

HTM electronics

INDUCTIVE & CAPACITIVE PROXIMITY SENSORS



WWW.HTM-SENSORS.COM

CONTENTS**MODEL SELECTION GUIDE**

FEATURE #	1	2	3	4	5	6	7	8	9	10	11
MODEL #	F	C	M	1	12	02	N	A	3	U	2

1. TYPE:

F: INDUCTIVE C: CAPACITIVE L: LONG RANGE
E: EXTENDED RANGE I: 5-36 VDC W: WELD FIELD IMMUNE

2. HOUSINGS:

C: CYLINDRICAL Q: SQUARE

3. HOUSING MATERIAL:

M: CHROME-PLATED BRASS U: STAINLESS STEEL
P: PLASTIC S: STAINLESS STEEL FACE

4. MOUNTING:

1: SHIELDED 2. NON-SHIELDED

5. HOUSING STYLE:

NUMERAL ONLY: THREADED BODY DIAMETER
D + NUMERAL: SMOOTH BODY DIAMETER

6. SENSING DISTANCE:

RANGE IN MILLIMETERS (EG. 02 = 2MM)

7. OUTPUT FUNCTION:

N: NPN P: PNP A: AC C: 2 WIRE DC
K: OPEN COLLECTOR U: AC/DC

8. OUTPUT:

A: NORMALLY OPEN B: NORMALLY CLOSED
C: AC OR AC/DC (NO OR NC SELECTABLE)
S: CHANGEOVER (NO AND NC) I: CURRENT OUTPUT (0-20 MA)
V: VOLTAGE OUTPUT (0-10 VDC)
M: BOTH CURRENT & VOLTAGE OUTPUT (0-20MA/0-10 VDC)

9. CONNECTION:

2: 2 WIRE 3: 3 WIRE 4: 4 WIRE 5: 5 WIRE
C: CONNECTOR (8MM PICO) R: CONNECTOR (12MM DC MICRO)
B: CONNECTOR (4 PIN AC MICRO)
U: CONNECTOR (3 PIN AC MICRO) Z: MINI

10. PROTECTION:

S: SHORT BODY, SHORT-CIRCUIT PROTECTED
L: NO SHORT CIRCUIT PROTECTION
U: SHORT CIRCUIT PROTECTED

11. CABLE LENGTH OR NUMBER OF CONNECTOR PINS:

CABLE TYPE: 2 = 2 METERS, 5 = 5 METERS
CONNECTOR TYPE: 2 = 2 PIN, 3 = 3 PIN, 4 = 4 PIN, 5 = 5 PIN

NOTE: NOT ALL MODEL COMBINATIONS ARE POSSIBLE. IF YOU NEED ASSISTANCE, PLEASE CALL OUR TECHNICAL DEPARTMENT (1-800-644-1756).

PROXIMITY CONTROL TECHNOLOGY

Inductive and Capacitive Proximity Sensors are devices that will make an electrical change in a circuit as a result of material approaching the sensor head. Inductive sensors are metal sensing devices, whereas capacitive types detect all material including liquids, powders and pastes.

Advances in integrated circuits and solid-state technology have allowed design engineers to overcome previous problems and develop both inductive and capacitive proximity sensors that can perform in industrial environments for many years with few problems.

NORMAL OPERATING DISTANCE

The Normal Operating Distance, or Sensing Range, is defined as the distance between the detector and the target when the change (switching) in the logic state of the proximity switch occurs. This distance and the tests associated in obtaining this distance are outlined in CENELEC EN 50010 Standards. From this standard, the target for establishing the Normal Operating Distance is an iron (FE 37) square, 1mm thick. For cylindrical switches the size is as shown in the table to the right.

Diameter (mm)	Nominal Distance SN (mm)	Fe 37 Actuator (mm)
8 - shielded	1	8x1
8 - unshielded	2	8x1
12 - shielded	2	12x1
12 - unshielded	4	12x1
18 - shielded	5	18x1
18 - unshielded	8	24x1
30 - shielded	10	30x1
30 - unshielded	15	45x1

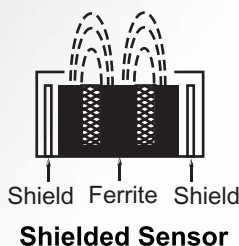
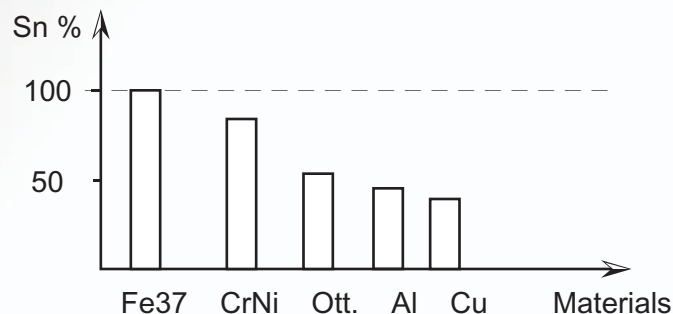
CENELEC EN 50010 Standards for Inductive Sensors

CORRECTION FACTOR

Inductive Sensors: When using inductive proximity sensors with non-ferrous metals it is necessary to apply a correction factor to the operating distance (sensing range) as follows:

Aluminum	Distance	x. 0.45
Brass	Distance	x. 0.50
Chrome Nickel Alloy	Distance	x. 0.85
Copper	Distance	x. 0.40

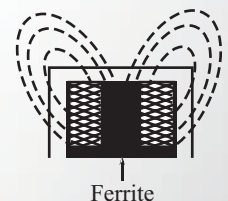
Capacitive Sensors: Capacitive sensors have an adjustable detection range, and are dependant upon the type of material to be sensed (shown below).



SHIELDED & NON-SHIELDED

Shielded construction includes a metal band which surrounds the ferrite core and coil arrangement. This helps to direct the electro-magnetic field to the front of the sensor.

Non-shielded sensors do not have this metal band, therefore they can be side sensitive.

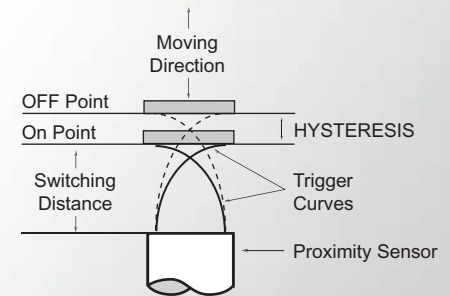


HYSTERESIS

Hysteresis is the travel of the target between the “switch-on” point and the “switch-off” point. This distance is required to allow the switch to properly detect the target, and reduces the possibility of false trips.

CURRENT SOURCE AND CURRENT SINK

DC Proximity Sensors are made to interface with solid state controllers such as Programmable Controllers (PLCs). The inputs described in the instruction manuals of these devices often ask for a Current Source or Current Sink input. NPN type sensors are designed to be a Current Sink device. Current from the controller is supplied to the sensor and it will “sink” the current to ground when the sensor is activated. PNP type sensors are designed to be a Current Source device. Current is supplied from the sensor as a “source” to the controller when the sensor is activated.



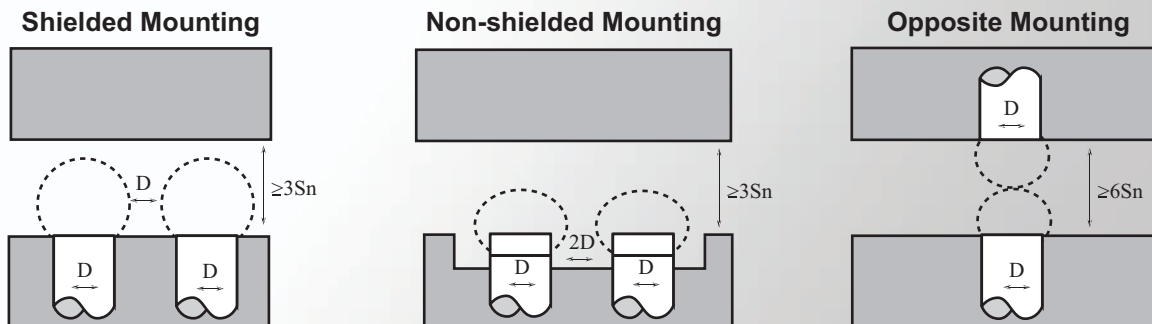
MOUNTING

Because of possible interference of the electromagnetic fields generated by the oscillators, minimum spacing is required between adjacent or opposing “active surfaces” of proximity switches.

Shielded Mounting: The “active surface” may be flush with the metal in which the switch is mounted.

Non-shielded Mounting: The “active surface” must have a free zone in which no metal is present.

Opposite Mounting: When mounting proximity switches in this manner where the “active surfaces” are opposite each other, there must be a minimum distance between them.



PROXIMITY SENSOR SPECIFICATIONS

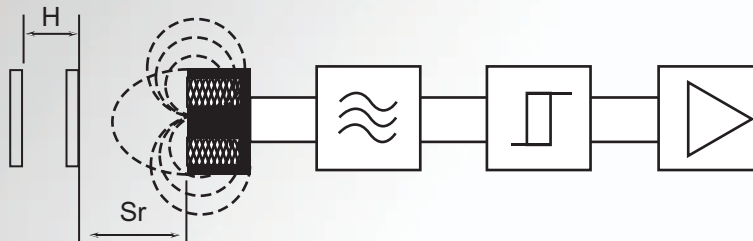
AC Models	Brass or Plastic Housing
Supply voltage	20 to 250 VAC
Voltage drop	< 8 VAC at 400 mA
Max. load	400 mA
Max. leakage	1.8 mA
No load current	5 mA
Surge current (inrush protection)	5A (20 ms)
Response time ON/OFF	10ms/10ms
Switching frequency	25 Hz
Short circuit protection	No
Hysteresis	< 15%
Repeat accuracy	< 1% full range
Temperature range	-25° to +70°C
Temperature drift	< 10% full range
Protection rating	IP67

DC Models	Brass or Plastic Housing	Stainless Steel Housing
Supply voltage	10 to 30 VDC	5 to 36 VDC
Voltage drop	< 3 V	< 1 V
Max. load	100 mA	200 mA
Max. leakage	< 0.01 mA	
No load current	< 10 mA	
Response time ON/OFF	0.1 ms/0.1 ms	
Frequency response	as rated on each sensor	
Short circuit protection	Yes	
Hysteresis	< 15%	
Repeat accuracy	< 1% full range	
Temperature range	-25° to +70°C	
Temperature drift	< 10% full range	
Protection rating	IP67	

INDUCTIVE PROXIMITY SENSORS

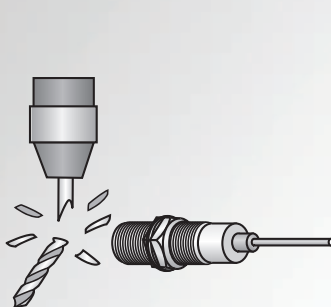
The inductive sensor's circuit consists of a coil of copper wire wrapped on a ferrite core and a transistorized circuit. A small amount of energy is supplied to the coil and the transistorized circuit uses this coil to produce an oscillation. The inductive sensors operate on a "kill oscillator" principle. When the conductive material (metals) are brought into the Radio Frequency field, eddy current losses draw energy from the coil to run along the surface of the metal (skin effect). 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 oscillation is killed, a detector produces an output signal that is used to operate a relay or to switch another electronic circuit.

Since the signal is Radio Frequency, ferrous metal is not attracted to the sensor head. These new generation proximity sensors resemble their ancestors mostly in the operating principal only. With the development of stable integrated circuits, the oscillator driver and amplifier can now be located in the detector head itself. This removes the troublesome shielded cable from the circuit and drastically improves the detector's noise immunity. The only wire used with the detector is now the power supply and a low impedance output signal that does not have to be shielded since it is not in the detectors circuit.



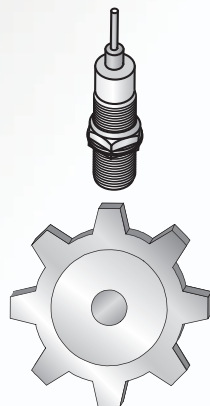
Inductive Switch Block Diagram

APPLICATIONS FOR INDUCTIVE PROXIMITY SENSORS



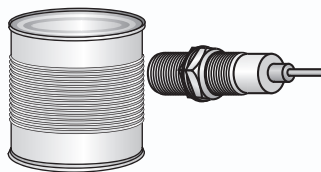
**BROKEN TOOL
DETECTION**

Inductive Proximity Sensors are ideal for detecting broken drill bits, tooling or other moving parts that can otherwise go unnoticed and slow down production.



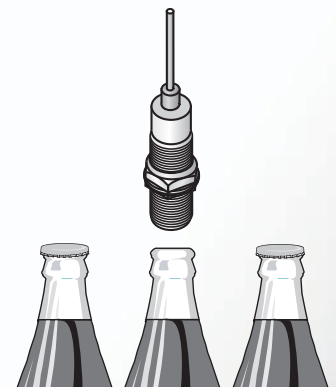
CAM FOLLOWER

The high switching speed of our inductive sensors allows you to monitor any variation in cam or gear rotation speed.



