

How do I Choose the Right Sensor?

All applications have certain specific needs, but, in general, the following steps will help you choose the correct sensor for your application:

Step 1:

What is the sensing distance required?

The sensing distance is the distance between the tip of the sensor and the object to be sensed. The selection guide and the specifications table for each sensor family lists the sensing distances.

Some things to keep in mind are:

A. In many applications, it is beneficial to place the sensor as far as possible from the sensing object due to temperature concerns. If a sensor is placed too close to a hot temperature source, the sensor will fail quicker and require more maintenance.

Greater distance may be achieved with extended and triple range sensors. In many applications, a sensor may not be mountable close to the sensed object. In this case, longer sensing distances are needed. Extended sensing distance sensors are offered in 8mm to 30mm diameters, and triple sensing distance sensors in 8mm and 12mm formats.



In many cases, using an extended distance sensor to get the sensor farther away from the detected object can be beneficial to the life of the sensor. For example, without an extended distance sensor you may not be able to place the sensor close enough to the detectable object, or you may need to buy more expensive high temperature sensors.



Another example would be a mechanical overshoot situation, where mounting the sensor farther from the detection object may eliminate unneeded contact with the sensor, thereby extending the life of the sensor.

These are just a few examples, but the benefits of using extended distance sensors are obvious in many applications. Think of how extended distance sensors could save you time and money in your application.

B. The material being sensed (i.e. brass, copper, aluminum, steel, etc.) makes a difference in the type of sensor needed.

Note: If you are sensing a non-metallic object, you must use a capacitive sensor.

The sensing distances specified in this catalog were calculated using FE360 material. Many materials are more difficult to sense and require a shorter distance from the sensor tip to the object sensed.

If sensing a material that is difficult to sense, you may consider using our unique stainless steel sensing technology. This will measure virtually all materials at the specified sensing distances.

Step 2:

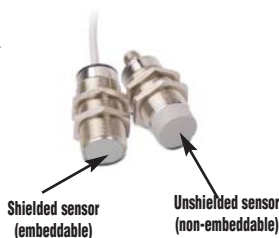
How much space is available for mounting the sensor?

Have you ever tried using a round sensor or short body version, and not been able to make it fit? Our rectangular sensors can meet your needs. The same technology used in a standard round proximity sensor is enclosed in a rectangular housing. This technology includes sensing distances, electrical protection and switching frequencies similar to round sensors.

Step 3:

Is a shielded or unshielded sensor needed?

Shielded and unshielded sensors are also referred to as embeddable and non-embeddable. Unshielded sensors allow longer sensing distances but shielded sensors allow flush mounting.



Step 4:

Consider environmental placement concerns. Will the sensor be placed underwater, in a high-temperature environment, continually splashed with oil, etc.? This will determine the type of sensor you may use. In the selection table and in the specification tables for each sensor family, we list the environ-

mental protection degree ratings. Most of our sensors are rated IEC-IP67 and others are rated IP65 or IP68.

These ratings are defined as:

IP65: Protection from live or moving parts, dust, and protection from water jets from any direction.

IP67: Protection from live or moving parts, dust, and protection from immersion in water.

IP68: Protection from live or moving parts, dust, and protection from submersion in water under pressure.

Step 5:

What is the sensor output connected to?

Note: If using AC sensors, please skip this step.

The type of output required must be determined (i.e., NPN, PNP or analog). Most PLC products will accept either output. If connecting to a solid state relay, a PNP output is needed.

Type	Guidelines
2-wire	<ul style="list-style-type: none"> Will work with sinking or sourcing ... devices. Only 2 wires to terminate. Higher leakage current.
3-wire	<ul style="list-style-type: none"> Most popular output. Familiar to most users. (Must select between NPN and PNP outputs.)
4-wire	<ul style="list-style-type: none"> Allows configurability in one device. May have both NPN/PNP selection or NO/NC selection. Allows user to stock one part for numerous applications.

Step 6a:

Do I need 2, 3, or 4-wire discrete outputs?

This is somewhat determined by what the sensor will be connected to. Some simple guidelines to use are:

Type	Guidelines
1-5mA	available on AM9, AK9 and AT9 series analog inductive sensors
4-20mA	available on AM9, AK9 and AT9 series analog inductive sensors
0-5VDC	available on AM9, AK9 and AT9 series analog inductive sensors
0-10VDC	available on AE9, AM9, AK9 and AT9 series analog inductive sensors and SU and TU ultrasonic sensors

Step 6b:

Do I need analog outputs?

This is determined by the sensor application and what the sensor will be connected to. Sensors with analog outputs produce an output signal approximately proportional to the target distance.

Step 7:

Determine output connection type.

Do you want an axial cable factory attached to the sensor (pigtail) or a quick-disconnect cable?

There are many advantages to using a quick-disconnect cable, such as easier maintenance and replacement. All proximity sensors will fail in time and using a Q/D (quick-disconnect) cable allows for simple replacement.

Factory attached axial cables come in a 2 meter length. CD08/CD12 Q/D cables come in 2 meter, 5 meter, and 7 meter lengths. Extension cables are available in 1 meter and 3 meter lengths to extend the length of the standard Q/D cables.

Q/D cables are offered in PVC and PUR jackets for meeting the requirements of all applications. Axial cables typically come with a PVC jacket. PVC is a general purpose insulation while PUR provides excellent oxidation, oil and ozone resistance. PUR is beneficial if the cable is exposed to oils or placed in direct sunlight.

There are also advantages to a factory attached axial cable:

Cost: The cable is integrated into the sensor and included in the price. Q/D cables must be purchased separately.

Environmental impact: Since the cable is sealed into the sensor, there is less chance of oil, water or dust penetration into the sensor, which could cause failure.

