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Principle of Operation

Introduction

The BlueLevel Technologies Model IPH inductive proximity switches are compact sensors that are used for detecting the presence and absence of conductive metallic material within proximity of the sensor. They offer high value as automatic proximity sensors. They can be used to detect a variety of metallic objects in the automation of various production processes.

Use

The Model IPH is used to detect the presence or absence of a metallic object within its range of influence. These sensors operate based on a proven principle. Refer to the Applications section for more information.

Function

The Inductive Proximity Switch sensors circuit consists of a coil of copper wire wrapped on a ferrite core, and a transistorized circuit. A small amount of energy is supplied to the coil and the transistorized circuit uses this coil to produce an oscillation. The inductive sensors operate on a “kill oscillator” principle. When the conductive material or object is brought into the radio frequency field, eddy current losses draw energy from the coil to run along the surface of the metal. Since there is little energy in the coil, the amplitude of the oscillation decreases as more of the target metal enters the field. When enough metal enters the field the losses become so great that the circuit is unable to keep the oscillator running. When the oscillator is “killed” a detector produces a solid state switch output.

Sensing Distance

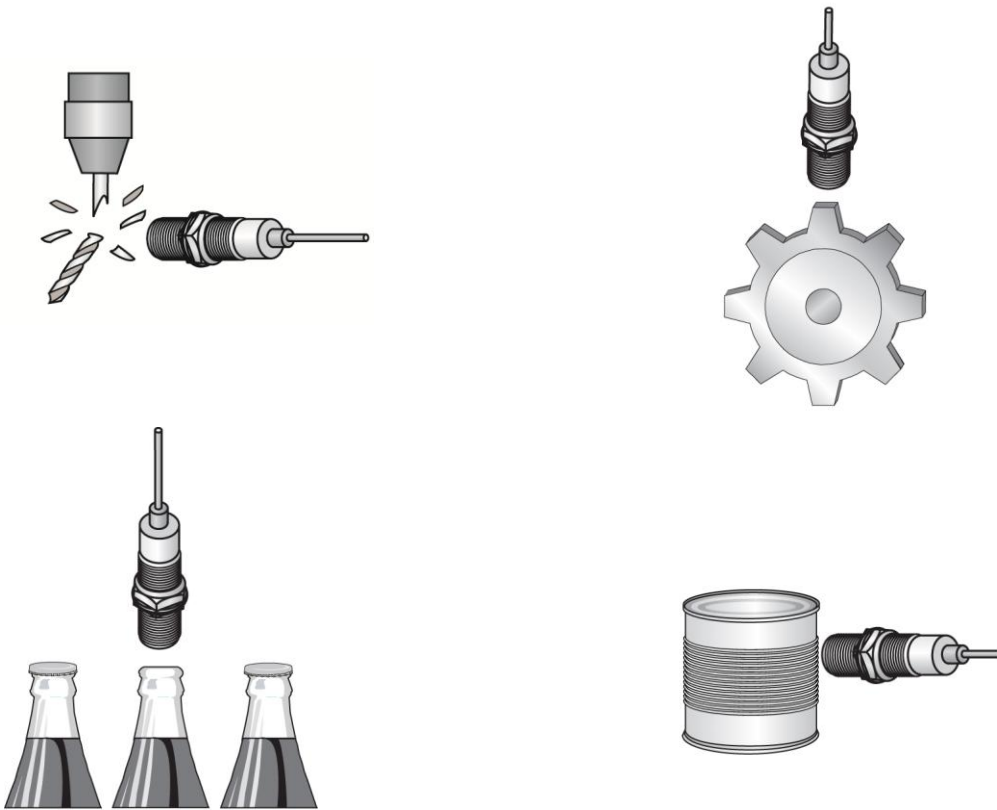
Maximum sensing distance (from sensor face to target material) remains constant at 5mm for the 18mm shielded construction inductive proximity switch. This is based upon an iron (FE 37) square as the target material. The sensing distance is not adjustable like that of capacitive proximity sensors. The sensing distance of inductive switches declines for other non-ferrous metals such as those shown below:

<u>Metal</u>	<u>Correction Factor</u>
Aluminum	Maximum Distance X 0.45
Brass	Maximum Distance X 0.50
Chrome Nickel Alloy	Maximum Distance X 0.85
Copper	Maximum Distance X 0.40

Applications

General

Model IPH inductive proximity switches can be used to detect conductive metal objects. The maximum sensing distance is based upon an iron target and reduced based upon a correction factor as discussed previously. Shielded construction is the most commonly available and this construction includes a metal band surrounding the ferrite core and coil arrangement which helps direct the electromagnetic field to the front of the sensor allowing the sensor to be embedded in its mounting. Unshielded sensors do not have this and are side sensitive. Inductive sensors can be used for a wide variety of purposes in detecting metal objects including detecting broken drill bits, variation in cam or gear rotation speed, part or product detection for position sensing and many other purposes.