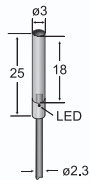
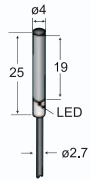
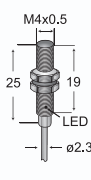
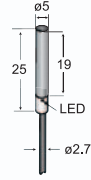
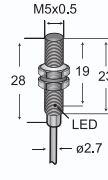
**PART & PRODUCT
DETECTION**

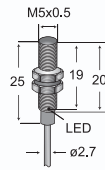
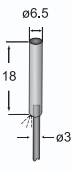
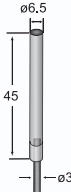
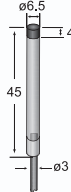
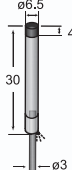
Inductive Sensors can be used for detecting any metal part or product to allow for perfect positioning in filling, labelling or batch counting applications

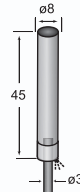
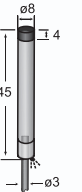
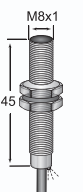
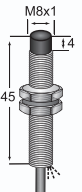
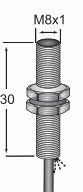
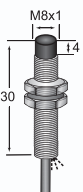


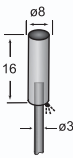
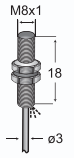
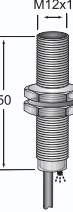
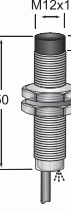
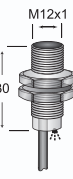
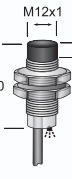
**BOTTLE CAP
DETECTION**

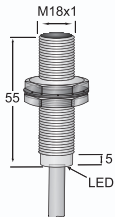
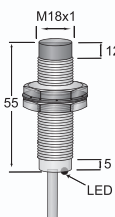
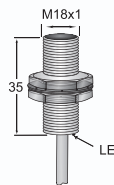
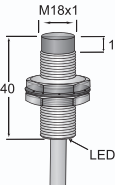
Use Inductive Sensors to ensure quality control in packaged or bottled food and drink production.

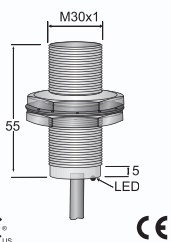
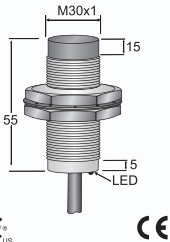
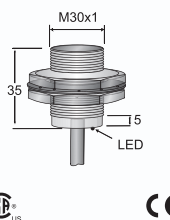
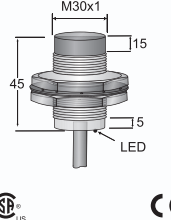
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Sensing Distance			0.8 mm		
Operating Voltage			10-30 VDC		
Ripple			<10%		
No Load Current			<10mA		
Max. Load Current			200mA		
Leakage Current			<0.01mA		
Surge Current			-		
Min. Load Current			-		
Voltage Drop			<1.5V		
Switching Frequency			2 KHz		
Response Time			0.1ms/0.1ms		
Switching Hysteresis			<15% (Sr)		
Repeat Accuracy			<1.0% (Sr)		
Protection Category			IP67		
Operating Temperature			-25°C - +70°C		
Temperature Drift			<10% (Sr)		
Short Circuit Protection			Yes		
Overload Trip Point			220mA		
Time Delay Before Availability			<10ms		
Shock / Vibration			IEC 60947-5-2, Part 7.4.1 & 7.4.2		
Material Active Face			POM		
Housing Material			Stainless Steel		
Part Numbers	Shielded	Shielded	Shielded	Shielded	Shielded
DC 3 wire 10-30V NPN N.O.	FCU1-D030.8N-A3U2	FCU1-D0401N-A3U2	FCU1-040.8N-A3U2	FCU1-D0501N-A3U2	FCU1-0501N-A3U2
DC 3 wire 10-30V NPN N.C.	FCU1-D030.8N-B3U2	FCU1-D0401N-B3U2	FCU1-040.8N-B3U2	FCU1-D0501N-B3U2	FCU1-0501N-B3U2
DC 3 wire 10-30V PNP N.O.	FCU1-D030.8P-A3U2	FCU1-D0401P-A3U2	FCU1-040.8P-A3U2	FCU1-D0501P-A3U2	FCU1-0501P-A3U2
DC 3 wire 10-30V PNP N.C.	FCU1-D030.8P-B3U2	FCU1-D0401P-B3U2	FCU1-040.8P-B3U2	FCU1-D0501P-B3U2	FCU1-0501P-B3U2
DC 4 wire 10-30V Changeover NPN					
DC 4 wire 10-30V Changeover PNP					
DC 2 wire 10-60V N.O.					
DC 2 wire 10-60V N.C.					
DC 3 wire 5-36V NPN N.O.					
DC 3 wire 5-36V NPN N.C.					
DC 3 wire 5-36V PNP N.O.					
DC 3 wire 5-36V PNP N.C.					
DC 4 wire 5-36V Changeover NPN					
DC 4 wire 5-36V Changeover PNP					
Diagrams (units in mm)					
					
					

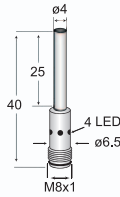
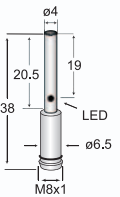
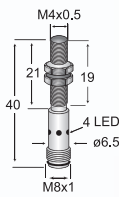
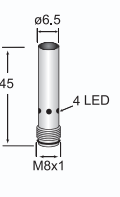
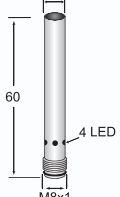
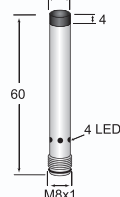
	M5	ø6.5	ø6.5	ø6.5	ø6.5	ø6.5
						
Sensing Distance	0.8 mm	1.0 mm	1mm	2 mm	1mm	2 mm
Operating Voltage	10-30 VDC					
Ripple	<10%					
No Load Current	<10mA					
Max. Load Current	200mA					
Leakage Current	<0.01mA					
Surge Current	-					
Min. Load Current	-					
Voltage Drop	<1.5V		<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	2 KHz					
Response Time	0.1ms/0.1ms					
Switching Hysteresis	<15% (Sr)					
Repeat Accuracy	<1.0% (Sr)					
Protection Category	IP67					
Operating Temperature	-25°C - +70°C					
Temperature Drift	<10% (Sr)					
Short Circuit Protection	Yes					
Overload Trip Point	220mA					
Time Delay Before Availability	<10ms					
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2					
Material Active Face	POM					
Housing Material	Stainless Steel					
Part Numbers	Shielded	Shielded	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCU1-0501N-A3S2	FCU1-D0601N-A3R2	FCU1-D0601N-A3U2	FCU2-D0602N-A3U2	FCU1-D0601N-A3S2	FCU2-D0602N-A3S2
DC 3 wire 10-30V NPN N.C.	FCU1-0501N-B3S2	FCU1-D0601N-B3R2	FCU1-D0601N-B3U2	FCU2-D0602N-B3U2	FCU1-D0601N-B3S2	FCU2-D0602N-B3S2
DC 3 wire 10-30V PNP N.O.	FCU1-0501P-B3S2	FCU1-D0601P-B3R2	FCU1-D0601P-A3U2	FCU2-D0602P-A3U2	FCU1-D0601P-A3S2	FCU2-D0602P-A3S2
DC 3 wire 10-30V PNP N.C.	FCU1-0501P-B3S2	FCU1-D0601P-B3R2	FCU1-D0601P-B3U2	FCU2-D0602P-B3U2	FCU1-D0601P-B3S2	FCU2-D0602P-B3S2
DC 4 wire 10-30V Changeover NPN						
DC 4 wire 10-30V Changeover PNP						
DC 2 wire 10-60V N.O.						
DC 2 wire 10-60V N.C.						
DC 3 wire 5-36V NPN N.O.						
DC 3 wire 5-36V NPN N.C.						
DC 3 wire 5-36V PNP N.O.						
DC 3 wire 5-36V PNP N.C.						
DC 4 wire 5-36V Changeover NPN						
DC 4 wire 5-36V Changeover PNP						
Diagrams (units in mm)						
	 	 	 	 	 	 

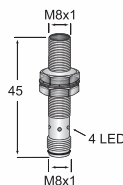
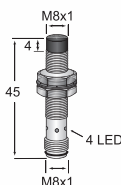
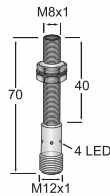
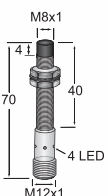
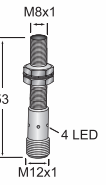
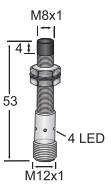
	ø8	ø8	M8	M8	M8	M8
						
Sensing Distance	1 mm, 1.5 mm	2 mm, 2.5 mm	1mm, 1.5mm	2 mm, 2.5mm	1mm, 1.5mm	2 mm, 2.5mm
Operating Voltage	10-30 VDC or 5-36 VDC or 10-60 VDC				10-30 VDC or 5-36 VDC	
Ripple	<10%					
No Load Current	<10mA					
Max. Load Current	200mA					
Leakage Current	<0.01mA					
Surge Current	-					
Min. Load Current	-					
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)					
Switching Frequency	2 KHz					
Response Time	0.1ms/0.1ms					
Switching Hysteresis	<15% (Sr)					
Repeat Accuracy	<1.0% (Sr)					
Protection Category	IP67					
Operating Temperature	-25°C - +70°C					
Temperature Drift	<10% (Sr)					
Short Circuit Protection	Yes					
Overload Trip Point	220mA					
Time Delay Before Availability	<10ms					
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2					
Material Active Face	POM					
Housing Material	Stainless Steel					
Part Numbers	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCU1-D0801N-A3U2	FCU2-D0802N-A3U2	FCU1-0801N-A3U2	FCU2-0802N-A3U2	FCU1-0801N-A3S2	FCU2-0802N-A3S2
DC 3 wire 10-30V NPN N.C.	FCU1-D0801N-B3U2	FCU2-D0802N-B3U2	FCU1-0801N-B3U2	FCU2-0802N-B3U2	FCU1-0801N-B3S2	FCU2-0802N-B3S2
DC 3 wire 10-30V PNP N.O.	FCU1-D0801P-A3U2	FCU2-D0802P-A3U2	FCU1-0801P-A3U2	FCU2-0802P-A3U2	FCU1-0801P-A3S2	FCU2-0802P-A3S2
DC 3 wire 10-30V PNP N.C.	FCU1-D0801P-B3U2	FCU2-D0802P-B3U2	FCU1-0801P-B3U2	FCU2-0802P-B3U2	FCU1-0801P-B3S2	FCU2-0802P-B3S2
DC 4 wire 10-30V Changeover NPN						
DC 4 wire 10-30V Changeover PNP						
DC 2 wire 10-60V N.O.	FCU1-D0801C-A2U2	FCU2-D0802C-A2U2	FCU1-0801C-A2U2	FCU2-0802C-A2U2		
DC 2 wire 10-60V N.C.	FCU1-D0801C-B2U2	FCU2-D0802C-B2U2	FCU1-0801C-B2U2	FCU2-0802C-B2U2		
DC 3 wire 5-36V NPN N.O.	ICU1-D081.5N-A3U2	ICU2-D082.5N-A3U2	ICU1-081.5N-A3U2	ICU2-082.5N-A3U2	ICU1-081.5N-A3S2	ICU2-082.5N-A3S2
DC 3 wire 5-36V NPN N.C.	ICU1-D081.5N-B3U2	ICU2-D082.5N-B3U2	ICU1-081.5N-B3U2	ICU2-082.5N-B3U2	ICU1-081.5N-B3S2	ICU2-082.5N-B3S2
DC 3 wire 5-36V PNP N.O.	ICU1-D081.5P-A3U2	ICU2-D082.5P-A3U2	ICU1-081.5P-A3U2	ICU2-082.5P-A3U2	ICU1-081.5P-A3S2	ICU2-082.5P-A3S2
DC 3 wire 5-36V PNP N.C.	ICU1-D081.5P-B3U2	ICU2-D082.5P-B3U2	ICU1-081.5P-B3U2	ICU2-082.5P-B3U2	ICU1-081.5P-B3S2	ICU2-082.5P-B3S2
DC 4 wire 5-36V Changeover NPN						
DC 4 wire 5-36V Changeover PNP						
Diagrams (units in mm)						
	 	 	 	 	 	 

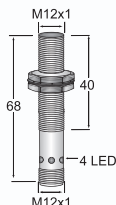
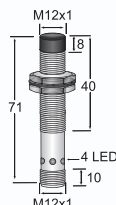
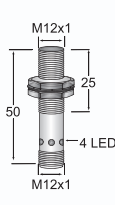
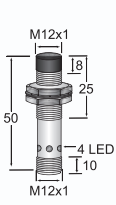
	ø8	M8	M12	M12	M12	M12
						
