch vs. other sensor

### ◈ BLTouch

BLTouch must be installed perpendicular to the ground.

If BLTouch push-pin can't be perpendicular to the ground, BLTouch will out put wrong signal.




### ◈ Micro switch

BLTouch is equipped with all three function as micro switch, servo motor and also servo arm. Comparison would be pointless if micro switch sensor for bed leveling does not include the retraction and deployment method.

### ◈ Inductive Proximity Sensor

At Inductive Proximity Sensors, to calculate the sensing distance for other application conditions the following parameters, which affect the sensing distance, must be taken into account. (For example : Variations in ambient temperature(KΘ), Different types of object material(Km), Size of the object to be detected(Kd), Variation of supply voltage(Kt))

Sa(assured sensing distance) = Sn x KΘ x Km x Kd x Kt

Sn : nominal sensing distance

If non-contacting Inductive Proximity sensor can receive the same Parameter at whole working area, it must be the best auto bed leveling sensor for 3D printers.

But who can provide this?

Most of metal beds have various temperature(KΘ) areas at one bed, and its thickness(Kd) and object material(Km) are also various because of bolts, nuts, or supporters etc.

Please see picture provided by Sensor manufacturer Schneider Electric

# Inductive proximity sensors

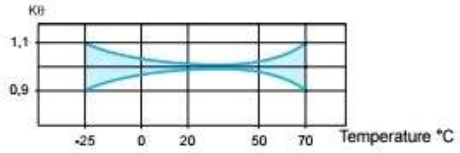
Sensing distance correction coefficients

**http://www.is-com.ru/files/photoelectric_detectors_xs.pdf**

## Correction coefficients to apply to the assured sensing distance

In practice, most target objects are generally made of steel and are of a size equal to, or greater, than the sensing face of the proximity sensor.
To calculate the sensing distance for other application conditions the following parameters, which affect the sensing distance, must be taken into account :
**Note** : The curves indicated below are purely representative of typical curves. They are given as a guide to the approximate usable sensing distance of a proximity sensor for a given application.

### Variations in ambient temperature

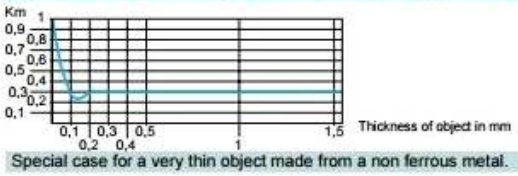



Apply a correction coefficient Kθ, determined from the curve shown above.

### Different types of object material


Apply a correction coefficient Km, determined from the diagram shown above.

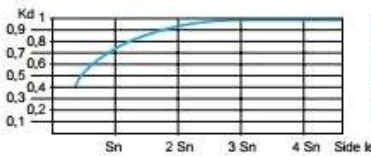
Typical curve for a copper object used with a Ø 18 mm cylindrical sensor.




Special case for a very thin object made from a non ferrous metal.

### Size of the object to be detected

Typical curve for a steel object used with a Ø 18 mm cylindrical sensor.




When calculating the sensing distance for the selection of a sensor, make the assumption that Kd = 1.

Apply a correction coefficient Kd, determined from the curve shown above.

### Variation of supply voltage

In all cases, apply the correction coefficient Kt = 0.9.

## Calculation examples

**Example 1 : correction of the sensing distance of a sensor**
Proximity sensor **XS7-C40FP260** with nominal sensing distance Sn = 15 mm.
Ambient temperature variation 0 to + 20 °C.
Object material and size : steel, 30 x 30 x 1 mm thick.
The assured sensing distance **Sa** can be determined using the formula :
**Sa = Sn x Kθ x Km x Kd x Kt** = 15 x 0.98 x 1 x 0.95 x 0.9, i.e. Sa = 12.5 mm.

**Example 2 : selecting a sensor for a given application**
Application characteristics :
- object material and size : iron (Km = 0.9), 30 x 30 mm,
- temperature : 0 to 20 °C (Kθ = 0.98),
- object detection distance : 3 mm ± 1.5 mm, i.e. Sa max. = 4.5 mm,
- assume Kd = 1.

A sensor must be selected for which $Sn \geq \frac{Sa}{K\theta \times Km \times Kd \times Kt} = \frac{4.5}{0.98 \times 0.9 \times 1 \times 0.9}$, i.e. Sn ≥ 5.7 mm.

One possible choice is a Ø 18 mm cylindrical non flush mountable sensor, type **XS2-M18PA370** (Sn = 8 mm).