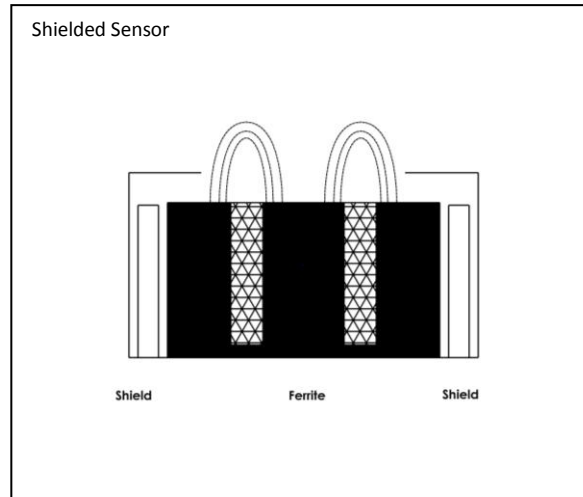


Shielded Vs. Unshielded Sensor Construction

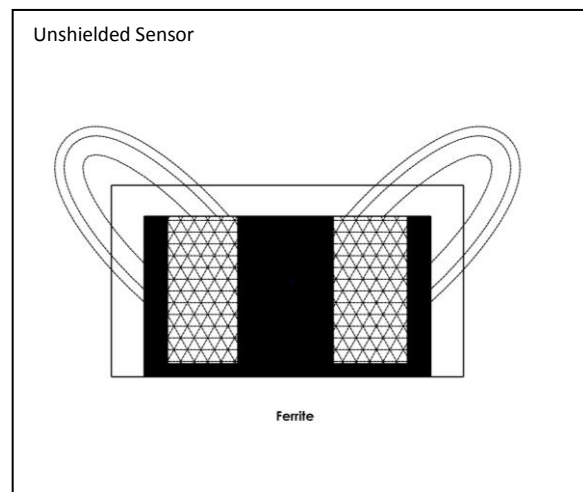
Model IPH inductive proximity sensors are available in shielded construction. Consult the factory for availability of unshielded construction inductive proximity switches.

The following briefly explains each and their typical use.

Shielded Sensor Construction: Sensors that are considered to be “shielded” are made with a metal band or shield surrounding the ferrite core and coil arrangement. This focuses the electrical field with a straight-line path in front of the sensor. The primary advantage of shielded sensors is that they can be mounted flush in surrounding material without causing a false trigger as they are only front sensitive. Unshielded sensors cannot.



Unshielded Sensor Construction: Unshielded sensor construction does not have a metal band surrounding the ferrite core and coil arrangement and these sensors have a less concentrated field than shielded sensors. Unshielded sensors therefore have a spherical electrical field and are side and front sensitive. Contact the BlueLevel factory to discuss your application and find the availability of unshielded sensors.



Installation

BlueLevel Technologies Model IPH inductive proximity sensors can be mounted using the provided mounting hardware. Consult the factory for availability of mounting accessories.

Refer to the Installation, Operation and Maintenance Instruction document supplied with the Model IPH for specific details and safety precautions regarding installation.

Features

Features that make the Model IPH the best choice for many material sensing applications include the following:

- ✚ All Model IPH inductive proximity switches are available in a common industry size that is very compact making them ideal for applications where space is very tight.
 - ✚ Low purchase cost makes the Model IPH a high value affordable sensor. Call for your quote today!
 - ✚ AC and DC (PNP or NPN) switches are available making the Model IPH sensor line very versatile. These units can switch up to 400mA in load current and are ideal for interfacing with PLC's and DCS control systems.
 - ✚ With a completely solid state design there are no moving parts to wear out or break. A long life comes at no charge with every Model IPH unit.
 - ✚ Each Model IPH is equipped with an M12 cord connector. Cord sets 5m in length are available and can simplify installation.
 - ✚ Shielded sensors can be mounted flush with the mounting bracket.
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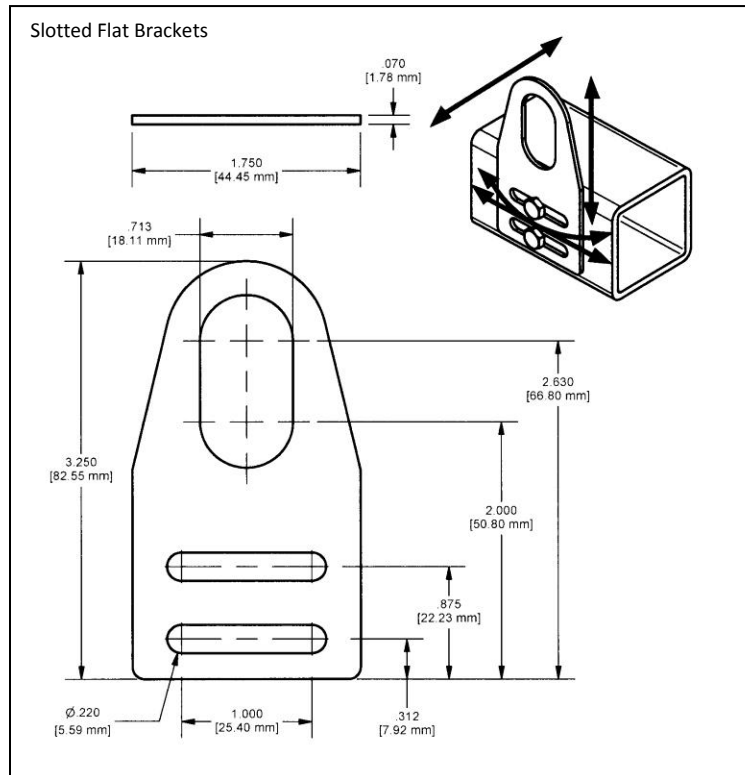
Options/Accessories

BlueLevel Technologies offers a variety of accessories for the Model IPH inductive proximity switches. Consult the factory for your mounting accessory needs.

Mounting Brackets

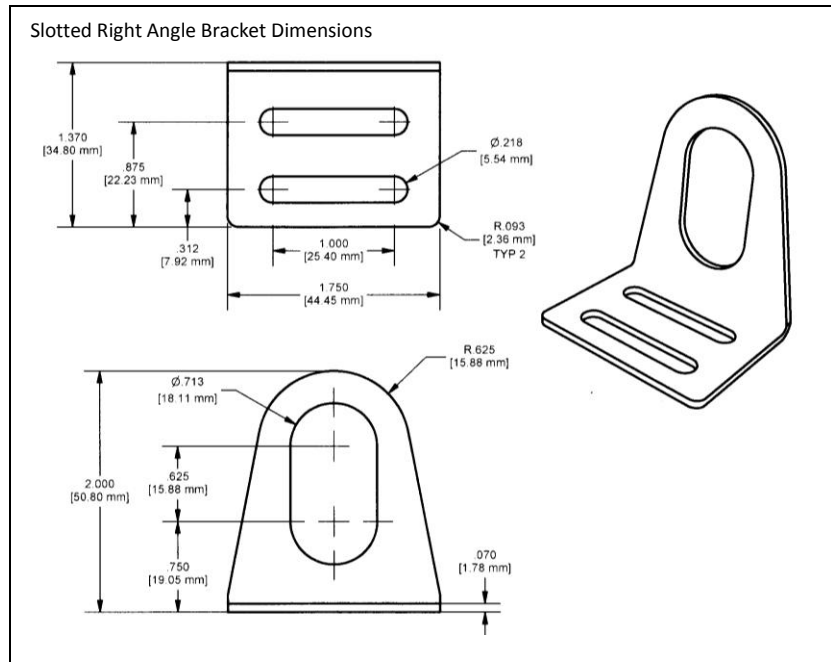
Flat and Angle Mounting Brackets are available. These mounting brackets are used in non-tank/bin applications and provide for maximum sensor adjustment without shimming or machinery equipment modification.

Flat Brackets are available in a slotted design. The **Slotted Flat Brackets** provide for maximum adjustability and are manufactured of zinc-plated cold rolled steel (PN 485100).