Sensing Distance	1 mm	1 mm	2 mm	4 mm	2 mm	4 mm
Operating Voltage	10-30 VDC		10-30 VDC or 5-36 VDC or 10-60 VDC			
Ripple	<10%					
No Load Current	<10mA		<10mA	<20mA	<10mA	<20mA
Max. Load Current	200mA					
Leakage Current	<0.01mA					
Surge Current	-					
Min. Load Current	-					
Voltage Drop	<1.5V		<1.5V or <1.0V or <2.0V			
Switching Frequency	2 KHz	2 KHz	2 KHz	1 KHz	2 KHz	1 KHz
Response Time	0.1ms/0.1ms	0.1ms/0.1ms	0.1ms/0.1ms	0.2ms/0.2ms	0.1ms/0.1ms	0.2ms/0.2ms
Switching Hysteresis	<15% (Sr)					
Repeat Accuracy	<1.0% (Sr)					
Protection Category	IP67					
Operating Temperature	-25°C - +70°C					
Temperature Drift	<10% (Sr)					
Short Circuit Protection	Yes					
Overload Trip Point	220mA					
Time Delay Before Availability	<10ms					
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2					
Material Active Face	POM		POM	PBT	POM	PBT
Housing Material	Stainless Steel		Chrome-plated Brass			
Part Numbers	Shielded	Shielded	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCU1-0801N-A3R2	FCU1-08101N-A3R2	FCM1-1202N-A3U2	FCM2-1204N-A3U2	FCM1-1202N-A3S2	FCM2-1204N-A3S2
DC 3 wire 10-30V NPN N.C.	FCU1-0801N-B3R2	FCU1-08101N-B3R2	FCM1-1202N-B3U2	FCM2-1204N-B3U2	FCM1-1202N-B3S2	FCM2-1204N-B3S2
DC 3 wire 10-30V PNP N.O.	FCU1-0801P-A3R2	FCU1-08101P-A3R2	FCM1-1202P-A3U2	FCM2-1204P-A3U2	FCM1-1202P-A3S2	FCM2-1204P-A3S2
DC 3 wire 10-30V PNP N.C.	FCU1-0801P-B3R2	FCU1-08101P-B3R2	FCM1-1202P-B3U2	FCM2-1204P-B3U2	FCM1-1202P-B3S2	FCM2-1204P-B3S2
DC 4 wire 10-30V Changeover NPN			FCM1-1202N-S4U2	FCM2-1204N-S4U2		
DC 4 wire 10-30V Changeover PNP			FCM1-1202P-S4U2	FCM2-1204P-S4U2		
DC 2 wire 10-60V N.O.			FCM1-1202C-A2U2	FCM2-1204C-A2U2	FCM1-1202C-A2S2	FCM2-1204C-A2S2
DC 2 wire 10-60V N.C.			FCM1-1202C-B2U2	FCM2-1204C-B2U2	FCM1-1202C-B2S2	FCM2-1204C-B2S2
DC 3 wire 5-36V NPN N.O.			ICM1-1202N-A3U2	ICM2-1204N-A3U2	ICM1-1202N-A3S2	ICM2-1204N-A3S2
DC 3 wire 5-36V NPN N.C.			ICM1-1202N-B3U2	ICM2-1204N-B3U2	ICM1-1202N-B3S2	ICM2-1204N-B3S2
DC 3 wire 5-36V PNP N.O.			ICM1-1202P-A3U2	ICM2-1204P-A3U2	ICM1-1202P-A3S2	ICM2-1204P-A3S2
DC 3 wire 5-36V PNP N.C.			ICM1-1202P-B3U2	ICM2-1204P-B3U2	ICM1-1202P-B3S2	ICM2-1204P-B3S2
DC 4 wire 5-36V Changeover NPN			ICM1-1202N-S4U2	ICM2-1204N-S4U2	ICM1-1202N-S4S2	ICM2-1204N-S4S2
DC 4 wire 5-36V Changeover PNP			ICM1-1202P-S4U2	ICM2-1204P-S4U2	ICM1-1202P-S4S2	ICM2-1204P-S4S2
Diagrams (units in mm)						
						
						

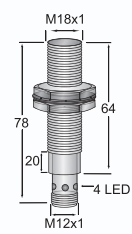
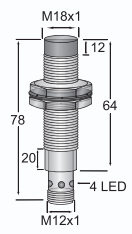
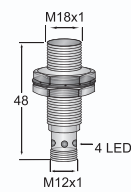
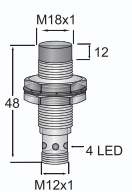
	M18	M18	M18	M18
				
Sensing Distance	5 mm	8 mm	5 mm	8 mm
Operating Voltage	10-30 VDC or 5-36 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	1 KHz	500 Hz	1 KHz	500 Hz
Response Time	0.2ms/0.2ms	0.5ms/0.5ms	0.2ms/0.2ms	0.5ms/0.5ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	PBT			
Housing Material	Chrome-plated Brass			
Part Numbers	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCM1-1805N-A3U2	FCM2-1808N-A3U2	FCM1-1805N-A3S2	FCM2-1808N-A3S2
DC 3 wire 10-30V NPN N.C.	FCM1-1805N-B3U2	FCM2-1808N-B3U2	FCM1-1805N-B3S2	FCM2-1808N-B3S2
DC 3 wire 10-30V PNP N.O.	FCM1-1805P-A3U2	FCM2-1808P-A3U2	FCM1-1805P-A3S2	FCM2-1808P-A3S2
DC 3 wire 10-30V PNP N.C.	FCM1-1805P-B3U2	FCM2-1808P-B3U2	FCM1-1805P-B3S2	FCM2-1808P-B3S2
DC 4 wire 10-30V Changeover NPN	FCM1-1805N-S4U2	FCM2-1808N-S4U2	FCM1-1805N-S4S2	FCM2-1808N-S4S2
DC 4 wire 10-30V Changeover PNP	FCM1-1805P-S4U2	FCM2-1808P-S4U2	FCM1-1805P-S4S2	FCM2-1808P-S4S2
DC 2 wire 10-60V N.O.	FCM1-1805C-A2U2	FCM2-1808C-A2U2	FCM1-1805C-A2S2	FCM2-1808C-A2S2
DC 2 wire 10-60V N.C.	FCM1-1805C-B2U2	FCM2-1808C-B2U2	FCM1-1805C-B2S2	FCM2-1808C-B2S2
DC 3 wire 5-36V NPN N.O.	ICM1-1805N-A3U2	ICM2-1808N-A3U2	ICM1-1805N-A3S2	ICM2-1808N-A3S2
DC 3 wire 5-36V NPN N.C.	ICM1-1805N-B3U2	ICM2-1808N-B3U2	ICM1-1805N-B3S2	ICM2-1808N-B3S2
DC 3 wire 5-36V PNP N.O.	ICM1-1805P-A3U2	ICM2-1808P-A3U2	ICM1-1805P-A3S2	ICM2-1808P-A3S2
DC 3 wire 5-36V PNP N.C.	ICM1-1805P-B3U2	IICM2-1808P-B3U2	ICM1-1805P-B3S2	IICM2-1808P-B3S2
DC 4 wire 5-36V Changeover NPN	ICM1-1805N-S4U2	ICM2-1808N-S4U2	ICM1-1805N-S4S2	ICM2-1808N-S4S2
DC 4 wire 5-36V Changeover PNP	ICM1-1805P-S4U2	ICM2-1808P-S4U2	ICM1-1805P-S4S2	ICM2-1808P-S4S2
Diagrams (units in mm)				
				
				

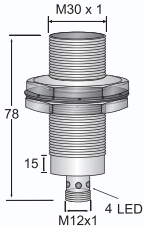
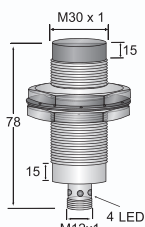
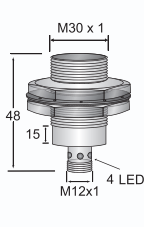
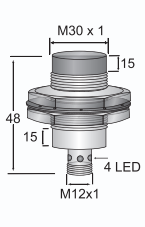
	M30	M30	M30	M30
				
Sensing Distance	10 mm	15 mm	10 mm	15 mm
Operating Voltage	10-30 VDC or 5-36 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	1 KHz	500 KHz	1 KHz	500 KHz
Response Time	0.2ms/0.2ms	0.5ms/0.5ms	0.2ms/0.2ms	0.5ms/0.5ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	PBT			
Housing Material	Chrome-plated Brass			
Part Numbers	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCM1-3010N-A3U2	FCM2-3015N-A3U2	FCM1-3010N-A3S2	FCM2-3015N-A3S2
DC 3 wire 10-30V NPN N.C.	FCM1-3010N-B3U2	FCM2-3015N-B3U2	FCM1-3010N-B3S2	FCM2-3015N-B3S2
DC 3 wire 10-30V PNP N.O.	FCM1-3010P-A3U2	FCM2-3015P-A3U2	FCM1-3010P-A3S2	FCM2-3015P-A3S2
DC 3 wire 10-30V PNP N.C.	FCM1-3010P-B3U2	FCM2-3015P-B3U2	FCM1-3010P-B3S2	FCM2-3015P-B3S2
DC 4 wire 10-30V Changeover NPN	FCM1-3010N-S4U2	FCM2-3015N-S4U2	FCM1-3010N-S4S2	FCM2-3015N-S4S2
DC 4 wire 10-30V Changeover PNP	FCM1-3010P-S4U2	FCM2-3015P-S4U2	FCM1-3010P-S4S2	FCM2-3015P-S4S2
DC 2 wire 10-60V N.O.	FCM1-3010C-A2U2	FCM2-3015C-A2U2	FCM1-3010C-A2S2	FCM2-3015C-A2S2
DC 2 wire 10-60V N.C.	FCM1-3010C-B2U2	FCM2-3015C-B2U2	FCM1-3010C-B2S2	FCM2-3015C-B2S2
DC 3 wire 5-36V NPN N.O.	ICM1-3010N-A3U2	ICM2-3015N-A3U2	ICM1-3010N-A3S2	ICM2-3015N-A3S2
DC 3 wire 5-36V NPN N.C.	ICM1-3010N-B3U2	ICM2-3015N-B3U2	ICM1-3010N-B3S2	ICM2-3015N-B3S2
DC 3 wire 5-36V PNP N.O.	ICM1-3010P-A3U2	ICM2-3015P-A3U2	ICM1-3010P-A3S2	ICM2-3015P-A3S2
DC 3 wire 5-36V PNP N.C.	ICM1-3010P-B3U2	ICM2-3015P-B3U2	ICM1-3010P-B3S2	ICM2-3015P-B3S2
DC 4 wire 5-36V Changeover NPN	ICM1-3010N-S4U2	ICM2-3015N-S4U2	ICM1-3010N-S4S2	ICM2-3015N-S4S2
DC 4 wire 5-36V Changeover PNP	ICM1-3010P-S4U2	ICM2-3015P-S4U2	ICM1-3010P-S4S2	ICM2-3015P-S4S2
Diagrams (units in mm)				
				
	 	 	 	 

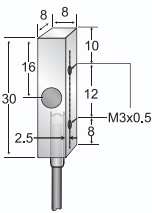
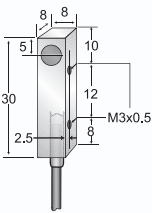
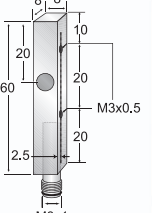
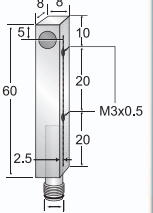
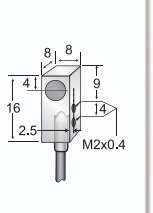
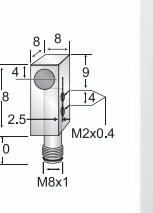
	ø4	ø4	M5	ø6.5	ø6.5	ø6.5
						
Sensing Distance	0.8 mm	0.8mm	0.8mm	1.0 mm	1 mm, 1.5 mm	2mm, 2.5 mm
Operating Voltage	10-30 VDC			10-30 VDC or 5-36 VDC		
Ripple				<10%		
No Load Current				<10mA		
Max. Load Current				200mA		
Leakage Current				<0.01mA		
Surge Current				-		
Min. Load Current				-		
Voltage Drop	<1.5V			<1.5V (10-30V) or <1.0V (5-36V)		
Switching Frequency				2 KHz		
Response Time				0.1ms/0.1ms		
Switching Hysteresis				<15% (Sr)		
Repeat Accuracy				<1.0% (Sr)		
Protection Category				IP67		
Operating Temperature				-25°C - +70°C		
Temperature Drift				<10% (Sr)		
Short Circuit Protection				Yes		
Overload Trip Point				220mA		
Time Delay Before Availability				<10ms		
Shock / Vibration				IEC 60947-5-2, Part 7.4.1 & 7.4.2		
Material Active Face				POM		
Housing Material				Stainless Steel		
Part Numbers	Shielded	Shielded	Shielded	Shielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCU1-D0401N-ACU3	FCU1-D0401N-ACU3/SN	FCU1-0501N-ACU3	FCU1-D0601N-ACR3	FCU1-D0601N-ACU3	FCU2-D0601N-ACU3
DC 3 wire 10-30V NPN N.C.	FCU1-D0401N-BCU3	FCU1-D0401N-BCU3/SN	FCU1-0501N-BCU3	FCU1-D0601N-BCR3	FCU1-D0601N-BCU3	FCU2-D0601N-BCU3
DC 3 wire 10-30V PNP N.O.	FCU1-D0401P-ACU3	FCU1-D0401P-ACU3/SN	FCU1-0501P-ACU3	FCU1-D0601P-ACR3	FCU1-D0601P-ACU3	FCU2-D0601P-ACU3
DC 3 wire 10-30V PNP N.C.	FCU1-D0401P-BCU3	FCU1-D0401P-BCU3/SN	FCU1-0501P-BCU3	FCU1-D0601P-BCR3	FCU1-D0601P-BCU3	FCU2-D0601P-BCU3
DC 4 wire 10-30V Changeover NPN						
DC 4 wire 10-30V Changeover PNP						
DC 2 wire 10-60V N.O.						
DC 2 wire 10-60V N.C.						
DC 3 wire 5-36V NPN N.O.					ICU1-D061.5N-ACU3	ICU2-D061.5N-ACU3
DC 3 wire 5-36V NPN N.C.					ICU1-D061.5N-BCU3	ICU2-D061.5N-BCU3
DC 3 wire 5-36V PNP N.O.					ICU1-D061.5P-ACU3	ICU2-D061.5P-ACU3
DC 3 wire 5-36V PNP N.C.					ICU1-D061.5P-BCU3	ICU2-D061.5P-BCU3
DC 4 wire 5-36V Changeover NPN						
DC 4 wire 5-36V Changeover PNP						
Diagrams (units in mm)						
						
	 	 	 	 	 	 