Proximity Sensor Selection Guide



Specifications	PY Stainless Steel DC	PD Stainless Steel DC	AE Series DC	AM Series DC
Description	Miniature inductive prox sensors, 3mm and 4mm, DC, stainless steel	Miniature inductive proximity sensors, 5mm, DC, stainless steel	Inductive proximity sensors, 8mm, DC, metal, standard and short body lengths	Inductive proximity sensors, 12mm, DC, metal, standard and short body lengths
Sensing Distances	Standard distance: 0.6mm Extended distance: 1mm	Standard distance: 0.8mm Extended distance: 1.5mm	Standard distance: 0 to 1.5mm 0 to 2.5mm Extended distance: 0 to 2.0mm 0 to 4mm Triple distance: 0 to 3mm	Standard shielded: 0 to 2.0mm Standard unshielded: 0 to 4mm Extended shielded: 0 to 4mm Extended unshielded: 0 to 8mm Triple distance shielded: 6mm
Output State	N.O.	N.O.	N.O.	N.O.
Logic Output	NPN / PNP	NPN / PNP	NPN / PNP	NPN / PNP / Sink / Source
Connection Type	Axial cable	Axial cable / M8 connector	Axial cable /M8 / M12 connector	Axial cable / M12 connector
Supply Voltage	10-30VDC	10-30VDC	10-30VDC	10-30VDC
Switching Frequency	Standard distance: 5kHz Extended distance: 3kHz	Standard distance: 5kHz Extended distance: 3kHz	Standard shielded: 3kHz Unshielded: 2.5kHz Extended shielded/unshielded: 3kHz Triple shielded: 1kHz	Standard distance shielded/unshielded: 3 wire 2kHz, 2 wire: 1.5kHz Extended distance shielded/unshielded: 1kHz Triple distance shielded: 800Hz
Protection Degree	IEC-IP67	IEC-IP67	IEC-IP67	IEC-IP67
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Specifications	AK Series DC	AT Series DC	PMW Stainless Steel DC	PKW Stainless Steel DC
Description	Inductive proximity sensors, 18mm, DC, metal	Inductive proximity sensors, 30mm, DC, metal	Inductive proximity sensors, 12mm, stainless steel, DC	Inductive proximity sensors, 18mm, stainless steel, DC
Sensing Distances	Standard distance: shielded 5mm, unshielded 8mm Extended distance: shielded, 8mm, unshielded 12mm	Standard distance shielded: 10mm, Standard distance unshielded: 15mm Extended distance shielded: 15mm Extended distance unshielded: 20mm	Standard distance: 2mm Extended distance: 4mm Triple distance: 6mm	Standard distance: 5mm Extended distance: 8mm Triple distance: 10mm
Output State	N.O.	N.O.	N.O./ N.C.	N.O. / N.C.
Logic Output	NPN / PNP / Sink / Source	NPN / PNP / Sink / Source	NPN / PNP	NPN / PNP
Connection Type	Axial cable / M12 connector	Axial cable / M12 connector	Axial Cable / M12 connector	Axial cable / M12 connector
Supply Voltage	10-30VDC	10-30VDC	10-30VDC	10-30VDC
Switching Frequency	Standard distance shielded: 600Hz Standard distance unshielded, Extended distance shielded, unshielded: 300Hz	Standard distance shielded/unshielded: 2 wire: 150Hz, 3 wire 200Hz Extended distance shielded/unshielded: 2 wire and 3 wire: 150Hz	Standard distance/extended distance: 2kHz Triple distance: 400Hz	Standard/extended distance: 1kHz Triple distance: 200Hz
Protection Degree	IEC-IP67	IEC-IP67	Standard/extended distance: IEC-IP67/68 Triple distance: IEC-IP67 connector / IP68 (Cable)	Standard/extended distance: IEC-IP67/68 Triple distance: IEC-IP67 connector/IP68 (Cable)
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Specifications	PTW Stainless Steel DC	V Series AC	CR5 Rectangular DC	CR8 Rectangular DC
Description	Inductive proximity sensors, 30mm, DC, stainless steel	12mm/18mm/30mm inductive proximity sensor, AC, metal	5 x 5 rectangular inductive proximity sensors, DC, metal	8 x 8 rectangular inductive proximity sensors, DC, metal
Sensing Distances	20mm	M12 models shielded: 2mm / Unshielded: 4mm M18 models shielded: 5mm / Unshielded: 8mm M30 models shielded 10mm / Unshielded 15mm	Standard: 0.8mm Extended distance: 1.5mm	Standard distance shielded: 0 to 1.5mm Extended distance shielded: 0 to 2.0mm Triple distance shielded: 3mm
Output State	N.O.	N.O.	N.O.	N.O.
Logic Output	NPN / PNP	-	NPN / PNP	NPN / PNP
Connection Type	Axial Cable / M12 connector	Axial cable / M12 connector	Axial cable / M8 connector	Axial cable / M8 connector
Supply Voltage	10-30VDC	20-253VAC, 50/60Hz	10-30VDC	10-30VDC
Switching Frequency	100Hz	25Hz	Standard distance: 5kHz Extended distance: 3kHz	1kHz
Protection Degree	IEC-IP67 (connector/ IP68 cable)	IEC-IP67	IEC-IP67	IEC-IP67
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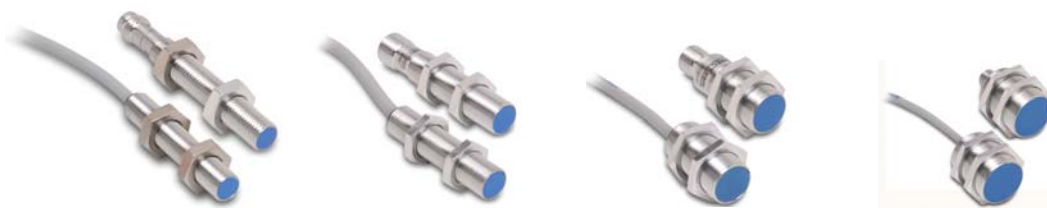


Specifications	DR10 Rectangular DC	APS4 Rectangular DC	CT Capacitive DC
Description	10 x 16 rectangular inductive prox sensor, DC, plastic	12 x 27 compact rectangular inductive prox, DC, plastic	30mm capacitive proximity sensors, DC, metal
Sensing Distances	Shielded: 3mm Unshielded: 6mm	4.0mm	Shielded: 2-15mm Unshielded: 2-20mm
Output State	N.O.	N.O.	N.O.
Logic Output	NPN/ PNP	NPN / PNP	NPN/ PNP
Connection Type	Axial cable/M8 connector	Axial cable	Axial cable
Supply Voltage	10-30VDC	10-30VDC	10-30VDC
Switching Frequency	3kHz	200Hz	100Hz
Protection Degree Rating	IEC-IP67	IEC-IP67	IEC-IP65
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Cables and Accessories

Cables and accessories can be found starting on page 17-48.

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Specifications	AE Analog Prox	AM Analog Prox	AK Analog Prox	AT Analog Prox
Description	Analog inductive proximity sensors, 8mm, metal	Analog inductive proximity sensors, 12mm, metal	Analog inductive proximity sensors, 18mm, metal	Analog inductive proximity sensors, 30mm, metal
Sensing Distance	4mm	6mm	10mm	20mm
Output	0-10VDC	0-5VDC, 1-5mA / 0-10VDC, 4-20mA	0-5VDC, 1-5mA / 0-10VDC, 4-20mA	0-5VDC, 1-5mA / 0-10VDC, 4-20mA
Supply Voltage	15-30VDC	10-30VDC / 15-30VDC	10-30VDC, 15-30VDC	10-30VDC / 15-30VDC
Connection Type	Axial cable / M8 connector	Axial cable / M12 connector	Axial cable / M12 connector	Axial cable / M12 connector
Protection Degree	IEC-IP67	IEC-IP67	IEC-IP67	IEC-IP67
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Specifications	SU Ultrasonic Sensor	TU Ultrasonic Sensor	UHZ Ultrasonic Sensor
Description	Ultrasonic Sensor, 18mm, plastic, DC and analog output models	Ultrasonic Sensor, 30mm, plastic, DC and analog output models	Ultrasonic Sensor, 30 mm x 20 mm, plastic, thru-beam models
Sensing Distances	100 to 600mm 200 to 1500mm	300 to 2500mm	300 mm
Output	DC models: PNP N.O. Analog models: 0-10VDC	DC models: PNP N.O. Analog models: 0-10VDC	PNP/NPN, N.O./N.C.
Supply Voltage	DC models: 15-30VDC Analog models: 18-30VDC	19-30VDC	18-30VDC
Connection Type	Axial cable/M12 connector	M12 connector	2 meter Axial cable
Protection Degree	IEC-IP67	IEC-IP67	IEC-IP67
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Our Proximity Sensors - at a glance

30 mm capacitive

CT SERIES

Three-wire DC with embedded cable

Sensing distance: **Standard**

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Ultrasonic

SU & TU SERIES

DC with discrete or analog output, embedded cable or quick-disconnect, IP67 rating

Sensing distance: **up to 2,500 mm**

- 18 mm
- 30 mm

UHZ SERIES

DC, discrete output, through-beam pair, embedded cable

Sensing distance: **up to 300 mm**

- Rectangular

Short body round

AE & AM SERIES

3-wire DC, embedded cable or quick-disconnect, IP67 rating

Sensing distance: **Extended**

- 8 mm
- 12 mm

Proximity with analog output

AE, AM, AK & AT ANALOG SERIES

DC with analog output (voltage/current), embedded cable or quick-disconnect, IP67 rating