Right Angle Mounting Brackets

are similar to the Flat Brackets except that they provide for right angle mounting. The **Slotted Right Angle Brackets** provide for maximum adjustability and are manufactured out of zinc-plated cold rolled steel (PN485110).



Cord Sets

5m (16.4ft) long cord sets are available that offer quick disconnect of the Model IPH from the sensor wiring. This is advantageous in most applications. A cord set is required to install all quick disconnect equipped sensors.

The 5m cord set for the AC sensors is PN 476002.
The 5m cord set for the DC sensors is PN 476001.

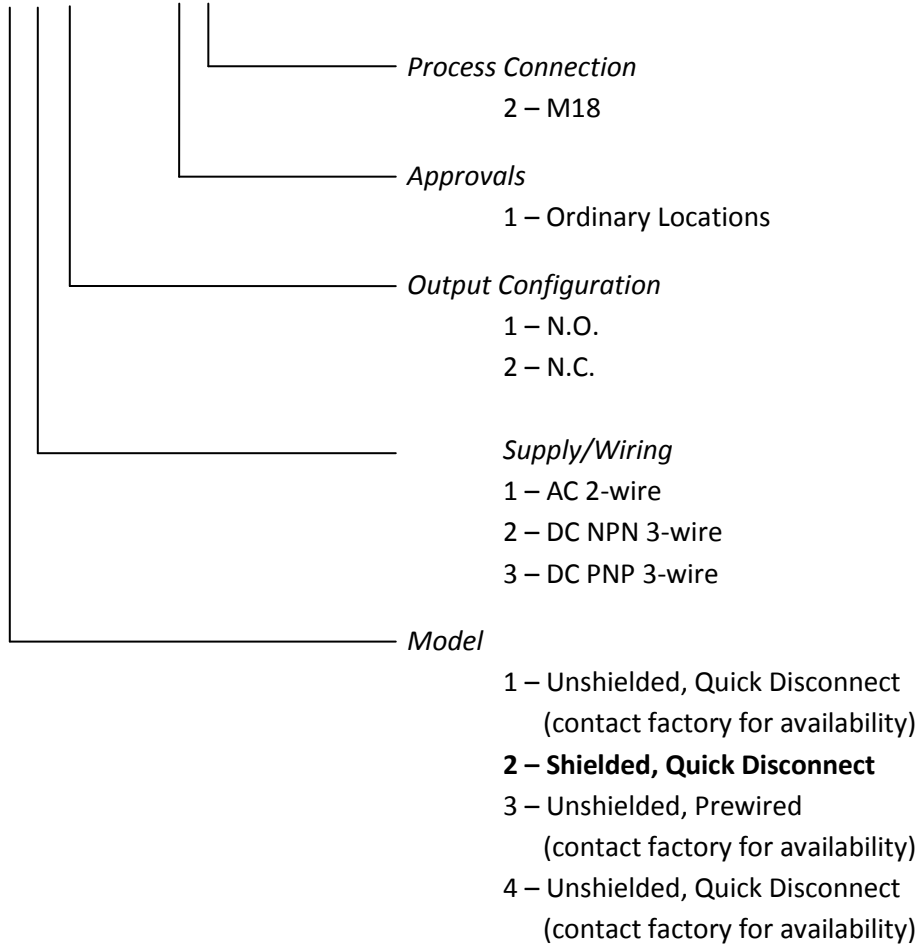


Ordering Information

Model IPH Capacitive Proximity Switch

Part Number Structure

4 8 - X X X 1 - 1 X X



Technical Data

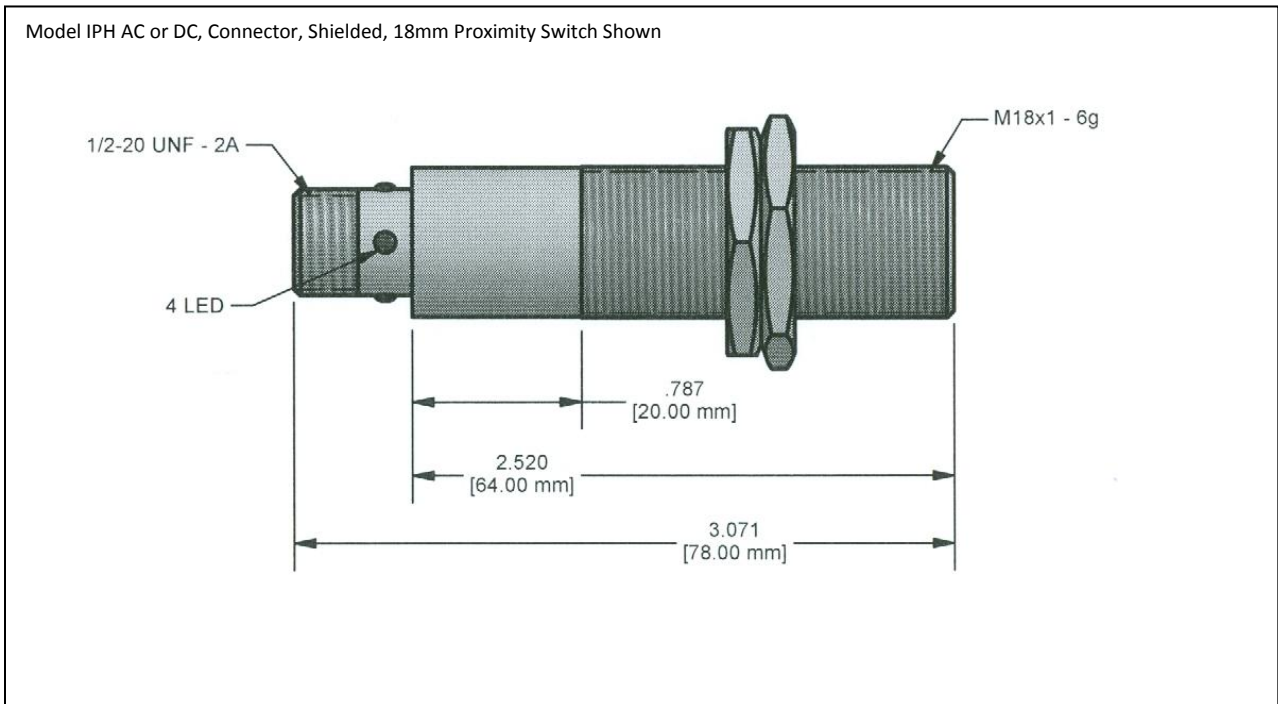
Model IPH 2-Wire AC Switches

Sensing Distance:	
M18 Shielded Sensors	5mm
Operating Voltage:	20-250VAC
No Load Current:	< 1.8mA
Maximum Load Current:	400mA
Leakage Current:	< 1.8mA
Surge Current:	5A (20ms)
Minimum Load Current:	5mA
Voltage Drop:	< 8VAC @ 400mA
Switching Frequency:	< 25Hz
Response Time:	10ms/10ms
Switching Hysteresis:	<15% (Sensing Range)
Repeat Accuracy:	< 1% (Sensing Range)