	M8	M8	M8	M8	M8	M8
						
Sensing Distance	1 mm, 1.5 mm	2mm, 2.5 mm	1 mm, 1.5 mm	2mm, 2.5 mm	1 mm, 1.5 mm	2mm, 2.5 mm
Operating Voltage	10-30 VDC or 5-36 VDC		10-30 or 10-60 or 5-36 VDC		10-30 VDC or 5-36 VDC	
Ripple	<10%					
No Load Current	<10mA					
Max. Load Current	200mA					
Leakage Current	<0.01mA					
Surge Current	-					
Min. Load Current	-					
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)					
Switching Frequency	2 KHz					
Response Time	0.1ms/0.1ms					
Switching Hysteresis	<15% (Sr)					
Repeat Accuracy	<1.0% (Sr)					
Protection Category	IP67					
Operating Temperature	-25°C - +70°C					
Temperature Drift	<10% (Sr)					
Short Circuit Protection	Yes					
Overload Trip Point	220mA					
Time Delay Before Availability	<10ms					
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2					
Material Active Face	POM					
Housing Material	Stainless Steel		Chrome-plated Brass			
Part Numbers	Shielded	Unshielded	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCU1-0801N-ACS3	FCU2-0802N-ACS3	FCM1-0801N-ARU4	FCM2-0802N-ARU4	FCM1-0801N-ARS4	FCM2-0802N-ARS4
DC 3 wire 10-30V NPN N.C.	FCU1-0801N-BCS3	FCU2-0802N-BCS3	FCM1-0801N-BRU4	FCM2-0802N-BRU4	FCM1-0801N-BRS4	FCM2-0802N-BRS4
DC 3 wire 10-30V PNP N.O.	FCU1-0801P-ACS3	FCU2-0802P-ACS3	FCM1-0801P-ARU4	FCM2-0802P-ARU4	FCM1-0801P-ARS4	FCM2-0802P-ARS4
DC 3 wire 10-30V PNP N.C.	FCU1-0801P-BCS3	FCU2-0802P-BCS3	FCM1-0801P-BRU4	FCM2-0802P-BRU4	FCM1-0801P-BRS4	FCM2-0802P-BRS4
DC 4 wire 10-30V Changeover NPN			FCM1-0801N-SRU4	FCM2-0802N-SRU4		
DC 4 wire 10-30V Changeover PNP			FCM1-0801P-SRU4	FCM2-0802P-SRU4		
DC 2 wire 10-60V N.O.			FCM1-0801C-ARU4	FCM2-0802C-ARU4		
DC 2 wire 10-60V N.C.			FCM1-0801C-BRU4	FCM2-0802C-BRU4		
DC 3 wire 5-36V NPN N.O.			ICM1-081.5N-ARU4	ICM2-082.5N-ARU4		
DC 3 wire 5-36V NPN N.C.			ICM1-081.5N-BRU4	ICM2-082.5N-BRU4		
DC 3 wire 5-36V PNP N.O.	ICU1-081.5P-ACS3	ICU2-082.5P-ACS3	ICM1-081.5P-ARU4	ICM2-082.5P-ARU4	ICM1-081.5P-ARS4	ICM2-082.5P-ARS4
DC 3 wire 5-36V PNP N.C.	ICU1-081.5P-BCS3	ICU2-082.5P-BCS3	ICM1-081.5P-BRU4	ICM2-082.5P-BRU4	ICM1-081.5P-BRS4	ICM2-082.5P-BRS4
DC 4 wire 5-36V Changeover NPN	ICU1-081.5N-SCS4	ICU2-082.5N-SCS4	ICM1-081.5N-SRU4	ICM2-082.5N-SRU4	ICM1-081.5N-SRS4	ICM2-082.5N-SRS4
DC 4 wire 5-36V Changeover PNP	ICU1-081.5P-SCS4	ICU2-082.5P-SCS4	ICM1-081.5P-SRU4	ICM2-082.5P-SRU4	ICM1-081.5P-SRS4	ICM2-082.5P-SRS4
Diagrams (units in mm)						
						

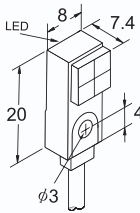
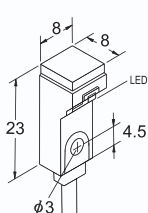
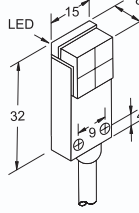
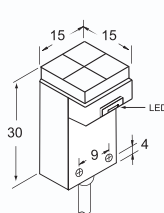
	M12	M12	M12	M12
				
Sensing Distance	2 mm	4 mm	2 mm	4 mm
Operating Voltage	10-30 VDC or 10-60 VDC or 5-36 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	2 KHz	1 KHz	2 KHz	1 KHz
Response Time	0.1ms/0.1ms	0.2ms/0.2ms	0.1ms/0.1ms	0.2ms/0.2ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	POM			
Housing Material	Chrome-plated Brass			
Part Numbers	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCM1-1202N-ARU4	FCM2-1204N-ARU4	FCM1-1202N-ARS4	FCM2-1204N-ARS4
DC 3 wire 10-30V NPN N.C.	FCM1-1202N-BRU4	FCM2-1204N-BRU4	FCM1-1202N-BRS4	FCM2-1204N-BRS4
DC 3 wire 10-30V PNP N.O.	FCM1-1202P-ARU4	FCM2-1204P-ARU4	FCM1-1202P-ARS4	FCM2-1204P-ARS4
DC 3 wire 10-30V PNP N.C.	FCM1-1202P-BRU4	FCM2-1204P-BRU4	FCM1-1202P-BRS4	FCM2-1204P-BRS4
DC 4 wire 10-30V Changeover NPN	FCM1-1202N-SRU4	FCM2-1204N-SRU4	FCM1-1202N-SRS4	FCM2-1204N-SRS4
DC 4 wire 10-30V Changeover PNP	FCM1-1202P-SRU4	FCM2-1204P-SRU4	FCM1-1202P-SRS4	FCM2-1204P-SRS4
DC 2 wire 10-60V N.O.	FCM1-1202C-ARU4	FCM2-1204C-ARU4	FCM1-1202C-ARS4	FCM2-1204C-ARS4
DC 2 wire 10-60V N.C.	FCM1-1202C-BRU4	FCM2-1204C-BRU4	FCM1-1202C-BRS4	FCM2-1204C-BRS4
DC 3 wire 5-36V NPN N.O.	ICM1-1202N-ARU4	ICM2-1204N-ARU4	ICM1-1202N-ARS4	ICM2-1204N-ARS4
DC 3 wire 5-36V NPN N.C.	ICM1-1202N-BRU4	ICM2-1204N-BRU4	ICM1-1202N-BRS4	ICM2-1204N-BRS4
DC 3 wire 5-36V PNP N.O.	ICM1-1202P-ARU4	ICM2-1204P-ARU4	ICM1-1202P-ARS4	ICM2-1204P-ARS4
DC 3 wire 5-36V PNP N.C.	ICM1-1202P-BRU4	ICM2-1204P-BRU4	ICM1-1202P-BRS4	ICM2-1204P-BRS4
DC 4 wire 5-36V Changeover NPN	ICM1-1202N-SRU4	ICM2-1204N-SRU4	ICM1-1202N-SRS4	ICM2-1204N-SRS4
DC 4 wire 5-36V Changeover PNP	ICM1-1202P-SRU4	ICM2-1204P-SRU4	ICM1-1202P-SRS4	ICM2-1204P-SRS4
Diagrams (units in mm)				
				
				

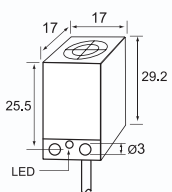
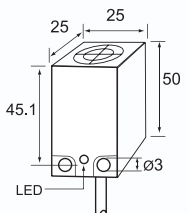
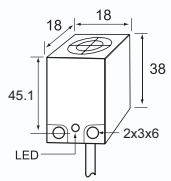
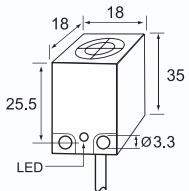
	M18	M18	M18	M18
				
Sensing Distance	5 mm	8 mm	5 mm	8 mm
Operating Voltage	10-30 VDC or 10-60 VDC or 5-36 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	1 KHz	500 Hz	1 KHz	500 Hz
Response Time	0.2ms/0.2ms	0.5ms/0.5ms	0.2ms/0.2ms	0.5ms/0.5ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	POM			
Housing Material	Chrome-plated Brass			
Part Numbers	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCM1-1805N-ARU4	FCM2-1808N-ARU4	FCM1-1805N-ARS4	FCM2-1808N-ARS4
DC 3 wire 10-30V NPN N.C.	FCM1-1805N-BRU4	FCM2-1808N-BRU4	FCM1-1805N-BRS4	FCM2-1808N-BRS4
DC 3 wire 10-30V PNP N.O.	FCM1-1805P-ARU4	FCM2-1808P-ARU4	FCM1-1805P-ARS4	FCM2-1808P-ARS4
DC 3 wire 10-30V PNP N.C.	FCM1-1805P-BRU4	FCM2-1808P-BRU4	FCM1-1805P-BRS4	FCM2-1808P-BRS4
DC 4 wire 10-30V Changeover NPN	FCM1-1805N-SRU4	FCM2-1808N-SRU4	FCM1-1805N-SRS4	FCM2-1808N-SRS4
DC 4 wire 10-30V Changeover PNP	FCM1-1805P-SRU4	FCM2-1808P-SRU4	FCM1-1805P-SRS4	FCM2-1808P-SRS4
DC 2 wire 10-60V N.O.	FCM1-1805C-ARU4	FCM2-1808C-ARU4	FCM1-1805C-ARS4	FCM2-1808C-ARS4
DC 2 wire 10-60V N.C.	FCM1-1805C-BRU4	FCM2-1808C-BRU4	FCM1-1805C-BRS4	FCM2-1808C-BRS4
DC 3 wire 5-36V NPN N.O.	ICM1-1805N-ARU4	ICM2-1808N-ARU4	ICM1-1805N-ARS4	ICM2-1808N-ARS4
DC 3 wire 5-36V NPN N.C.	ICM1-1805N-BRU4	ICM2-1808N-BRU4	ICM1-1805N-BRS4	ICM2-1808N-BRS4
DC 3 wire 5-36V PNP N.O.	ICM1-1805P-ARU4	ICM2-1808P-ARU4	ICM1-1805P-ARS4	ICM2-1808P-ARS4
DC 3 wire 5-36V PNP N.C.	ICM1-1805P-BRU4	ICM2-1808P-BRU4	ICM1-1805P-BRS4	ICM2-1808P-BRS4
DC 4 wire 5-36V Changeover NPN	ICM1-1805N-SRU4	ICM2-1808N-SRU4	ICM1-1805N-SRS4	ICM2-1808N-SRS4
DC 4 wire 5-36V Changeover PNP	ICM1-1805P-SRU4	ICM2-1808P-SRU4	ICM1-1805P-SRS4	ICM2-1808P-SRS4
Diagrams (units in mm)				
				
				

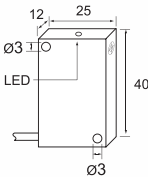
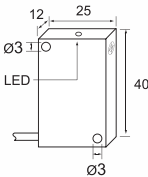
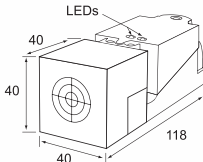
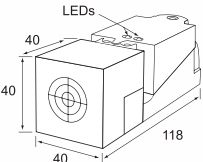
	M30	M30	M30	M30
				
Sensing Distance	10 mm	15 mm	10 mm	15 mm
Operating Voltage	10-30 VDC or 10-60 VDC or 5-36 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	300 Hz	150 Hz	300 Hz	150 Hz
Response Time	0.5ms/0.5ms	1ms/1ms	0.5ms/0.5ms	1ms/1ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	POM			
Housing Material	Chrome-plated Brass			
Part Numbers	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FCM1-3010N-ARU4	FCM2-3015N-ARU4	FCM1-3010N-ARS4	FCM2-3015N-ARS4
DC 3 wire 10-30V NPN N.C.	FCM1-3010N-BRU4	FCM2-3015N-BRU4	FCM1-3010N-BRS4	FCM2-3015N-BRS4
DC 3 wire 10-30V PNP N.O.	FCM1-3010P-ARU4	FCM2-3015P-ARU4	FCM1-3010P-ARS4	FCM2-3015P-ARS4
DC 3 wire 10-30V PNP N.C.	FCM1-3010P-BRU4	FCM2-3015P-BRU4	FCM1-3010P-BRS4	FCM2-3015P-BRS4
DC 4 wire 10-30V Changeover NPN	FCM1-3010N-SRU4	FCM2-3015N-SRU4	FCM1-3010N-SRS4	FCM2-3015N-SRS4
DC 4 wire 10-30V Changeover PNP	FCM1-3010P-SRU4	FCM2-3015P-SRU4	FCM1-3010P-SRS4	FCM2-3015P-SRS4
DC 2 wire 10-60V N.O.	FCM1-3010C-ARU4	FCM2-3015C-ARU4	FCM1-3010C-ARS4	FCM2-3015C-ARS4
DC 2 wire 10-60V N.C.	FCM1-3010C-BRU4	FCM2-3015C-BRU4	FCM1-3010C-BRS4	FCM2-3015C-BRS4
DC 3 wire 5-36V NPN N.O.	ICM1-3010N-ARU4	ICM2-3015N-ARU4	ICM1-3010N-ARS4	ICM2-3015N-ARS4
DC 3 wire 5-36V NPN N.C.	ICM1-3010N-BRU4	ICM2-3015N-BRU4	ICM1-3010N-BRS4	ICM2-3015N-BRS4
DC 3 wire 5-36V PNP N.O.	ICM1-3010P-ARU4	ICM2-3015P-ARU4	ICM1-3010P-ARS4	ICM2-3015P-ARS4
DC 3 wire 5-36V PNP N.C.	ICM1-3010P-BRU4	ICM2-3015P-BRU4	ICM1-3010P-BRS4	ICM2-3015P-BRS4
DC 4 wire 5-36V Changeover NPN	ICM1-3010N-SRU4	ICM2-3015N-SRU4	ICM1-3010N-SRS4	ICM2-3015N-SRS4
DC 4 wire 5-36V Changeover PNP	ICM1-3010P-SRU4	ICM2-3015P-SRU4	ICM1-3010P-SRS4	ICM2-3015P-SRS4
Diagrams (units in mm)				
				