Sensing distance: **Triple**

- 8 mm
- 12 mm
- 18 mm
- 30 mm

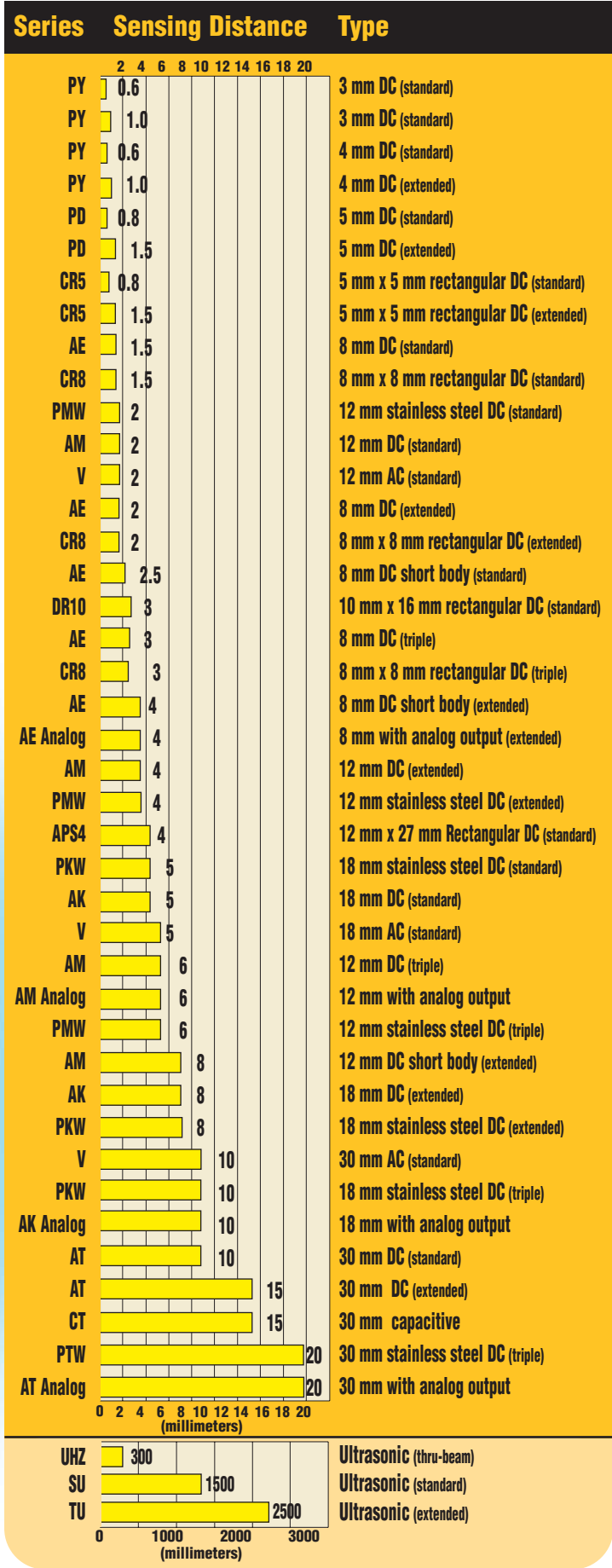
Q/D

extension cables

CDP SERIES

Axial or right-angle connectors, M8 or M12 connector sizes, 1 m or 3 m lengths, IP67 rating

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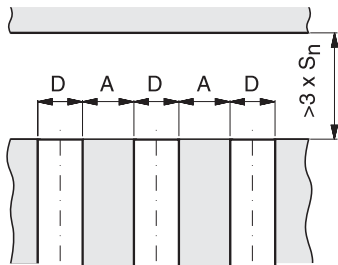
Never use this catalog for installation or operation of equipment. Refer to manual for installation and operation instructions.

The following descriptions refer to the European standard EN 60947-5-2, of September 95.

The specifications given here are intended to be minimum performance values described by the standard.

Alignment

Proximity switches must not be mutually influenced. For this reason, a minimum distance between them (referred to as alignment) must be provided.



Size D	Embeddable A (mm)	Non-Embeddable A (mm)
Ø3	0	--
M4	0	--
Ø4	0	--
M5	0	--
5X5	0	--
M8	2/3*	8
8X8	2/3*	--
M12	6/10*	12
M18	12/20*	30
M30	30	60

*Extended distance models

Break function (N.C., normally closed)

A break function causes load current to flow only when a target is not detected.

Degree of protection

If not otherwise specified, proximity switches (when installed in accordance with manufacturer's instructions) have minimum IP65 protection against dust and water jets.

Differential travel (H)

The differential travel is given as a percentage of the effective operating distance (S_r) and is the maximum difference between the switching distances. The differential is intentionally introduced to guarantee the stability of the output state in case the target is positioned near the switching points.

Distance/target size graph

Indicates the ON switching distance when target material and size changes.

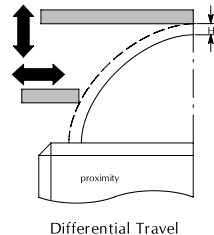
Below are some typical values for different target material of standard dimension:

Inox steel: $0.6-1 \times S_n$

Brass: $0.35-0.50 \times S_n$

Aluminum: $0.35-0.50 \times S_n$

Copper: $0.25-0.45 \times S_n$



Detection area graph

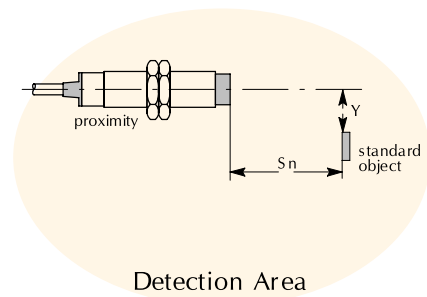
This is a graph of the parallel displacement needed to switch on (switch off, dashed line) as a function of the target distance. The construction of the curve is obtained by measuring the lateral distance between the sensor axis and the edge of the target necessary to switch on or off at any target distance (see figure below.)

Electrical connections

Keep sensor cables and power cables separated to avoid electrical interference.

The power supply voltage must not exceed the specified limits UB.

If a non-stabilized supply voltage is used for DC sensors, the maximum voltage peak under minimum power consumption conditions and minimum voltage peak under maximum power consumption must not exceed UB limits.



If the power supply of the sensor is also used to switch inductive loads, a suppression device must be provided. A fuse to protect the power supply line is also recommended.

Installation notes

Select a sensor compatible with the operating environment: verify the compatibility between building materials, the presence of chemicals, temperature range, protection degree, vibrations, shocks, EMC, supply voltage available, load type, etc.

Select the sensor by referring to the size and type of material to be detected.

Check the minimum distances between sensor and damping materials or another sensor.

Proximity Sensor Terminology

Installation notes, (cont.)

Check that the number of operations does not exceed the maximum switching frequency. If the phase of the output signal is important, check the turn on and turn off time.

Metallic chips or dust must not accumulate on the sensing face. The distance between the sensor and the object to detect must not exceed the assured operating distance S_a ; the best operating distance is $S_n/2$.

Check the effect of vibrations.

Install the sensor using the installation accessories and do not exceed the maximum tightening torque.

Leakage current

The leakage current is the current which passes through the output transistor when it is blocked (this must be taken into account, especially in the case of parallel connection of several switches).

LED status indicators

Proximity switches may incorporate one or more color indicators. The meaning of the colors are:

- CONTINUOUS GREEN: Power ON
- CONTINUOUS YELLOW: Output ON
- CONTINUOUS RED: Fault
(on AC models, RED = output ON)

Make function (N.O., normally open)

A make function causes load current to flow only when a target is detected.

Material influence

The nominal sensing distance $S(n)$ is defined using precisely defined measuring conditions (See **Operating Distance**.) Other conditions may result in a reduction of the operating distance. The tables in the next column show the influence different target materials have on the operating distances of the sensors.

Material Influence: Table 1	
Target Material	Operating Distance
Steel Type FE 360	$S(n) \times 1.00$
Brass	$S(n) \times 0.64$
Aluminum	$S(n) \times 0.55$
Copper	$S(n) \times 0.51$
Stainless Steel (V2A)	$S(n) \times 0.85$

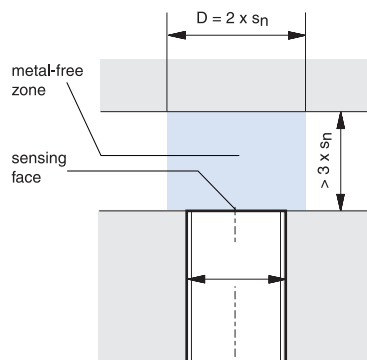
Material Influence: Table 2	
Target Material	Operating Distance
Steel Type FE 360	$S(n) \times 1.00$
Brass	$S(n) \times 0.44$
Aluminum	$S(n) \times 0.36$
Copper	$S(n) \times 0.32$
Stainless Steel (V2A)	$S(n) \times 0.69$

Material Influence: Table 3	
Target Material	Operating Distance
Steel Type FE 360	$S(n) \times 1.00$
Brass	$S(n) \times 1.00$
Aluminum	$S(n) \times 1.30$
Copper	$S(n) \times 0.89$
SS (1mm thick)	$S(n) \times 0.57$
SS (2mm thick)	$S(n) \times 0.90$

Mounting

Shielded (embeddable) proximity switches

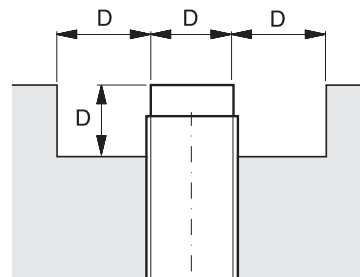
These proximity switches may be flush mounted regardless of the metal being used. For reliable operation, it is necessary to observe the minimum distances from adjacent metal targets.



S_n = Nominal sensing distance
(see Rated operating distance)

Unshielded (non-embeddable) proximity switches

When mounting non-embeddable mounting proximity switches in conducting materials (metals), it is necessary to observe the minimum distances from adjacent metal targets. Flush mounting in non-conducting materials is permitted.