Housing Protection Category:	IP 67
Operating Temperature:	-13° F to +158° F (-25° C to +70° C)
Temperature Drift:	< 10% (Sensing Range)
Short Circuit Protection:	No
Shock/Vibration:	IEC 60947-5-2, Part 7.4.1 and Part 7.4.2
Active Face Material:	PBT (Polybutylene Terephthalate)
Housing Material:	Chrome Plated Brass
Certifications:	CE Mark cCSA _{US} Ordinary Locations

Model IPH 3-Wire DC Switches

Sensing Distance:	
M18 Shielded Sensors	5mm
Operating Voltage:	10-30VDC
Ripple:	< 10%
No Load Current:	< 10mA
Maximum Load Current:	200mA
Leakage Current:	0.01mA
Voltage Drop:	< 1.5VDC
Switching Frequency:	1KHz
Response Time:	0.2ms/0.2ms
Switching Hysteresis:	<15% (Sensing Range)
Repeat Accuracy:	< 1% (Sensing Range)
Housing Protection Category:	IP 67
Operating Temperature:	-13° F to +158° F (-25° C to +70° C)
Temperature Drift:	< 10% (Sensing Range)
Short Circuit Protection:	Yes
Overload Trip Point:	220mA
Time Delay Before Availability:	<10ms
Shock/Vibration:	IEC 60947-5-2, Part 7.4.1 and Part 7.4.2
Active Face Material:	PBT (Polybutylene Terephthalate)
Housing Material:	Chrome Plated Brass
Certifications:	CE Mark cCSA _{US} Ordinary Locations

Dimensions





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