	 	 	 	 

	Q8	Q8	Q8	Q8	Q8	Q8
						
Sensing Distance	1.0 mm	1.0 mm	1.0 mm	1.0 mm	1.0 mm	1.0 mm
Operating Voltage	10-30 VDC					
Ripple	<10%					
No Load Current	<10mA					
Max. Load Current	200mA					
Leakage Current	<0.01mA					
Surge Current	-					
Min. Load Current	-					
Voltage Drop	<1.5V (10-30V)					
Switching Frequency	2 KHz					
Response Time	0.1ms/0.1ms					
Switching Hysteresis	<15% (Sr)					
Repeat Accuracy	<1.0% (Sr)					
Protection Category	IP67					
Operating Temperature	-25°C - +70°C					
Temperature Drift	<10% (Sr)					
Short Circuit Protection	Yes					
Overload Trip Point	220mA					
Time Delay Before Availability	<10ms					
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2					
Material Active Face	POM					
Housing Material	Nickel-plated Brass					
Part Numbers	Shielded	Shielded	Shielded	Shielded	Shielded	Shielded
DC 3 wire 10-30V NPN N.O.	FQM1-8801N-A3S2M	FQM1-8801N-A3S2T	FQM1-8801N-ACU3M	FQM1-8801N-ACU3T	FQM1-8801N-A3R2T	FQM1-8801N-ACR3T
DC 3 wire 10-30V NPN N.C.	FQM1-8801N-B3S2M	FQM1-8801N-B3S2T	FQM1-8801N-BCU3M	FQM1-8801N-BCU3T	FQM1-8801N-B3R2T	FQM1-8801N-BCR3T
DC 3 wire 10-30V PNP N.O.	FQM1-8801P-A3S2M	FQM1-8801P-A3S2T	FQM1-8801P-ACU3M	FQM1-8801P-ACU3T	FQM1-8801P-A3R2T	FQM1-8801P-ACR3T
DC 3 wire 10-30V PNP N.C.	FQM1-8801P-B3S2M	FQM1-8801P-B3S2T	FQM1-8801P-BCU3M	FQM1-8801P-BCU3T	FQM1-8801P-B3R2T	FQM1-8801P-BCR3T
DC 4 wire 10-30V Changeover NPN						
DC 4 wire 10-30V Changeover PNP						
DC 2 wire 10-60V N.O.						
DC 2 wire 10-60V N.C.						
DC 3 wire 5-36V NPN N.O.						
DC 3 wire 5-36V NPN N.C.						
DC 3 wire 5-36V PNP N.O.						
DC 3 wire 5-36V PNP N.C.						
DC 4 wire 5-36V Changeover NPN						
DC 4 wire 5-36V Changeover PNP						
Diagrams (units in mm)						
						
	 	 	 	 	 	 

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	8mm	8mm	15mm	15mm
				
Sensing Distance	2.5 mm	2.5 mm	4 mm	4 mm
Operating Voltage	10-30 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V (10-30V) or <1.0V (5-36V)			
Switching Frequency	500 Hz	500 Hz	250 Hz	250 Hz
Response Time	0.5ms/0.5ms	0.5ms/0.5ms	1.0ms/1.0ms	1.0ms/1.0ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	-			
Housing Material	Polycarbonate			
Part Numbers	Unshielded	Unshielded	Unshielded	Unshielded
DC 3 wire 10-30V NPN N.O.	MQP2-882.5N-A3U5F	MQP2-882.5N-A3U5T	MQP2-1504N-A3U5F	MQP2-1504N-A3U5T
DC 3 wire 10-30V NPN N.C.	MQP2-882.5N-B3U5F	MQP2-882.5N-B3U5T	MQP2-1504N-B3U5F	MQP2-1504N-B3U5T
DC 3 wire 10-30V PNP N.O.	MQP2-882.5P-A3U5F	MQP2-882.5P-A3U5T	MQP2-1504P-A3U5F	MQP2-1504P-A3U5T
DC 3 wire 10-30V PNP N.C.	MQP2-882.5P-B3U5F	MQP2-882.5P-B3U5T	MQP2-1504P-B3U5F	MQP2-1504P-B3U5T
DC 4 wire 10-30V Changeover NPN				
DC 4 wire 10-30V Changeover PNP				
DC 2 wire 10-60V N.O.				
DC 2 wire 10-60V N.C.				
DC 3 wire 5-36V NPN N.O.				
DC 3 wire 5-36V NPN N.C.				
DC 3 wire 5-36V PNP N.O.				
DC 3 wire 5-36V PNP N.C.				
DC 4 wire 5-36V Changeover NPN				
DC 4 wire 5-36V Changeover PNP				
Diagrams (units in mm)				

	Q16	Q25	Q18A	Q18
				
Sensing Distance	4 mm	10 mm	4 mm	4 mm
Operating Voltage	10-30 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V			
Switching Frequency	500 Hz	300 Hz	500 Hz	500 Hz
Response Time	0.5ms/0.5ms	1.0ms/1.0ms	0.5ms/0.5ms	0.5ms/0.5ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Material Active Face	-			
Housing Material	ABS Resin			
Part Numbers	Unshielded	Shielded	Unshielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FQP2-1604N-A3U2	FQP1-2510N-A3U2F	FQP2-18A04N-A3U2	FQP2-1804N-A3U2
DC 3 wire 10-30V NPN N.C.	FQP2-1604N-B3U2	FQP1-2510N-B3U2F	FQP2-18A04N-B3U2	FQP2-1804N-B3U2
DC 3 wire 10-30V PNP N.O.	FQP2-1604P-A3U2	FQP1-2510P-A3U2F	FQP2-18A04P-A3U2	FQP2-1804P-A3U2
DC 3 wire 10-30V PNP N.C.	FQP2-1604P-B3U2	FQP1-2510P-B3U2F	FQP2-18A04P-B3U2	FQP2-1804P-B3U2
DC 4 wire 10-30V Changeover NPN				
DC 4 wire 10-30V Changeover PNP				
DC 2 wire 10-60V N.O.				
DC 2 wire 10-60V N.C.				
DC 3 wire 5-36V NPN N.O.				
DC 3 wire 5-36V NPN N.C.				
DC 3 wire 5-36V PNP N.O.				
DC 3 wire 5-36V PNP N.C.				
DC 4 wire 5-36V Changeover NPN				
DC 4 wire 5-36V Changeover PNP				
Diagrams (units in mm)				

	Q25x40x12	Q25x40x12	5-Way	5-Way
				
Sensing Distance	2 mm	4mm	15mm	30mm
Operating Voltage	10-30 VDC			
Ripple	<10%			
No Load Current	<10mA			
Max. Load Current	200mA			
Leakage Current	<0.01mA			
Surge Current	-			
Min. Load Current	-			
Voltage Drop	<1.5V			
Switching Frequency	300 Hz	100 Hz	100 Hz	100 Hz
Response Time	0.5ms/0.5ms	1.0ms/1.0ms	1.0ms/1.0ms	1.0ms/1.0ms
Switching Hysteresis	<15% (Sr)			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Short Circuit Protection	Yes			
Overload Trip Point	220mA			
Time Delay Before Availability	<10ms			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & 7.4.2			
Connection	2 meter cable		1/2"-14 NPT or PG13.5	
Housing Material	ABS		PBT	
Part Numbers	Shielded	Unshielded	Shielded	Unshielded
DC 3 wire 10-30V NPN N.O.	FQP1-4002N-A3U2	FQP2-4004N-A3U2	FQP1-4015N-A3U	FQP2-4030N-A3U2
DC 3 wire 10-30V NPN N.C.	FQP1-4002N-B3U2	FQP2-4004N-B3U2	FQP1-4015N-B3U	FQP2-4030N-B3U2
DC 3 wire 10-30V PNP N.O.	FQP1-4002P-A3U2	FQP2-4004P-A3U2	FQP1-4015P-A3U	FQP2-4030P-A3U2
DC 3 wire 10-30V PNP N.C.	FQP1-4002P-B3U2	FQP2-4004P-B3U2	FQP1-4015P-B3U	FQP2-4030P-B3U2
DC 4 wire 10-30V Changeover NPN				FQP2-4030N-SRU4
DC 4 wire 10-30V Changeover PNP				FQP2-4030P-SRU4
DC 2 wire 10-60V N.O.				
DC 2 wire 10-60V N.C.				
DC 3 wire 5-36V NPN N.O.				
DC 3 wire 5-36V NPN N.C.				
DC 3 wire 5-36V PNP N.O.				
DC 3 wire 5-36V PNP N.C.				
DC 4 wire 5-36V Changeover NPN				
DC 4 wire 5-36V Changeover PNP				
Diagrams (units in mm)				

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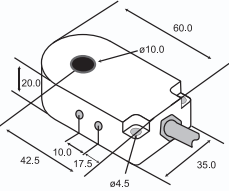
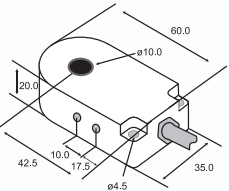
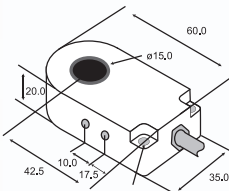
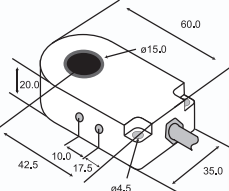
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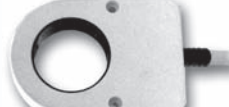
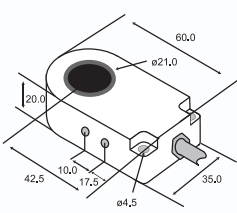
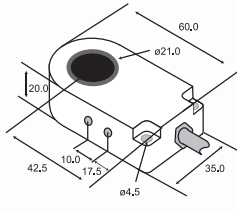
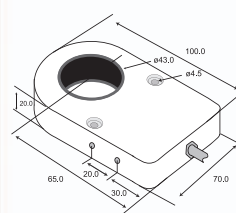
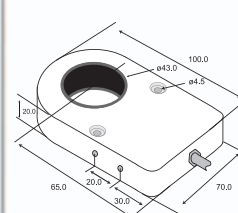
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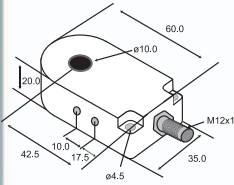
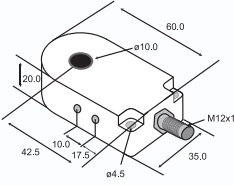
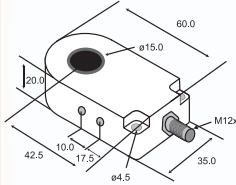
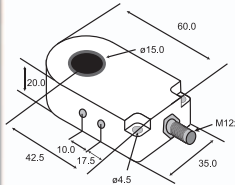
The image displays six technical drawings of LED light fixtures, arranged in two rows of three. Each drawing includes dimensions and specifications:

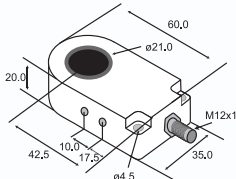
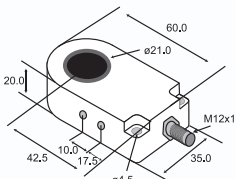
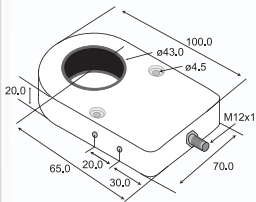
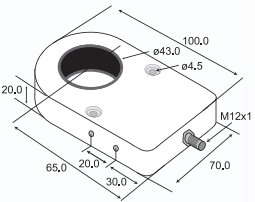
- Model 1 (Top Left):** M12x1 thread, 68mm total height, 42mm mounting bracket height, 4 LED chips. Base: 1/2"-20UNF.
- Model 2 (Top Middle):** M12x1 thread, 68mm total height, 42mm mounting bracket height, 4 LED chips. Base: 1/2"-20UNF.
- Model 3 (Top Right):** M18x1 thread, 78mm total height, 64mm mounting bracket height, 20mm base height, 4 LED chips. Base: 1/2"-20UNF.
- Model 4 (Bottom Left):** M18x1 thread, 78mm total height, 64mm mounting bracket height, 20mm base height, 4 LED chips. Base: 1/2"-20UNF.
- Model 5 (Bottom Middle):** M30 x 1 thread, 78mm total height, 20mm base height, 4 LED chips. Base: 1/2"-20UNF.
- Model 6 (Bottom Right):** M30 x 1 thread, 78mm total height, 20mm base height, 4 LED chips. Base: 1/2"-20UNF.

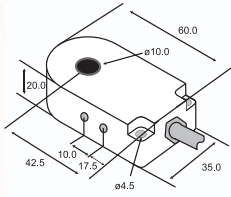
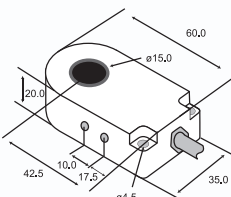
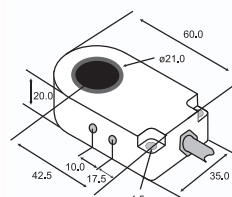
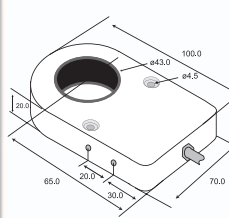
Each drawing also includes the SF US logo and the CE mark.