Off-state (leakage) current (I_r)

This is the current that flows through the load circuit of the proximity switch in the OFF state at the maximum supply voltage.

Open collector

The output transistor is not internally connected to a pull-up or pull-down load. It is therefore possible to connect an external load supplied by an external voltage.

Operating distance (sensing range) (S)

The operating distance is the distance at which a standard target approaching the active face of the sensor causes a sensor output state change.

Output type and load connections –3-wire NPN

There are two power wires and one output wire. The switching element is connected between the output wire and the negative terminal, and the load is connected between the output wire and the positive terminal. In the ON state, the current sinks from the load into the switching element.

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Output type and load connections –3-wire PNP

There are two power wires and one output wire. The switching element is connected between the output wire and the positive terminal, and the load is connected between the output wire and the negative terminal. In the ON state, the current flows from the switching element into the load.

Overvoltage protection

No damage will occur in the presence of surge pulses exceeding UB and energy less than 0.5J.

Polarity reversing protection

No damage will occur to proximity switches if the supply wires are reversed.

Protection against inductive loads

Unless otherwise specified, DC sensors are protected against inductive overvoltage by use of a surge diode or a zener diode.

Unshielded proximity switches

The sensor housing does not cover the side of the sensing head. This type of sensor has a higher sensing range than the shielded type.

Rated insulation voltage (Ui)

Unless specified differently, all of the sensors with a supply voltage of up to 50 VAC and 75 VDC are tested at 500 VAC.

Sensors with a supply voltage up to 250 VAC are tested as follows:

Class 1 (with earth terminal) at 1500 VAC

Class 2 (with double insulation, without earth terminal) at 3000 VAC.

Rated operating distance —(nominal sensing distance) (Sn)

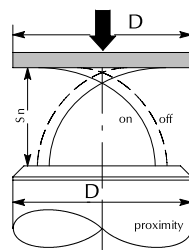
This distance does not take into account manufacturing tolerances ($\pm 10\%$) or variations due to external conditions, such as voltages and temperatures not falling within the rated values.

Repeat accuracy (R)

The repeat accuracy of the effective operating distance (S_r) is measured over an eight hour period at an ambient temperature of 73°F ($\pm 9^\circ$) [23°C ($\pm 5^\circ$)] at a specified humidity and with a specified supply voltage. The difference between the measurements shall not exceed the specified value, or if not specified, 10% of S_r .

Ripple

This is given as a percentage of the mean supply voltage. It is the maximum peak-to-peak value of the admitted ripple voltage. A ripple voltage of $< 10\%$ U_e is desirable.



Rated Operating Distance

Shocks

In accordance with IEC 68-2-27

Pulse shape: half-sine

Peak acceleration: 30g

Pulse duration: 11 ms

Shielded proximity switches

A metal housing surrounds the coil, and only the front of the active face is sensitive. The device allows flush installation on metal plates without any performance change. Refer to Alignment when installing shielded sensors side-by-side.

Short-circuit protection

All DC sensors have integrated short-circuit protection. AC sensors should be protected externally by such devices as fuses.

Standard target

A standard target is square, 1mm thick, and made from type FE360 carbon steel. The length of the side of the square is equal to the diameter of the sensor's active surface, or three times the rated operating distance (S_n), whichever is greater.

Switching frequency (f)

Switching frequency is the maximum output switching frequency performed by the output circuit when standard targets cross the sensing field at a distance of $S_n/2$. The targets are spaced $2d$.

- For DC sensors, the minimum output pulse width must not fall below 50 μs .
- For AC sensors, the minimum output pulse must not fall below half a sine period (ie. for 60 Hz, $1/60 \div 2 = 8.33$ ms.)

Temperature range

Unless otherwise specified, the minimum temperature range is -13 to $+158^\circ\text{F}$ (-25 to $+70^\circ\text{C}$).

Turn-on time

Turn-on time is the elapsed time from when the target enters the sensing range until the output switches.

Turn-off time

Turn-off time is the elapsed time from when the target is removed until the output switches.

Proximity Sensor Terminology

Voltage drop (Ud)

This is the voltage measured across the active output of the proximity switch when the rated operational current (Ie) flows in the load at the rated supply voltage and the temperature is at 73°F (±9°) [(23°C (±5°)). Unless specified differently, the following values are guaranteed:

- Two-wire DC models <8 VDC
- Three-wire DC models <3.5 VDC
- Two-wire AC models <10 VDC

Vibration

In accordance with IEC 68-2-6

Frequency range: 10-55 Hz

Amplitude: 1mm

Sweep cycle duration: 5 min.

Duration of endurance at 55 Hz: 30 min. in each of the three axis directions

4-wire NPN or PNP (programmable output state)

There are two power wires: one N.O./N.C. selection input wire and one output wire. The output state is programmable by connecting the input wire to one of the power supply lines.

4-wire NPN or PNP (complementary outputs)

There are two power wires: one normally open output wire and one normally closed output wire.

4-wire NPN and PNP

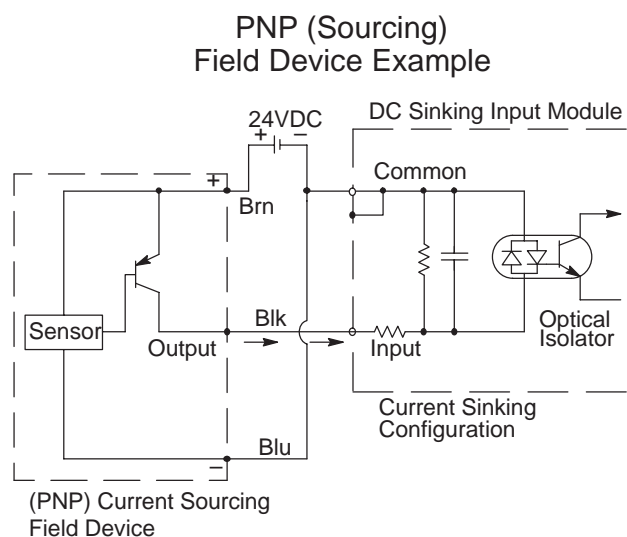
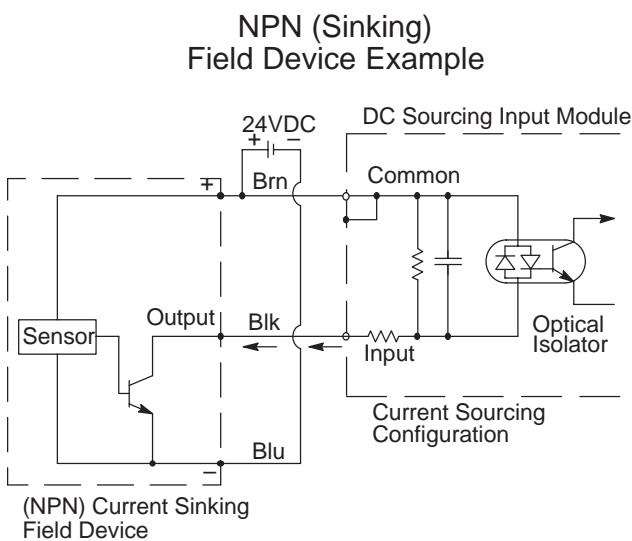
There are two power wires, and the output type is wiring programmable. An NPN output is available by connecting the PNP terminal to the negative power supply line. A PNP output is available by connecting the NPN terminal to the positive power supply line.

Time delay before availability (tv)

The time delay before availability is the time between the switching on of the supply voltage and the instant at which the sensor becomes ready to operate correctly.

During the reset the output circuit is in OFF-state; false signal may be present but the duration shall not exceed 2 ms. If not specified otherwise, the reset duration doesn't exceed 300 ms.

Field Device Examples - 3 Wire Connections



Frequently Asked Questions

How do inductive proximity switches work?

Inductive proximity switches are used to detect the presence of metallic objects without actually contacting the object. Their high-speed switching and small size make them indispensable in automation applications.

Inductive proximity switches consist of a coil driven by an oscillator. The oscillator creates an electromagnetic field which appears at the active face of the switch. If a metal target enters this area, the electromagnetic field is reduced and the switch turns on or off.

Some typical inductive sensor applications are: counting metallic objects, monitoring the position of elements in a machine, sensing the presence of metallic parts like screws, etc., and measuring the rotational speed of axial detecting cams.

What is the difference between inductive and capacitive sensors?

