

JAYASHREE ELECTRON

PROXIMITY SWITCHES A SIMPLE GUIDE FOR EVERYONE

Understanding the basics — even without a technical background

1. What is a Proximity Switch?

A proximity switch is a sensor that detects an object without touching it. When an object comes near the sensor, it detects the object and sends an electrical signal to the machine or control system.

Simple example: A metal part moves on a conveyor. When it comes in front of the sensor, the sensor detects it and can send a signal to a PLC, counter or controller.

2. Where is it Used?

Application	What it does
Object detection	Detects whether an object is present or absent.
Position detection	Detects when a machine part reaches a required position.
Counting	Counts objects passing a sensing point.
Speed monitoring	Provides pulses for speed-related applications where the selected model is suitable.
Automation	Sends an ON/OFF signal to a PLC, relay, counter or controller.
Conveyors	Detects material or machine parts at selected points.

3. First Question: What Object Do You Want to Detect?

Before selecting a sensor, start with the object — not the model number.

Question	Why it matters
Is it metallic?	Standard inductive proximity switches are intended primarily for electrically conductive/metallic targets.
What material is it?	Sensing distance changes with target material. Catalogue sensing values are generally based on mild steel (MS).
What is its size?	Target size can affect practical sensing conditions.
What is its shape?	The way the object approaches the sensing face matters for reliable detection.

4. Metallic and Non-Metallic — Simple Meaning

Metallic: iron, steel, stainless steel, aluminium, copper, brass etc. Inductive proximity switches are mainly used for metallic targets.

Non-metallic: plastic, wood, glass etc. Do not assume a standard inductive sensor will detect these. The sensing technology must be suitable for the material.

Catalogue note: Jayashree also lists special non-ferrous sensing models for Copper, Aluminium, Gold, Tin and Zinc.

5. What is Sensing Distance?

Sensing distance is the distance between the sensor's sensing face and the target when the sensor operates.

Example: If a model is specified with a 5 mm sensing distance, the specified target is intended to be detected at that operating distance under the stated conditions.

The catalogue covers inductive switch sizes from about 4 mm diameter to 140 mm diameter and sensing distances from 0.5 mm to 100 mm across the range.

6. Flush vs Non-Flush

Flush	Non-Flush
Can be mounted flush with the surrounding metal surface, where permitted by the model.	Requires the specified metal-free space around the sensing face.
Generally has a shorter sensing distance than the corresponding non-flush arrangement.	Generally allows a longer sensing distance than the corresponding flush arrangement.

Why it matters: If there is very little space around the sensor in your machine, mounting type becomes an important selection point.

7. What is Switch Size?

Switch size means the physical size/form factor of the sensor, such as M12, M18, M30, M50 or a special rectangular type. Size helps with mechanical mounting, but **size alone does not determine the complete electrical specification.**

8. What is Supply Voltage?

Supply voltage is the electrical voltage required to operate the sensor. The catalogue contains different electrical versions, including 10–30 V DC, 24 V DC and other AC/DC ranges. Always check the exact model.

9. What is Load?

Load is the electrical device or circuit operated by the sensor output. Examples include a PLC input, relay, counter or controller. Maximum load current depends on the exact model.

10. What is Output?

Term	Simple meaning
NO – Normally Open	Output changes to the active state when the target is detected.
NC – Normally Closed	Output changes from its normal state when the target is detected.
PNP	Sourcing output arrangement, commonly used with compatible PLC inputs.
NPN	Sinking output arrangement, commonly used with compatible control inputs.

11. 2-Wire, 3-Wire and 4-Wire — What Does It Mean?

Type	Simple explanation
2-Wire	Uses two wires. The exact behaviour depends on whether it is AC, DC, AC/DC or NAMUR.
3-Wire	Typically has supply connections plus one output; PNP/NPN depends on the model.
4-Wire	Provides supply and output functionality; exact NO/NC or PNP/NPN arrangement depends on the model.

12. How to Select the Right Sensor?

Step	Ask this question
1	What object do you want to detect?
2	What material is it made of?
3	What is its approximate size and shape?
4	How far will it be from the sensor?
5	How fast will it move or pass the sensor?
6	Which machine/application will use the sensor?
7	What supply voltage is available?
8	What output/connection does the control system require?
9	Is flush or non-flush mounting required?
10	Are there special conditions such as high temperature, high pressure or welding?

13. A Simple Example

Requirement: A steel component must be detected on a conveyor and the control system provides 24 V DC.

Selection thought process: Steel → Inductive sensing → Required sensing distance → Sensor size → Flush/Non-Flush → 24 V DC → Output → Suitable model.

The exact model must then be confirmed against its individual datasheet and the actual application conditions.

14. Common Mistakes

- Choosing only by sensor size.
- Ignoring target material.
- Ignoring actual sensor-to-object distance.
- Assuming Flush and Non-Flush have the same sensing distance.
- Not checking supply voltage.

- Not checking output type and load.
- Assuming a standard inductive sensor will detect every non-metallic material.

15. Remember These 5 Things

- **WHAT** are you detecting?
- **WHAT MATERIAL** is it made of?
- **HOW FAR** is the object from the sensor?
- **WHERE** and **HOW** will the sensor be mounted?
- **WHAT** electrical supply and output does your machine require?

Source: Jayashree Electron Proximity Switch catalogue supplied for this project. This guide explains the catalogue information in simpler language and does not replace an individual model datasheet.