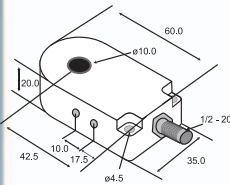
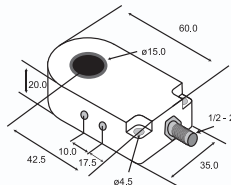
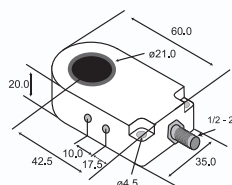
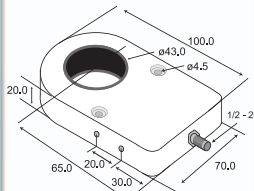
	10mm	10mm	15mm	15mm
				
Min. Target Size	D=2.5mm; L=4mm	D=2.5mm; L=4mm	D=3mm; L=6mm	D=3mm; L=6mm
Operating Voltage & Ripple	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)
No Load Current	≤1.8mA	≤1.8mA	≤1.8mA	≤15mA
Max. Load Current	≤100mA	≤100mA	≤100mA	≤200mA
Leakage Current	≤1.2mA	≤1.8mA	≤1.8mA	≤10μA
Min. Load Current	3mA	-	3mA	-
Voltage Drop	<6V at 100mA	-	<6V at 100mA	≤1.5V at 200mA
Overload Trip Point	120-150mA	-	120-150mA	220-280mA
Switching Frequency	2KHz	2KHz	1.5KHz	1.5KHz
Surge Current	-			
Min. Time Between Objects	-			
Pulse Duration	-			
Switching Hysteresis	15%			
Repeat Accuracy	≤ 2% of rated operating distance			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	±10% (sr)			
Reverse Polarity Protection	Yes	-	-	Yes
Short Circuit Protection	Yes	-	-	Yes
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (contact)			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2			
Housing Material				
Part Numbers				
DC 3 wire 10-30V NPN N.O.		RRP2-R1020N-A3U2		RRP2-R1520N-A3U2
DC 3 wire 10-30V NPN N.C.		RRP2-R1020N-B3U2		RRP2-R1520N-B3U2
DC 3 wire 10-30V PNP N.O.		RRP2-R1020P-A3U2		RRP2-R1520P-A3U2
DC 3 wire 10-30V PNP N.C.		RRP2-R1020P-B3U2		RRP2-R1520P-B3U2
DC 4 wire 10-30V Changeover NPN		RRP2-R1020N-S4U2		RRP2-R1520N-S4U2
DC 4 wire 10-30V Changeover PNP		RRP2-R1020P-S4U2		RRP2-R1520P-S4U2
DC 2 wire 10-60V N.O.	RRP2-R1020C-A2U2		RRP2-R1520C-A2U2	
DC 2 wire 10-60V N.C.	RRP2-R1020C-B2U2		RRP2-R1520C-B2U2	
AC 2 wire 20-250V N.O.				
AC 2 wire 20-250V N.C.				
Diagrams (units in mm)				

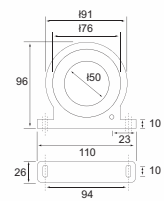
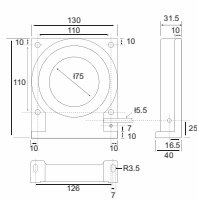
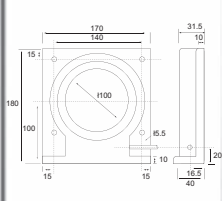
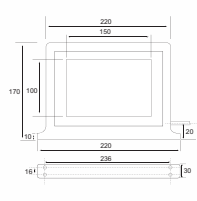
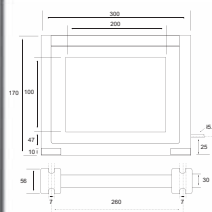
	21mm	21mm	43mm	43mm
				
Min. Target Size	D=6mm; L=12mm	D=6mm; L=12mm	D=9mm; L=18mm	D=9mm; L=18mm
Operating Voltage & Ripple	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)
No Load Current	≤1.8mA	≤1.8mA	≤1.8mA	≤15mA
Max. Load Current	≤100mA	≤100mA	≤100mA	≤200mA
Leakage Current	≤1.2mA	≤1.8mA	≤1.2mA	≤10µA
Min. Load Current	3mA	-	3mA	-
Voltage Drop	<6V at 100mA	-	<6V at 100mA	≤1.5V at 200mA
Overload Trip Point	120-150mA	-	120-150mA	220-280mA
Switching Frequency	1KHz	2KHz	500 Hz	1.5 KHz
Surge Current	-			
Min. Time Between Objects	-			
Pulse Duration	-			
Switching Hysteresis	15%			
Repeat Accuracy	≤ 2% of rated operating distance			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	±10% (sr)			
Reverse Polarity Protection	Yes	-	-	Yes
Short Circuit Protection	Yes	-	-	Yes
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (contact)			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2			
Housing Material				
Part Numbers				
DC 3 wire 10-30V NPN N.O.		RRP2-R2120N-A3U2		RRP2-R4320N-A3U2
DC 3 wire 10-30V NPN N.C.		RRP2-R2120N-B3U2		RRP2-R4320N-B3U2
DC 3 wire 10-30V PNP N.O.		RRP2-R2120P-A3U2		RRP2-R4320P-A3U2
DC 3 wire 10-30V PNP N.C.		RRP2-R2120P-B3U2		RRP2-R4320P-B3U2
DC 4 wire 10-30V Changeover NPN		RRP2-R2120N-S4U2		RRP2-R4320N-S4U2
DC 4 wire 10-30V Changeover PNP		RRP2-R2120P-S4U2		RRP2-R4320P-S4U2
DC 2 wire 10-60V N.O.	RRP2-R2120C-A2U2		RRP2-R4320C-A2U2	
DC 2 wire 10-60V N.C.	RRP2-R2120C-B2U2		RRP2-R4320C-B2U2	
AC 2 wire 20-250V N.O.				
AC 2 wire 20-250V N.C.				
Diagrams (units in mm)				
				

	10mm	10mm	15mm	15mm
				
Min. Target Size	D=2.5mm; L=4mm	D=3mm; L=6mm	D=6mm; L=12mm	D=9mm; L=18mm
Operating Voltage & Ripple	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)
No Load Current	≤1.8mA	≤15mA	≤1.8mA	≤15mA
Max. Load Current	≤100mA	≤200mA	≤100mA	≤200mA
Leakage Current	≤1.8mA	≤10μA	≤1.8mA	≤10μA
Min. Load Current	3mA	-	3mA	-
Voltage Drop	<8 VAC at 400mA	≤1.5V at 200mA	<6V at 100mA	≤1.5V at 200mA
Overload Trip Point	120-150mA	220-280mA	120-150mA	220-280mA
Switching Frequency	2KHz		1.5KHz	
Surge Current	-			
Min. Time Between Objects	-			
Pulse Duration	-			
Switching Hysteresis	15%			
Repeat Accuracy	≤ 2% of rated operating distance			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	±10% (sr)			
Reverse Polarity Protection	Yes			
Short Circuit Protection	Yes			
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (contact)			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2			
Housing Material				
Part Numbers				
DC 3 wire 10-30V NPN N.O.		RRP2-R1020N-ARU4		RRP2-R1520N-ARU4
DC 3 wire 10-30V NPN N.C.		RRP2-R1020N-BRU4		RRP2-R1520N-BRU4
DC 3 wire 10-30V PNP N.O.		RRP2-R1020P-ARU4		RRP2-R1520P-ARU4
DC 3 wire 10-30V PNP N.C.		RRP2-R1020P-BRU4		RRP2-R1520P-BRU4
DC 4 wire 10-30V Changeover NPN		RRP2-R1020N-SRU4		RRP2-R1520N-SRU4
DC 4 wire 10-30V Changeover PNP		RRP2-R1020P-SRU4		RRP2-R1520P-SRU4
DC 2 wire 10-60V N.O.	RRP2-R1020C-ARU4		RRP2-R1520C-ARU4	
DC 2 wire 10-60V N.C.	RRP2-R1020C-BRU4		RRP2-R1520C-BRU4	
AC 2 wire 20-250V N.O.				
AC 2 wire 20-250V N.C.				
Diagrams (units in mm)				
				

	21mm	21mm	43mm	43mm
				
Min. Target Size	D=6mm; L=12mm	D=6mm; L=12mm	D=9mm; L=18mm	D=9mm; L=18mm
Operating Voltage & Ripple	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)	10-60 VDC (Ripple ≤ 10%)	10-30 VDC (Ripple ≤ 10%)
No Load Current	≤1.8mA	≤15mA	≤1.8mA	≤15mA
Max. Load Current	≤100mA	≤200mA	≤100mA	≤200mA
Leakage Current	≤1.2mA	≤10µA	≤1.2mA	≤10µA
Min. Load Current	3mA	-	3mA	-
Voltage Drop	<6V at 100mA	≤1.5V at 200mA	<6V at 100mA	≤1.5V at 200mA
Overload Trip Point	120-150mA	220-280mA	120-150mA	220-280mA
Switching Frequency	1KHz		500Hz	
Surge Current	-			
Min. Time Between Objects	-			
Pulse Duration	-			
Switching Hysteresis	15%			
Repeat Accuracy	≤ 2% of rated operating distance			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	±10% (sr)			
Reverse Polarity Protection	Yes			
Short Circuit Protection	Yes			
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (contact)			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2			
Housing Material				
Part Numbers				
DC 3 wire 10-30V NPN N.O.		RRP2-R2120N-ARU4		RRP2-R4320N-ARU4
DC 3 wire 10-30V NPN N.C.		RRP2-R2120N-BRU4		RRP2-R4320N-BRU4
DC 3 wire 10-30V PNP N.O.		RRP2-R2120P-ARU4		RRP2-R4320P-ARU4
DC 3 wire 10-30V PNP N.C.		RRP2-R2120P-BRU4		RRP2-R4320P-BRU4
DC 4 wire 10-30V Changeover NPN		RRP2-R2120N-SRU4		RRP2-R4320N-SRU4
DC 4 wire 10-30V Changeover PNP		RRP2-R2120P-SRU4		RRP2-R4320P-SRU4
DC 2 wire 10-60V N.O.	RRP2-R2120C-ARU4		RRP2-R4320C-ARU4	
DC 2 wire 10-60V N.C.	RRP2-R2120C-BRU4		RRP2-R4320C-BRU4	
AC 2 wire 20-250V N.O.				
AC 2 wire 20-250V N.C.				
NAMUR				
Diagrams (units in mm)				
				

	10mm	15mm	21mm	43mm
				
Min. Target Size	D=2.5mm; L=4mm	D=3mm; L=6mm	D=6mm; L=12mm	D=9mm; L=18mm
Operating Voltage & Ripple	10-250 VAC			
Min. Time Between Objects	-			
No Load Current	≤1.8mA			
Max. Load Current	≤400mA			
Leakage Current	≤1.8mA			
Surge Current	5mA (20ms)			
Min. Load Current	5mA			
Voltage Drop	<8 VAC at 400mA			
Switching Frequency	8Hz			
Pulse Duration	-			
Switching Hysteresis	-			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Reverse Polarity Protection	-			
Short Circuit Protection	-			
Overload Trip Point	-			
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (contact)			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2			
Housing Material				
Part Numbers				
DC 3 wire 10-30V NPN N.O.				
DC 3 wire 10-30V NPN N.C.				
DC 3 wire 10-30V PNP N.O.				
DC 3 wire 10-30V PNP N.C.				
DC 4 wire 10-30V Changeover NPN				
DC 4 wire 10-30V Changeover PNP				
DC 2 wire 10-60V N.O.				
DC 2 wire 10-60V N.C.				
AC 2 wire 20-250V N.O.	RRP2-R1020A-A2L2	RRP2-R1520A-A2L2	RRP2-R2120A-A2L2	RRP2-R4320A-A2L2
AC 2 wire 20-250V N.C.	RRP2-R1020A-B2L2	RRP2-R1520A-B2L2	RRP2-R2120A-B2L2	RRP2-R4320A-B2L2
NAMUR				
Diagrams (units in mm)				
				

	10mm	15mm	21mm	43mm
				
Min. Target Size	D=2.5mm; L=4mm	D=3mm; L=6mm	D=6mm; L=12mm	D=9mm; L=18mm
Operating Voltage & Ripple	10-250 VAC			
Min. Time Between Objects	-			
No Load Current	≤1.8mA			
Max. Load Current	≤400mA			
Leakage Current	≤1.8mA			
Surge Current	5mA (20ms)			
Min. Load Current	5mA			
Voltage Drop	<8 VAC at 400mA			
Switching Frequency	8Hz			
Pulse Duration	-			
Switching Hysteresis	-			
Repeat Accuracy	<1.0% (Sr)			
Protection Category	IP67			
Operating Temperature	-25°C - +70°C			
Temperature Drift	<10% (Sr)			
Reverse Polarity Protection	-			
Short Circuit Protection	-			
Overload Trip Point	-			
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (contact)			
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2			
Housing Material				
Part Numbers				
DC 3 wire 10-30V NPN N.O.				
DC 3 wire 10-30V NPN N.C.				
DC 3 wire 10-30V PNP N.O.				
DC 3 wire 10-30V PNP N.C.				
DC 4 wire 10-30V Changeover NPN				
DC 4 wire 10-30V Changeover PNP				
DC 2 wire 10-60V N.O.				
DC 2 wire 10-60V N.C.				
AC 2 wire 20-250V N.O.	RRP2-R1020A-AUL3	RRP2-R1520A-AUL3	RRP2-R2120A-AUL3	RRP2-R4320A-AUL3
AC 2 wire 20-250V N.C.	RRP2-R1020A-BUL3	RRP2-R1520A-BUL3	RRP2-R2120A-BUL3	RRP2-R4320A-BUL3
NAMUR				
Diagrams (units in mm)				
				

	MDS-D050	MDS-D075	MDS-D100	MSR-150	MSR-200
Image					
Detection Area	ø50mm	ø75mm	ø100	ø150	ø200
Detectin Object	Moving Ferrous Metal			Magnetic Metal	
Min. Target (steel Ball)	ø2.0mm	ø2.5mm	ø3.0mm	ø5.0mm	ø7.0mm
Operating Temperature	-25°C...+70°C (-13°F...+158°F) without icing				
Operating Humidity	35...90%RH				
Isolate Resistance	Except for exposed head and isolate wire with connection			50 MΩ	
Voltage Resistance	Except for exposed head and isolate wire with connection			AC1,000V/1min.	
Vibration Resistance	10 to 55Hz, 1.5mm double amplitude in X, Y and Z directions, 2 hours respectively				
Shock Immunity	50G in X, Y and Z directions, 3 times respectively				
Cable	3m coacial cable				
Weight	430g	800g	1200g	1300g	2100g
Protection Category	IP67				
Material	Housing	Aluminum		ABS	Aluminum
	Face	ABS			
Diagram					

Control Unit

Image	Power Supply	Output	Part #
	AC 110 / 220V 50 / 60Hz	Relay Contacts: SPDT AC250V 2A / DC 30V 3A Solid State: Open-Collect or 100mA Max.	MDA-001

CAPACITIVE PROXIMITY SENSORS

Capacitive Proximity Sensors detect all materials, including liquids, powders and metallic and non-metallic solids. These sensors are often used to control the levels of pellets, liquids and powders in production control.