The primary difference is sensing material. Inductive sensors only detect metallic objects while capacitive sensors will detect materials such as wood, paper, liquids, cardboard, etc.

How do I know what size proximity sensor I need?

It depends on two factors: mounting space and sensing distance. Each application has a specific space available for the sensor and each application has a requirement for how close the sensor can be mounted to the sensed object.

What is the difference between shielded and unshielded?

With a shielded proximity sensor, the face of the sensor may be mounted flush with metal, whereas an unshielded sensor may NOT be mounted flush with metal (otherwise the sensor will always be ON). In many applications, flush mounting is a requirement. Also, unshielded proximity sensors allow for greater sensing distances.

What output do I need? NPN or PNP?

This is determined by the device you are connecting the sensor to. Most DirectLOGIC PLC modules (except 305 series) allow NPN or PNP sensors to be connected. This is determined by how the sensor is wired to the PLC.

How do I choose between normally open (N.O.) and normally closed (N.C.)?

N.O. sensors do not pass power to the PLC until an object is detected. N.C. sensors always pass power to the PLC until an object is detected. The majority of Centsable sensors are N.O.; however, some sensors offer the option of N.C., such as PKW, PMW and CT1 series.

When do I want quick disconnects (Q/D) versus embedded cable output?

There is a slight cost increase to purchase a sensor and a Q/D cable compared to only purchasing a sensor with a pre-attached cable. However, the Q/D output allows easy replacement of a failed sensor. This is important in minimizing machine or operation downtime.

What is the difference between 2-wire, 3-wire, and 4-wire sensors?

2-wire sensors: allows either NPN or PNP outputs (don't have to select).

3-wire sensors: standard sensors. When ordering, you must choose between NPN and PNP output.

4-wire sensors: Allow either N.O. or N.C. outputs (don't have to select). Must still select NPN or PNP output.

Do AutomationDirect supplied sensors operate on AC or DC voltage?

The majority of AutomationDirect supplied sensors operate on 10-30 VDC. However, we do offer the VT1, VK1, and VM1 series that operate on 20-253VAC.

Can my sensor be installed in a washdown area?

Yes. All AutomationDirect supplied proximity sensors carry an IP67 or IP68 enclosure rating. This rating allows temporary submersion of the sensor into water.

What does switching frequency mean to my application?

This is how fast your sensor can sense an object, reset, and sense another object. For example, if a sensor has a switching frequency of 100 Hz or 100 cycles per second, the sensor can sense a maximum of 100 objects per second. This is very critical in many applications such as gear rotation measurement.

Can the sensor be put into a vibrating environment?

Yes. Frequency range of 10-55 Hz, maximum amplitude of 1mm. Duration in any axis a maximum of 30 minutes.

What is the temperature range of the sensors?

Most sensors operate between -25°F and 70°F. However, check the specifications for exact ranges.

If I wire my proximity sensor wrong, will it damage it?

Possibly. All sensors contain polarity reversal, short-circuit and transient noise protection. However, the transient protection is only effective under 30 VDC.

Proximity Sensor Cross-reference Table

Note: Some newer models are not listed in table; check our Web site for updated information.

AutomationDirect	Allen Bradley	Balluff	Baumer Electric	Cutler-Hammer	Efactor
AE1-AN-1A	872C-D2NN8-E2	BES-516-343-E0-C-03 (SS)	IFRM 08N1504/L (SS)	E57EAL8T110SP (SS)	IEB3001ANOG
AE1-AN-1H	872C-D2NN8-D4	BES-516-343-S4-C (SS)	IFRM 08N1703/S14L (SS)	E57EAL8T110SD (SS)	IEB3001ANOG/US100DNS
AE1-AN-2A	872C-D3NN8-E2	BES-516-384-E0-C-03 (SS)	IFRM 08N1104/L (SS)	E57EAL8T110EP (SS)	NA
AE1-AN-2H	872C-D3NN8-D4	BES-516-384-S4-C (SS)	NA	E57EAL8T110ED (SS)	NA
AE1-AP-1A	872C-D2NP8-E2	BES-516-324-E0-C-03 (SS)	IFRM 08P1504/L (SS)	E57EAL8T111SP (SS)	IEB3001BPOG
AE1-AP-1H	872C-D2NP8-D4	BES-516-324-S4-C (SS)	IFRM 08P1703/S14L (SS)	E57EAL8T111SD (SS)	IEB3001BPOG/US100DPS
AE1-AP-2A	872C-D3NP8-E2	BES-516-383-E0-C-03 (SS)	IFRM 08P1104/L (SS)	E57EAL8T111EP (SS)	NA
AE1-AP-2H	872C-D3NP8-D4	BES-516-383-S4-C (SS)	NA	E57EAL8T111ED (SS)	NA
AM1-AN-1A	872C-DH3NN12-E2	BES-516-329-E4-Y-03	IFR 12.26.15/L	E57SAL12T110	IFA3002ANKG
AM1-AN-1H	872C-DH3NN12-D4	BES-516-329-E5-Y-S4	IFRM 12N1501/S14L	E57SAL12T110SD	IFK3002ANOG/US100DNS
AM1-AN-2A	872C-DH4NN12-E2	BES-516-357-E4-Y-03	IFR 12.26.11/L	E57SAL12T110E	IFA3004ANKG
AM1-AN-2H	872C-DH4NN12-D4	BES-516-357-E5-Y-S4	NA	E57SAL12T110ED	IFK3004ANOG/US100DNS
AM1-AN-3A	NA	BES-516-329-G-E4-Y-03	IFRM 12N1702/L	E57-12LE06-C	NA
AM1-AN-3H	NA	BES-516-329-G-E5-Y-S4	IFRM 12N1701/S14L	E57-12LE06-CD	NA
AM1-AN-4A	NA	NA	NA	E57-12LE10-C	NA
AM1-AN-4H	NA	NA	NA	E57-12LE10-CD	NA
AM1-AP-1A	872C-DH3NP12-E2	BES-516-325-E4-Y-03	IFR 12.26.35/L	E57SAL12T111	IFA3002BPKG
AM1-AP-1H	872C-DH3NP12-D4	BES-516-325-E5-Y-S4	IFRM 12P1501/S14L	E57SAL12T111SD	IFK3002BPOG/US100DPS
AM1-AP-2A	872C-DH4NP12-E2	BES-516-356-E4-Y-03	IFR 12.26.31/L	E57SAL12T111E	IFA3004BPKG
AM1-AP-2H	872C-DH4NP12-D4	BES-516-356-E5-Y-S4	NA	E57SAL12T111ED	IFK3004BPOG/US100DPS
AM1-AP-3A	871C-DE4NP12-E2	BES-516-325-G-E4-Y-03	IFRM 12P1702/L	E57-12LE06-B	NA
AM1-AP-3H	871C-DE4NP12-D4	BES-516-325-G-E5-Y-S4	IFRM 12P1701/S14L	E57-12LE06-BD	IFK3004BPKG/US100DPS
AM1-AP-4A	NA	NA	NA	E57-12LE10-B	NA
AM1-AP-4H	NA	NA	IFRM 12P1301/S14L	E57-12LE10-BD	IFK3007BPKG/US100DPS
AM1-AO-1A	872C-D3NE12-A2	BES-516-542-B0-H-03	IFRM 12D1501/L	E57SAL12A2 (VDC)	IFB2002ARKG/UP
AM1-AO-2A	872C-D4NE12-A2	BES-516-544-B0-H-03	IFRM 12D1101/L	E57SAL12A2E (VDC)	IFB2004ARKG/UP
AM1-AO-1H	872C-D3NE12-D4	BES-516-542-S4-H (SS)	IFRM 12D1501/S14L	NA	IFB2002ARKG/UP/US100IRS
AM1-AO-2H	872C-D4NE12-D4	BES-516-544-S4-H (SS)	IFRM 12D1101/S14L	NA	IFB2002ARKG/UP/US100IRS
AK1-AN-1A	872C-DH5NN18-E2	BES-516-355-E4-Y-03	IFRM 18N1504/L	E57SAL18T110	IGA3005ANKG
AK1-AN-1H	872C-DH5NN18-D4	BES-516-355-S4-C	IFRM 18N1501/S14L	E57SAL18T110SD	IGB3005ANKG/US100DNS
AK1-AN-2A	872C-DH8NN18-E2	BES-516-361-E4-Y-03	IFRM 18N1104/L	E57SAL18T110E	IGA3008ANKG
AK1-AN-2H	872C-DH8NN18-D4	BES-516-361-S4-C	NA	E57SAL18T110ED	IGB3008ANKG/US100DNS
AK1-AN-3A	NA	BES-516-355-G-E4-Y-PU-3	NA	NO CROSS	NA
AK1-AN-3H	NA	NA	NA	NO CROSS	NA
AK1-AN-4A	NA	NA	NA	NO CROSS	NA
AK1-AN-4H	NA	NA	NA	NO CROSS	NA
AK1-AP-1A	872C-DH5NP18-E2	BES-516-326-E4-Y-03	IFRM 18P1504/L	E57SAL18T111	IGA3005BPKG
AK1-AP-1H	872C-DH5NP18-D4	BES-516-326-S4-C	IFRM 18P1501/S14L	E57SAL18T111SD	IGB3005BPKG/US100DPS
AK1-AP-2A	872C-DH8NP18-E2	BES-516-360-E4-Y-03	IFRM 18P1104/L	E57SAL18T111E	IGA3008BPKG
AK1-AP-2H	872C-DH8NP18-D4	BES-516-360-S4-C	NA	E57SAL18T111ED	IGB3008BPKG/US100DPS
AK1-AP-3A	871C-DE8NP18-E2	BES-516-326-G-E4-Y-03	NA	NO CROSS	NA
AK1-AP-3H	871C-DE8NP18-D4	BES-516-326-G-S4-L	NA	NO CROSS	IGK3008BPKG/US100DPS
AK1-AP-4A	NA	NA	IFRM 18P1301/L	NO CROSS	NA
AK1-AP-4H	NA	NA	IFRM 18P1301/S14L	NO CROSS	IGK3012BPKG/US100DPS
AK1-AO-1A	872C-D5NE18-A2	BES-516-538-B0-H-PU-3	IFRM 18D1501/L	E57SAL18A2 (VDC)	IGB2005ARKG/UP
AK1-AO-2A	872C-D8NE18-A2	BES-516-546-B0-H-3	IFRM 18D1101/L	E57SAL18A2E (VDC)	IGB2008ARKG/UP
AK1-AO-1H	872C-D5NE18-D4	BES-516-538-S4-H	IFRM 18D1501/S14L	NA	IGB2005ARKG/UP/US100IRS
AK1-AO-2H	872C-D8NE18-D4	BES-516-546-S4-H	IFRM 18D1101/S14L	NA	IGB2008ARKG/UP/US100IRS