Like their inductive counterparts, they are manufactured in shielded and non-shielded configurations and are available in both AC and DC power formats. The shielded models are used to detect solid products such as cartons, stacks of paper, wood or liquids through the wall of a non-metallic container. The non-shielded models are used to detect liquids or powders where the product flows around the sensor. Shielded models have a shorter detection range since part of the field is lost in the shielding process.

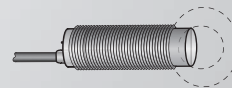
All detection ranges given on the following pages are for a steel target which is equal to, or larger than the diameter of the sensor. Non-conductive products, such as wood or plastic, will be detected at a reduced detection range. The range at which a product is detected is directly related to the dielectric constant of the material; the greater the dielectric constant, the greater the detection range.

SHIELDED CONFIGURATION:



Shielded sensors have a straight-line electrical field. They scan for the presence of solids (e.g. wafers, components, PCB's, hybrids, cartons, bottles, plastic blocks and stacks of paper) at a distance. Shielded capacitive sensors can also detect liquids through a separating wall (glass or plastic up to a maximum of 4mm thick).

NON-SHIELDED CONFIGURATION:



Non-shielded sensors have a spherical electrical field. They are designed to touch the product with their active surface. They are used to detect mainly bulk goods or liquids (e.g. granulate, sugar, flour, corn, sand, oil, water or pastes).

SENSITIVITY ADJUSTMENT

All capacitive models have an adjustable sensitivity that allows the calibration to be made in the field. This allows the sensitivity to be set for the target desired; for example, the sensitivity can be reduced to ignore a glass container but still detect the liquid inside the container. Similarly, the sensitivity can be reduced to ignore a build-up of a viscous product such as honey while still detecting the level when a large amount of the product reaches the sensor.

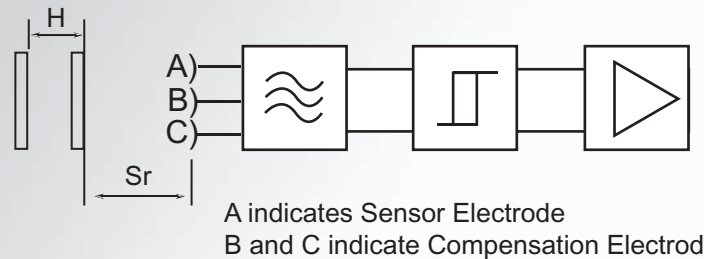
To adjust the sensitivity on a Capacitive Proximity Sensor, mount the sensor in the working position. Allow the target material to reach the position where detection should take place. If the material has not been detected, rotate the sensitivity potentiometer clockwise, with the screwdriver provided, until detection first occurs (LED will illuminate). Continue to rotate the potentiometer for another 1/4 turn. Remove the target material and ensure that the sensor turns OFF (LED will turn off). If the sensor turns OFF, leave the sensitivity at that position. If the sensor remains ON, decrease the sensitivity (counterclockwise rotation) until the sensor turns OFF. For best results, position the sensitivity potentiometer half way between these two points.

CAPACITIVE SENSOR OSCILLATOR CIRCUIT

Capacitive proximity sensors consist of an RC-oscillator with a special multi-part sensing electrode. The electrode and the oscillator circuit have a tube connected with earth potential for lateral shielding. This enables flush mounting of sensor in metal, since the electrical field is only present in front of the sensing electrode. This field is the active zone of the sensor.

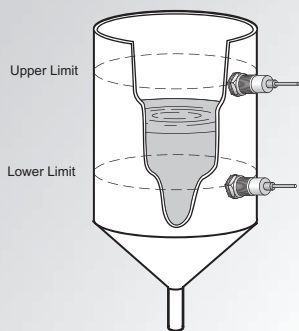
When the conductive material is removed from the active zone, the oscillator is undamped and the oscillation amplitude decreases. The amplifier of the oscillator voltage and the sensitivity of the sensor can be altered by the built-in potentiometer.

The middle electrode together with the built-in re-coupling gives very effective compensation under conditions of humidity, dust or icing. Special circuitry automatically compensates for these influences. The preset sensing distance remains nearly constant. The electrode design, along with the compensating circuitry of capacitive sensors, is a unique design, and provides performance advantages far superior to other capacitive sensors.



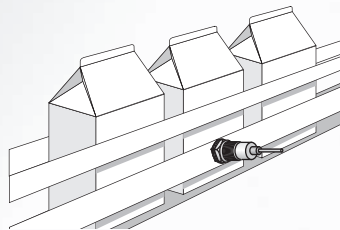
Capacitive Switch Block Diagram

APPLICATIONS FOR CAPACITIVE PROXIMITY SENSORS



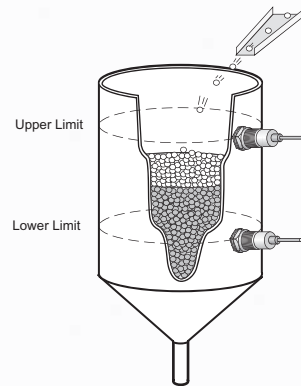
Liquid Level Control

Capacitive Proximity Sensors reliably detect liquid levels.



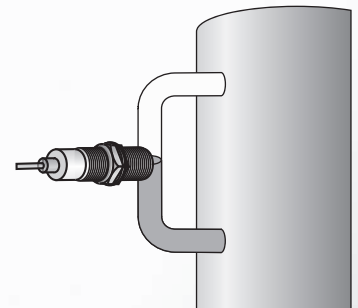
Carton Detection

The packaging industry relies on Capacitive sensors to detect paper and cardboard cartons.



Bin Level Control

Capacitive Sensors can detect liquids, powders, plastic pellets and pastes for level control.



Resist Liquid Level

Use Capacitive Sensors to monitor resist liquid levels in pipes.

MATERIAL CORRECTION FACTOR

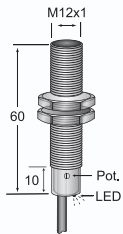
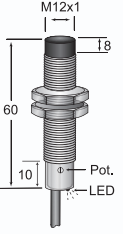
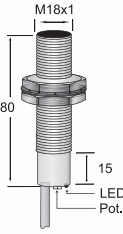
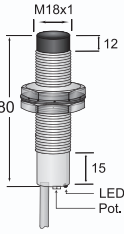
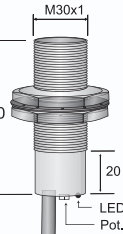
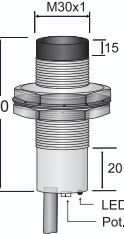
The reduction factors for the different materials are shown in the table below.
If the material of the object to be sensed is not metal or water, the sensing distance is reduced.

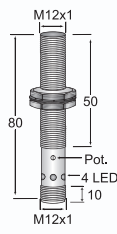
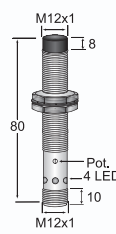
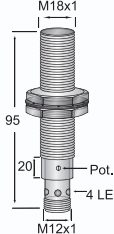
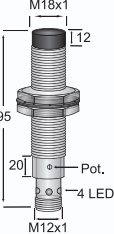
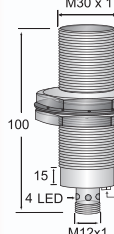
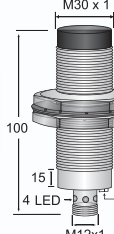
Actuating Material	Sensing Distance Compared to Surface of Water			
	20mm	10mm	15mm	10mm
Hand	20	10	158	10
Square Steel Plate (100x100x1)	20	10	15	10
Round Steel Plate (30 øx1)	11	6	4	2
Stone (marble)	18	8.5	8	5
Wood	13	5	5	3
Glass	12	4	6	2.5
Carbon	19	9	12	9
PVC-block (30x30x5)	8	4	1.5	-
Lupulin Granulate 1800H	8	3	2.5	Head approx. 2mm immersed
Polystyrene 454H	9.5	3	4	1
Hostalen GC 8960H	8.2	1.5	2	Head approx. 1mm immersed
Vestyron 719-50	7.9	1.2	2	Head approx. 3mm immersed
Hostyren	8.2	3	3	Head approx. 1mm immersed
BM Scrap Material (Z)	6.7	1.4	1	Head surrounded
Hostalen GC Coarse Powder	8	2	1.5	Head approx. 3mm immersed
Lupulin Fine Granulate	7.7	1.5	1	Head approx. 3mm immersed
Hostaform C	9.8	3.5	4	1
Hostyren (polystyrene)	7.4	2	2.5	Head approx. 2mm immersed
Hostalit S	7.5	2	1.5	Head surrounded
Hostalen PP	5	1.5	1.5	Head surrounded
Hostalit E	7.2	1	1	Head approx. 4mm immersed
Strypor Unfoamed	8.1	3	3	0.5
Styropor ø1.5	-	-	-	-
Antimony-trioxide	6.2	0.9	2.5	Direct contact
Oil	9	3	5	3
Maximum Sensing Distance Critical Point	55		110	

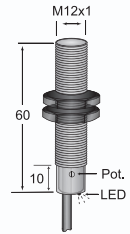
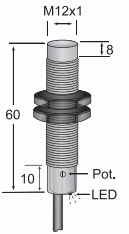
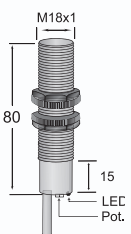
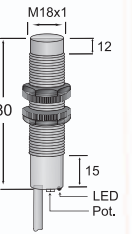
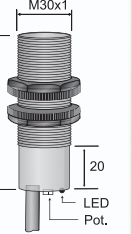
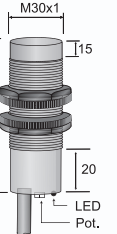
Conditions:

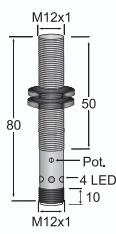
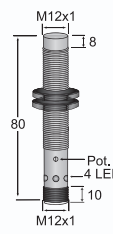
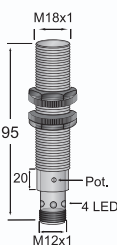
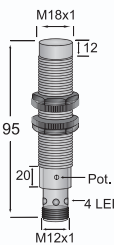
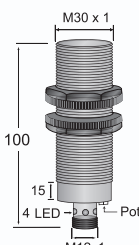
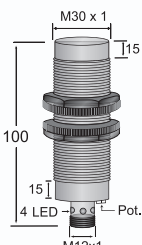
$T_u = 25^{\circ}\text{C}$; $V_A = 24 \text{ VDC}$

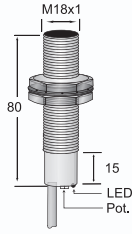
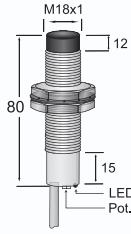
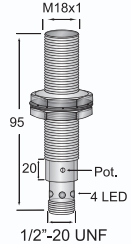
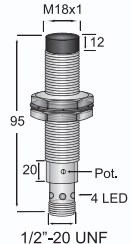
In each case, the measurements were made from a level surface

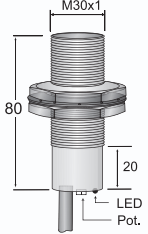
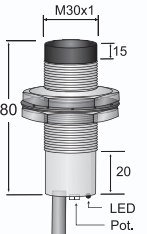
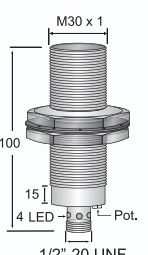
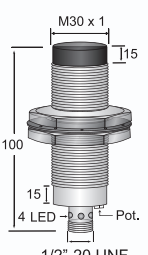
	M12		M18		M30	
						
Sensing Distance	1-4mm adjustable	1-8mm adjustable	2-8mm adjustable	2-15mm adjustable	2-20mm adjustable	2-30mm adjustable
Operating Voltage	10-30 VDC		10-30 VDC		10-30 VDC	
Ripple	<10%		<10%		<10%	
No Load Current	<10mA		<10mA		<10mA	
Max. Load Current	200mA		300mA		300mA	
Leakage Current	0.01mA		0.01mA		0.01mA	
Surge Current	-		-		-	
Min. Load Current	-		-		-	
Voltage Drop	<2 VDC		<2 VDC		<2 VDC	
Switching Frequency	100Hz		100Hz		100Hz	
Response Time	1.5ms/1.5ms		1.5ms/1.5ms		1.5ms/1.5ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)		<10% (Sr)	
Short Circuit Protection	Yes		Yes		Yes	
Overload Trip Point	220mA		350mA		220mA	
Time Delay Before Availability	<25ms		<25ms		<25ms	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT		PBT	
Housing Material	Chrome-plated Brass		Chrome-plated Brass		Chrome-plated Brass	
Part Numbers						
DC 3 wire 10-30V NPN N.O.	CCM1-1204N-A3U2	CCM2-1208N-A3U2	CCM1-1808N-A3U2	CCM2-1815N-A3U2	CCM1-3020N-A3U2	CCM2-3030N-A3U2
DC 3 wire 10-30V NPN N.C.	CCM1-1204N-B3U2	CCM2-1208N-B3U2	CCM1-1808N-B3U2	CCM2-1815N-B3U2	CCM1-3020N-B3U2	CCM2-3030N-B3U2
DC 3 wire 10-30V PNP N.O.	CCM1-1204P-A3U2	CCM2-1208P-A3U2	CCM1-1808P-A3U2	CCM2-1815P-A3U2	CCM1-3020P-A3U2	CCM2-3030P-A3U2
DC 3 wire 10-30V PNP N.C.	CCM1-1204P-B3U2	CCM2-1208P-B3U2	CCM1-1808P-B3U2	CCM2-1815P-B3U2	CCM1-3020P-B3U2	CCM2-3030P-B3U2
DC 4 wire 10-30V NPN (N.O. & N.C.)			CCM1-1808N-S4U2	CCM2-1815N-S4U2	CCM1-3020N-S4U2	CCM2-3030N-S4U2
DC 4 wire 10-30V PNP (N.O. & N.C.)			CCM1-1808P-S4U2	CCM2-1815P-S4U2	CCM1-3020P-S4U2	CCM2-3030P-S4U2
Diagrams (Units in mm)						
						