PLC Overview

DL05/06 PLC

DL105 PLC

DL205 PLC

DL305 PLC

DL405 PLC

Field I/O

Software

C-more HMIs

Other HMI

AC Drives

Motors

Steppers/ Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Pushbuttons/ Lights

Process

Relays/ Timers

Comm.

TB's & Wiring

Power

Enclosures

Appendix

Part Index

Proximity Sensor Cross-reference Table

AutomationDirect	Allen Bradley	Balluff	Baumer Electric	Cutler-Hammer	Efactor
AT1-AN-1A	872C-DH10NN30-E2	BES-516-359-B0-C-03	IFRM 30N1601/L	E57SAL30T110	IIA3010ANKG
AT1-AN-1H	872C-DH10NN30-D4	NA	NA	E57SAL30T110SD	IIB3010ANKG/ US100DPS
AT1-AN-2A	872C-DH15NN30-E2	BES-516-363-B0-C-03	IFRM 30N1201/L	E57SAL30T110E	IIA3015ANKG
AT1-AN-2H	872C-DH15NN30-D4	NA	NA	E57SAL30T110ED	IIB3015ANKG/ US100DNS
AT1-AN-3A	NA	NA	NA	NO CROSS	NA
AT1-AN-3H	NA	NA	NA	NO CROSS	NA
AT1-AN-4A	NA	NA	NA	NO CROSS	NA
AT1-AN-4H	NA	NA	NA	NO CROSS	NA
AT1-AP-1A	872C-DH10NP30-E2	BES-516-327-B0-C-03	IFRM 30P1601/L	E57SAL30T111	IIA3010BPKG
AT1-AP-1H	872C-DH10NP30-D4	BES-515-327-S4-C	IFRM 30P1501/S14L	E57SAL30T111SD	IIB3010BPKG/ US100DPS
AT1-AP-2A	872C-DH15NP30-E2	BES-516-362-B0-C-03	IFRM 30P1201/L	E57SAL30T111E	IIA3015BPKG
AT1-AP-2H	872C-DH15NP30-D4	BES-515-362-S4-C	IFRM 30P1101/S14L	E57SAL30T111ED	IIB3015BPKG/ US100DPS
AT1-AP-3A	871C-DE15NP30-E2	NA	NA	NO CROSS	NA
AT1-AP-3H	871C-DE15NP30-D4	NA	NA	NO CROSS	IIK3015BBPKG/ US100DPS
AT1-AP-4A	NA	NA	NA	NO CROSS	NA
AT1-AP-4H	NA	NA	NA	NO CROSS	IIK3022BPKG/ US100DPS
AT1-A0-1A	872C-D10NE30-A2	BES-516-540-B0-H-3	IFRM 30D1601/L	E57SAL30A2 (VDC)	IIB2010ARKG/UP
AT1-A0-2A	872C-D15NE30-A2	BES-516-548-B0-H-3	NA	E57SAL30A2E (VDC)	IIB2015ARKG/UP
AT1-A0-1H	872C-D10NE30-D4	BES-516-540-S4-H	NA	NA	IIB2010ARKG/UP/ US100IRS
AT1-A0-2H	872C-D15NE30-D4	BES-516-548-S4-H	NA	NA	IIB2015ARKG/UP/ US100IRS
PMW-ON-1H	871T-R2A12 (pre-wired)	BES-516-118-S4-C	NA	E57L(A or B)JL12T110SD	NA
PMW-OP-1H	871T-L2A12 (pre-wired)	BES-516-113-S4-C	IFRM 12P(1or3)570/S14L	E57L(A or B)JL12T111SD	NA
PMW-ON-2H	871T-R4B12 (pre-wired)	BES-516-122-S4-C	NA	E57L(A or B)JL12T110ED	NA
PMW-OP-2H	871T-L4B12 (pre-wired)	BES-516-131-S4-C	NA	E57L(A or B)JL12T111ED	NA
PKW-ON-1H	871T-R5A18 (pre-wired)	NA	NA	E57L(A or B)JL18T110SD	NA
PKW-OP-1H	871T-L5A18 (pre-wired)	BES-515-326-S4-C (NO)	IFRM 18P1790/S14L	E57L(A or B)JL18T111SD	NA
PKW-ON-2H	871T-R8B18 (pre-wired)	NA	NA	E57L(A or B)JL18T110ED	NA
PKW-OP-2H	871T-L8B18 (pre-wired)	BES-515-123-S4-C	NA	E57L(A or B)JL18T111ED	NA
VM1-A0-1B	872C-A2N12-A2	NA	IFRM 12A1501/L	E57SAL12A2	IFA2002AB0W
VM1-A0-2B	872C-A4N12-A2	NA	IFRM 12A1101/L	E57SAL12A2E	IFA2004AB0W
VK1-A0-1B	872C-A5N18-A2	NA	IFRM 18A1501/L	E57SAL18A2	IGA2005AB0A (AC/DC)
VK1-A0-2B	872C-A10N18-A2	NA	IFRM 18A1101/L	E57SAL18A2E	IGA2008AB0A (AC/DC)
VT1-A0-1B	872C-A10N30-A2	NA	IFRM 30A1601/L	E57SAL30A2	IIA2010AB0A (AC/DC)
VT1-A0-2B	872C-A15N30-A2	NA	IFRM 30A1201/L	E57SAL30A2E	IIA2015AB0A (AC/DC)
CD12L-OB-020-A0	889D-F4AC-2	NA	ES 34AP2	E57KYED129-2	US/3-DC-P/ N-SOL-PVC-2M/W
CD12L-OB-020-C0	889D-R4AC-2	NA	ES 33AP2	E57KYED130-2	US/3-DC-P/ N-ROL-PVC-2M/W
CD12M-OB-070-A1	889D-F4AC-5	BKS-S19-3-5	ES 34AP5	E57KYED129-5	US/3-DC-P/ N-SOL-PVC-5M/W
CD12M-OB-070-C1	889D-R4AC-5	BKS-S20-3-3	ES 33AP5	E57KYED130-5	US/3-DC-P/ N-ROL-PVC-5M/W

Notes:
AutomationDirect DC sensors operate on 10-30 VDC. If you are using a higher DC voltage with a competitor's sensor, do not cross to AutomationDirect.
Comparable sensor overall lengths and thread lengths may vary slightly.
AutomationDirect AC sensors are VAC only. Some competitor's sensors are AC/DC.
Significant sensing distance (SD) differences are noted. Others may vary slightly.
SS after the part number denotes the sensor is Stainless Steel.
NPB after the part number denotes the sensor is Nickel Plated Brass.
N.O. after the part number denotes the sensor operates normally open only.
VDC after part number means to cross to AutomationDirect only if competitor's sensor is used in VDC application.

Proximity Sensor Cross-Reference Table

AutomationDirect	Omron	Pepperl & Fuchs	Sick Optic	Siemens	Turck
AE1-AN-1A	E2E-X1R5E1-N (SS)	NBB1.5-8GM50-E0	IM08-01B5NS-ZW1	3RG40 11-0GB05 (SS)	Bi 1.5-EG08-AN6X (SS)
AE1-AN-1H	E2E-X1R5E1-M1-N (SS)	NBB1.5-8GM40-E0-V1	IM08-01B5NS-ZC1	3RG40 11-3GB05 (SS)	Bi 1.5-EG08-AN6X-H1341 (SS)
AE1-AN-2A	E2E-X2ME1-N (SS)	NBN2-8GM50-E0	IM08-02N5NS-ZW1	3RG40 21-0GB33 (SS)	Ni 3 -EG08-AN6X (SS)
AE1-AN-2H	E2E-X2ME1-M1-N (SS)	NBN2-8GM40-E0-V1	IM08-02N5NS-ZC1	NA	Ni 3-EG08-AN6X-H1341 (SS)
AE1-AP-1A	E2E-X1R5F1-N (SS)	NBB1.5-8GM50-E2	IM08-01B5PS-ZW1	3RG40 11-0AG05 (SS)	Bi 1.5-EG08-AP6X (SS)
AE1-AP-1H	E2E-X1R5F1-M1-N (SS)	NBB1.5-8GM40-E2-V1	IM08-01B5PS-ZC1	3RG40 11-3AG05 (SS)	Bi 1.5-EG08-AP6X-H1341 (SS)
AE1-AP-2A	E2E-X2MF1-N (SS)	NBN2-8GM50-E2	IM08-02N5PS-ZW1	3RG40 21-0AG33 (SS)	Ni 3-EG08-AP6X (SS)
AE1-AP-2H	E2E-X2MF1-M1-N (SS)	NBN2-8GM40-E2-V1	IM08-02N5PS-ZC1	NA	Ni 3-EG08-AP6X-H1341 (SS)
AM1-AN-1A	E2E-X2E1-N	NBB2-12GM50-E0	IM12-02BNS-ZW1	3RG40 12-0GB00	Bi 2-G12(K)-AN6X
AM1-AN-1H	E2E-X2E1-M1-N	NBB2-12GM50-E0-V1	IM12-02BNS-ZC1	3RG40 12-3GB00	Bi 2-M12-AN6X-H1141
AM1-AN-2A	E2E-X5ME1-N	NBN4-12GM50-E0	IM12-04NNS-ZW1	3RG40 22-0GB00	Ni 5-G12(K)-AN6X
AM1-AN-2H	E2E-X5ME1-M1-N	NBN4-12GM50-E0-V1	IM12-04NNS-ZC1	3RG40 22-3GB00	Ni 4-M12-AN6X-H1141
AM1-AN-3A	NA	NA	IM12-04BNS-ZU0	NA	NA
AM1-AN-3H	NA	NA	IM12-04BNS-ZC0	NA	Bi 4-M12-AN6X-H1141
AM1-AN-4A	NA	NA	IM12-08NNS-ZU0	3RG46 12-0GB01	NA
AM1-AN-4H	NA	NA	IM12-08NNS-ZC0	3RG46 12-3GB01	NA
AM1-AP-1A	E2E-X2F1-N	NBB2-12GM50-E2	IM12-02BPS-ZW1	3RG40 12-0AG01	Bi 2-G12(K)-AP6X
AM1-AP-1H	E2E-X2F1-M1-N	NBB2-12GM50-E2-V1	IM12-02BPS-ZC1	3RG40 12-3AG01	Bi 2-M12-AP6X-H1141
AM1-AP-2A	E2E-X5MF1-N	NBN4-12GM50-E2	IM12-04NPS-ZW1	3RG40 22-0AG01	Ni 5-G12(K)-AP6X
AM1-AP-2H	E2E-X5MF1-M1-N	NBN4-12GM50-E2-V1	IM12-04NPS-ZC1	3RG40 22-3AG01	Ni 4-M12-AP6X-H1141
AM1-AP-3A	NA	NBB4-12GM50-E2	IM12-04BPS-ZU0	3RG41 12-0AG01	NA
AM1-AP-3H	NA	NBB4-12GM50-E2-V1	IM12-04BPS-ZC0	3RG41 12-3AG01	Bi 4-M12-AP6X-H1141
AM1-AP-4A	NA	NA	IM12-08NPS-ZU0	3RG46 12-0AG01	NA
AM1-AP-4H	NA	NA	IM12-08NPS-ZC0	3RG46 12-3AB01	NA
AM1-A0-1A	E2E-X3D1-N-N	NCB2-12GM40-Z0	NA	3RG40 12-0JB00	Bi 2-M12-AD4X (65VDC)
AM1-A0-2A	E2E-X8MD1-N (8mm SD)	NBN4-12GM40-Z0	NA	3RG40 22-0JB00	Ni 4-M12-AD4X (65VDC)
AM1-A0-1H	E2E-X3D1-M1G-N	NCB2-12GM40-Z0-V1	NA	3RG40 12-3JB00	Bi 2-M12-AD4X-H1141 (65VDC)
AM1-A0-2H	E2E-X8MD1-M1G-N (8mm SD)	NBN4-12GM40-Z0-V1	NA	3RG40 22-3JB00	Ni 4-M12-AD4X-H1141 (65VDC)
AK1-AN-1A	E2E-X5E1-N	NBB5-18GM50-E0	IM18-05BNS-ZW1	3RG40 13-0GB00	Bi 5-G18(K)-AN6X
AK1-AN-1H	E2E-X5E1-M1-N	NBB5-18GM50-E0-V1	IM18-05BNS-ZC1	3RG40 13-3GB00	Bi 5-M18-AN6X-H1141
AK1-AN-2A	E2E-X10ME1-N	NBN8-18GM50-E0	IM18-08NNS-ZW1	3RG40 23-0GB00	Ni10-G18(K)-AN6X
AK1-AN-2H	E2E-X10ME1-M1-N	NBN8-18GM50-E0-V1	IM18-08NNS-ZC1	3RG40 23-3GB00	Ni 8-M18-AN6X-H1141
AK1-AN-3A	NA	NA	IM18-07BNS-ZU0	NA	NA
AK1-AN-3H	NA	NA	IM18-07BNS-ZC0	NA	Bi 8-M18-AN6X-H1141
AK1-AN-4A	NA	NA	IM18-12NNS-ZU0	3RG46 13-0GB00	NA
AK1-AN-4H	NA	NA	IM18-12NNS-ZC0	3RG46 13-3GB01	NA
AK1-AP-1A	E2E-X5F1-N	NBB5-18GM50-E2	IM18-05BPS-ZW1	3RG40 13-0AG01	Bi 5-G18(K)-AP6X
AK1-AP-1H	E2E-X5F1-M1-N	NBB5-18GM50-E2-V1	IM18-05BPS-ZC1	3RG40 13-3AG01	Bi 5-M18-AP6X-H1141
AK1-AP-2A	E2E-X10MF1-N	NBN8-18GM50-E2	IM18-08NPS-ZW1	3RG40 23-0AG01	Ni10-G18(K)-AP6X
AK1-AP-2H	E2E-X10MF1-M1-N	NBN8-18GM50-E2-V1	IM18-08NPS-ZC1	3RG40 23-3AG01	Ni 8-M18-AP6X-H1141
AK1-AP-3A	NA	NA	IM18-07BPS-ZU0	NA	NA
AK1-AP-3H	NA	NA	IM18-07BPS-ZC0	NA	Bi 8-M18-AP6X-H1141
AK1-AP-4A	NA	NEB12-18GM50-E2	IM18-12NPS-ZU0	3RG46 13-1AB01	NA
AK1-AP-4H	NA	NEB12-18GM50-E2-V1	IM18-12NPS-ZC0	3RG46 13-3AB01	NA
AK1-A0-1A	E2E-X7D1-N-N	NBB5-18GM50-Z0	IM18-05BUS-ZU0 (AC/DC)	3RG40 13-0JB00	Bi 5-M18-AD4X (65VDC)
AK1-A0-2A	E2E-X14MD1-N (14mm SD)	NBN8-18GM50-Z0	IM18-08NUS-ZU0 (AC/DC)	3RG40 23-0JB00	Ni 8-M18-AD4X (65VDC)
AK1-A0-1H	E2E-X7D1-M1G-N	NBB5-18GM50-Z0-V1	NA	3RG40 13-3JB00	Bi 5-M18-AD4X-H1141 (65VDC)
AK1-A0-2H	E2E-X14MD1-M1G-N (14mm SD)	NBN8-18GM50-Z0-V1	NA	3RG40 23-3JB00	Ni 8-M18-AD4X-H1141 (65VDC)

PLC Overview

DL05/06 PLC

DL105 PLC

DL205 PLC

DL305 PLC

DL405 PLC

Field I/O

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C-more HMIs

Other HMI

AC Drives

Motors

Steppers/Servos

Motor Controls

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Encoders

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Relays/Timers

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Appendix

Part Index

Proximity Sensor Cross-reference Table

AutomationDirect	Omron	Pepperl & Fuchs	Sick Optic	Siemens	Turck
AT1-AN-1A	E2E-X10E1-N	NBB10-30GM50-E0	IM30-10BNS-ZW1	3RG40 14-0GB00	Bi10-G30(K)-AN6X
AT1-AN-1H	E2E-X10E1-M1-N	NBB10-30GM50-E0-V1	IM30-10BNS-ZC1	3RG40 14-3GB00	Bi10-M30-AN6X-H1141
AT1-AN-2A	E2E-X18ME1-N	NBN15-30GM50-E0	IM30-15NNS-ZW1	3RG40 24-0GB00	Ni15-G30(K)-AN6X
AT1-AN-2H	E2E-X18ME1-M1-N	NBN15-30GM50-E0-V1	IM30-15NNS-ZC1	3RG40 24-3GB00	Ni15-M30-AN6X-H1141
AT1-AN-3A	NA	NA	IM30-15BNS-ZU0	NA	NA
AT1-AN-3H	NA	NA	IM30-15BNS-ZC0	NA	Bi15-M30-AN6X-H1141
AT1-AN-4A	NA	NA	IM30-20NNS-ZU0	NA	NA
AT1-AN-4H	NA	NA	IM30-20NNS-ZC0	NA	NA
AT1-AP-1A	E2E-X10F1-N	NBB10-30GM50-E2	IM30-10BPS-ZW1	3RG40 14-0AG01	Bi10-G30(K)-AP6X
AT1-AP-1H	E2E-X10F1-M1-N	NBB10-30GM50-E2-V1	IM30-10BPS-ZC1	3RG40 14-3AG01	Bi10-M30-AP6X-H1141
AT1-AP-2A	E2E-X18MF1-N	NBN15-30GM50-E2	IM30-15NPS-ZW1	3RG40 24-0AG01	Ni15-G30(K)-AP6X
AT1-AP-2H	E2E-X18MF1-M1-N	NBN15-30GM50-E2-V1	IM30-15NPS-ZC1	3RG40 24-3AG01	Ni15-M30-AP6X-H1141
AT1-AP-3A	NA	NA	IM30-15BPS-ZU0	3RG41 14-0AG01	NA
AT1-AP-3H	NA	NA	IM30-15BPS-ZC0	3RG41 14-3AG01	Bi15-M30-AP6X-H1141
AT1-AP-4A	NA	NA	IM30-20NPS-ZU0	NA	NA
AT1-AP-4H	NA	NA	IM30-20NPS-ZC0	NA	NA
AT1-A0-1A	E2E-X10D1-N-N	NBB10-30GM50-Z0	IM30-10BUS-ZU0 (AC/DC)	3RG40 14-0JB00	Bi 10-M30-AD4X (65VDC)
AT1-A0-2A	E2E-X20MD1-N (20mm SD)	NBN15-30GM50-Z0	IM30-15NUS-ZU0 (AC/DC)	3RG40 24-0JB00	Ni 15-M30-AD4X (65VDC)
AT1-A0-1H	E2E-X10D1-M1G-N	NBB10-30GM50-Z0-V1	NA	3RG40 14-3JB00	Bi 10-M30-AD4X-H1141 (65VDC)
AT1-A0-2H	E2E-X20MD1-M1G-N (20mm SD)	NBN15-30GM50-Z0-V1	NA	3RG40 24-3JB00	Ni 15-M30-AD4X-H1141 (65VDC)
PMW-ON-1H	NA	NJ2-12GM40-E0-V1 (NO)	NA	NA	Bi 2-EM12-AN6X-H1141
PMW-OP-1H	NA	NJ2-12GM40-E2-V1 (NO)	NA	3RG40 12-3CD00 (NPB)	NA
PMW-ON-2H	NA	NJ4-12GM40-E0-V1 (NO)	NA	NA	NA
PMW-OP-2H	NA	NJ4-12GM40-E2-V1 (NO)	NA	3RG40 22-3CD00 (NPB)	Bi 2-EM12-AP6X-H1141
PKW-ON-1H	NA	NJ5-18GM50-E0-V1 (NO)	NA	NA	Bi 5-EM18-AN6X-H1141
PKW-OP-1H	NA	NJ5-18GM50-E2-V1 (NO)	NA	3RG40 13-3CD00 (NPB)	NA
PKW-ON-2H	NA	NA	NA	NA	NA
PKW-OP-2H	NA	NJ8-18GM50-E2-V1	NA	3RG40 23-3CD00 (NPB)	Bi 5-EM18-AP6X-H1141
VM1-A0-1B	E2E-X2Y1-US-N	NJ2-12GM50-WS (SS)	IM12-02BAS-ZU0	3RG40 12-0KB00 (AC/DC)	Bi 2-G12-AZ33X
VM1-A0-2B	E2E-X5MY1-US-N	NJ4-12GM50-WS (SS)	IM12-04NAS-ZU0	3RG40 22-0KB00 (AC/DC)	Ni 4-G12-AZ33X
VK1-A0-1B	E2E-X5Y1-US-N	NBB5-18GM60-WS	IM18-05BUS-ZU0 (AC/DC)	3RG40 13-0KB00 (AC/DC)	Bi 5-M18T-AZ3X
VK1-A0-2B	E2E-X10MY1-US-N	NBN8-18GM60-WS	IM18-08NUS-ZU0 (AC/DC)	3RG40 23-0KB00 (AC/DC)	Ni 8-M18T-AZ3X
VT1-A0-1B	E2E-X10Y1-US-N	NBB10-30GM60-WS	IM30-10BUS-ZU0 (AC/DC)	3RG40 14-0KB00 (AC/DC)	Bi 10-M30T-AZ3X
VT1-A0-2B	E2E-X18MY1-US-N	NBN15-30GM60-WS	IM30-15NUS-ZU0 (AC/DC)	3RG40 24-0KB00 (AC/DC)	Ni 15-M30T-AZ3X
CD12L-OB-020-A0	Y96E-44SD2	V1-G-2M-PVC	KD4-SIM122	NA	RK 4T-2
CD12L-OB-020-C0	Y96E-44RD2	V1-W-2M-PVC	KD4-RIM122	NA	WK 4T-2
CD12M-OB-070-A1	Y96E-44SD5	V1-G-5M-PVC	KD4-SIM125	3RX1 513	RK 4T-6
CD12M-OB-070-C1	Y96E-44RD5	V1-W-5M-PVC	KD4-RIM125	3RX1 512	WK 4T-6

Notes:

AutomationDirect DC sensors operate on 10-30 VDC. If you are using a higher DC voltage with a competitor's sensor, do not cross to AutomationDirect.

Comparable sensor overall lengths and thread lengths may vary slightly.

AutomationDirect AC sensors are VAC only. Some competitors sensors are AC/DC.

Significant sensing distance (SD) differences are noted. Others may vary slightly.

SS after the part number denotes the sensor is Stainless Steel.

NPB after the part number denotes the sensor is Nickel Plated Brass.

N.O. after the part number denotes the sensor operates normally open only.

VDC after part number means to cross to AutomationDirect only if competitors sensor is used in VDC application