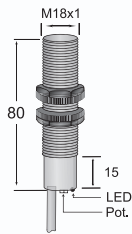
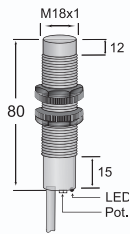
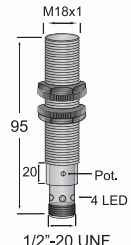
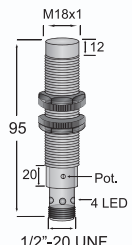
	M12		M18		M30	
						
Sensing Distance	1-4mm adjustable	1-8mm adjustable	2-8mm adjustable	2-15mm adjustable	2-20mm adjustable	2-30mm adjustable
Operating Voltage	10-30 VDC		10-30 VDC		10-30 VDC	
Ripple	<10%		<10%		<10%	
No Load Current	<10mA		<10mA		<10mA	
Max. Load Current	200mA		300mA		300mA	
Leakage Current	0.01mA		0.01mA		0.01mA	
Surge Current	-		-		-	
Min. Load Current	-		-		-	
Voltage Drop	<2 VDC		<2 VDC		<2 VDC	
Switching Frequency	100Hz		100Hz		100Hz	
Response Time	1.5ms/1.5ms		1.5ms/1.5ms		1.5ms/1.5ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)		<10% (Sr)	
Short Circuit Protection	Yes		Yes		Yes	
Overload Trip Point	220mA		350mA		220mA	
Time Delay Before Availability	<25ms		<25ms		<25ms	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT		PBT	
Housing Material	Chrome-plated Brass		Chrome-plated Brass		Chrome-plated Brass	
Part Numbers						
DC 3 wire 10-30V NPN N.O.	CCM1-1204N-ARU4	CCM2-1208N-ARU4	CCM1-1808N-ARU4	CCM2-1815N-ARU4	CCM1-3020N-ARU4	CCM2-3030N-ARU4
DC 3 wire 10-30V NPN N.C.	CCM1-1204N-BRU4	CCM2-1208N-BRU4	CCM1-1808N-BRU4	CCM2-1815N-BRU4	CCM1-3020N-BRU4	CCM2-3030N-BRU4
DC 3 wire 10-30V PNP N.O.	CCM1-1204P-ARU4	CCM2-1208P-ARU4	CCM1-1808P-ARU4	CCM2-1815P-ARU4	CCM1-3020P-ARU4	CCM2-3030P-ARU4
DC 3 wire 10-30V PNP N.C.	CCM1-1204P-BRU4	CCM2-1208P-BRU4	CCM1-1808P-BRU4	CCM2-1815P-BRU4	CCM1-3020P-BRU4	CCM2-3030P-BRU4
DC 4 wire 10-30V NPN (N.O. & N.C.)			CCM1-1808N-SRU4	CCM2-1815N-SRU4	CCM1-3020N-SRU4	CCM2-3030N-SRU4
DC 4 wire 10-30V PNP (N.O. & N.C.)			CCM1-1808P-SRU4	CCM2-1815P-SRU4	CCM1-3020P-SRU4	CCM2-3030P-SRU4
Diagrams (Units in mm)						
						

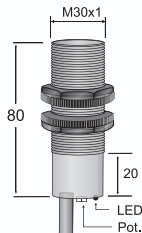
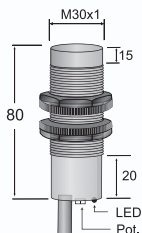
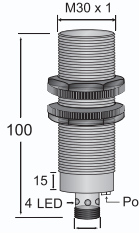
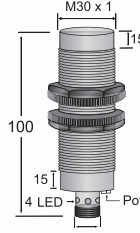
	M12		M18		M30	
						
Sensing Distance	1-4mm adjustable	1-8mm adjustable	2-8mm adjustable	2-15mm adjustable	2-20mm adjustable	2-30mm adjustable
Operating Voltage	10-30 VDC		10-30 VDC		10-30 VDC	
Ripple	<10%		<10%		<10%	
No Load Current	<10mA		<10mA		<10mA	
Max. Load Current	200mA		300mA		300mA	
Leakage Current	0.01mA		0.01mA		0.01mA	
Surge Current	-		-		-	
Min. Load Current	-		-		-	
Voltage Drop	<2 VDC		<2 VDC		<2 VDC	
Switching Frequency	100Hz		100Hz		100Hz	
Response Time	1.5ms/1.5ms		1.5ms/1.5ms		1.5ms/1.5ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)		<10% (Sr)	
Short Circuit Protection	Yes		Yes		Yes	
Overload Trip Point	220mA		350mA		220mA	
Time Delay Before Availability	<25ms		<25ms		<25ms	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT		PBT	
Housing Material	PBT		PBT		PBT	
Part Numbers						
DC 3 wire 10-30V NPN N.O.	CCP1-1204N-A3U2	CCP2-1208N-ARU4	CCP1-1808N-A3U2	CCP2-1815N-A3U2	CCP1-3020N-A3U2	CCP2-3030N-A3U2
DC 3 wire 10-30V NPN N.C.	CCP1-1204N-B3U2	CCP2-1208N-BRU4	CCP1-1808N-B3U2	CCP2-1815N-B3U2	CCP1-3020N-B3U2	CCP2-3030N-B3U2
DC 3 wire 10-30V PNP N.O.	CCP1-1204P-A3U2	CCP2-1208P-ARU4	CCP1-1808P-A3U2	CCP2-1815P-A3U2	CCP1-3020P-A3U2	CCP2-3030P-A3U2
DC 3 wire 10-30V PNP N.C.	CCP1-1204P-B3U2	CCP2-1208P-BRU4	CCP1-1808P-B3U2	CCP2-1815P-B3U2	CCP1-3020P-B3U2	CCP2-3030P-B3U2
DC 4 wire 10-30V NPN (N.O. & N.C.)			CCP1-1808N-S4U2	CCP2-1815N-S3U2	CCP1-3020N-S4U2	CCP2-3030N-SRU4
DC 4 wire 10-30V PNP (N.O. & N.C.)			CCP1-1808P-S4U2	CCP2-1815P-S3U2	CCP1-3020P-S4U2	CCP2-3030P-S3U2
Diagrams (Units in mm)						
						

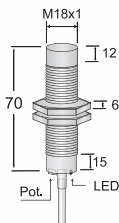
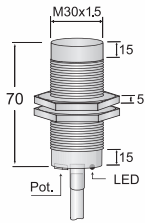
	M12		M18		M30	
						
Sensing Distance	1-4mm adjustable	1-8mm adjustable	2-8mm adjustable	2-15mm adjustable	2-20mm adjustable	2-30mm adjustable
Operating Voltage	10-30 VDC		10-30 VDC		10-30 VDC	
Ripple	<10%		<10%		<10%	
No Load Current	<10mA		<10mA		<10mA	
Max. Load Current	200mA		300mA		300mA	
Leakage Current	0.01mA		0.01mA		0.01mA	
Surge Current	-		-		-	
Min. Load Current	-		-		-	
Voltage Drop	<2 VDC		<2 VDC		<2 VDC	
Switching Frequency	100Hz		100Hz		100Hz	
Response Time	1.5ms/1.5ms		1.5ms/1.5ms		1.5ms/1.5ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)		<10% (Sr)	
Short Circuit Protection	Yes		Yes		Yes	
Overload Trip Point	220mA		350mA		220mA	
Time Delay Before Availability	<25ms		<25ms		<25ms	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT		PBT	
Housing Material	PBT		PBT		PBT	
Part Numbers						
DC 3 wire 10-30V NPN N.O.	CCP1-1204N-ARU4	CCP2-1208N-ARU4	CCP1-1808N-ARU4	CCP2-1815N-ARU4	CCP1-3020N-ARU4	CCP2-3030N-ARU4
DC 3 wire 10-30V NPN N.C.	CCP1-1204N-BRU4	CCP2-1208N-BRU4	CCP1-1808N-BRU4	CCP2-1815N-BRU4	CCP1-3020N-BRU4	CCP2-3030N-BRU4
DC 3 wire 10-30V PNP N.O.	CCP1-1204P-ARU4	CCP2-1208P-ARU4	CCP1-1808P-ARU4	CCP2-1815P-ARU4	CCP1-3020P-ARU4	CCP2-3030P-ARU4
DC 3 wire 10-30V PNP N.C.	CCP1-1204P-BRU4	CCP2-1208P-BRU4	CCP1-1808P-BRU4	CCP2-1815P-BRU4	CCP1-3020P-BRU4	CCP2-3030P-BRU4
DC 4 wire 10-30V NPN (N.O. & N.C.)			CCP1-1808N-SRU4	CCP2-1815N-SRU4	CCP1-3020N-SRU4	CCP2-3030N-SRU4
DC 4 wire 10-30V PNP (N.O. & N.C.)			CCP1-1808P-SRU4	CCP2-1815P-SRU4	CCP1-3020P-SRU4	CCP2-3030P-SRU4
Diagrams (Units in mm)						
						

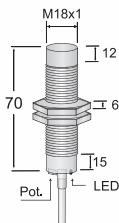
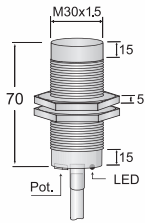
	M18		M18	
				
Sensing Distance	8mm	15mm	8mm	15mm
Operating Voltage	20-250 VAC		20-250 VAC	
Ripple	-		-	
No Load Current	<2.5mA		<2.5mA	
Max. Load Current	300mA		300mA	
Leakage Current	<2.5mA		<2.5mA	
Surge Current	5A		5A	
Min. Load Current	5mA		5mA	
Voltage Drop	<9VAC @ 300mA		<9VAC @ 300mA	
Switching Frequency	25Hz		25Hz	
Response Time	10ms/10ms		10ms/10ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)	
Short Circuit Protection	No		No	
Overload Trip Point	-		-	
Time Delay Before Availability	-		-	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT	
Housing Material	Chrome-plated Brass		Chrome-plated Brass	
Part Numbers				
AC 2 wire 20-250 VAC N.O.	CCM1-1808A-A3L2	CCM2-1815A-A3L2	CCM1-1808A-AUL3	CCM2-1815A-AUL3
AC 2 wire 20-250 VAC N.C.	CCM1-1808A-B3L2	CCM2-1815A-B3L2	CCM1-1808A-BUL3	CCM2-1815A-BUL3
Diagrams (Units in mm)				
				

	M30		M30	
				
Sensing Distance	2 - 20mm	2 - 30mm	2 - 20mm	2 - 30mm
Operating Voltage	20-250 VAC		20-250 VAC	
Ripple	-		-	
No Load Current	<2.5mA		<2.5mA	
Max. Load Current	300mA		300mA	
Leakage Current	<2.5mA		<2.5mA	
Surge Current	5A		5A	
Min. Load Current	5mA		5mA	
Voltage Drop	<9VAC @ 300mA		<9VAC @ 300mA	
Switching Frequency	25Hz		25Hz	
Response Time	10ms/10ms		10ms/10ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)	
Short Circuit Protection	No		No	
Overload Trip Point	-		-	
Time Delay Before Availability	-		-	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT	
Housing Material	Chrome-plated Brass		Chrome-plated Brass	
Part Numbers				
AC 2 wire 20-250 VAC N.O.	CCM1-3020A-A3L2	CCM2-3030A-A3L2	CCM1-3020A-AUL3	CCM2-3030A-AUL3
AC 2 wire 20-250 VAC N.C.	CCM1-3020A-B3L2	CCM2-3030A-B3L2	CCM1-3020A-BUL3	CCM2-3030A-BUL3
Diagrams (Units in mm)				
				

	M18		M18	
				
Sensing Distance	2 - 8mm	2 - 15mm	2 - 8mm	2 - 15mm
Operating Voltage	20-250 VAC		20-250 VAC	
Ripple	-		-	
No Load Current	<2.5mA		<2.5mA	
Max. Load Current	300mA		300mA	
Leakage Current	<2.5mA		<2.5mA	
Surge Current	5A		5A	
Min. Load Current	5mA		5mA	
Voltage Drop	<9VAC @ 300mA		<9VAC @ 300mA	
Switching Frequency	25Hz		25Hz	
Response Time	10ms/10ms		10ms/10ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)	
Short Circuit Protection	No		No	
Overload Trip Point	-		-	
Time Delay Before Availability	-		-	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT	
Housing Material	PBT		PBT	
Part Numbers				
AC 2 wire 20-250 VAC N.O.	CCP1-1808A-A2L2	CCP2-1815A-A2L2	CCP1-1808A-AUL3	CCP2-1815A-AUL3
AC 2 wire 20-250 VAC N.C.	CCP1-1808A-B2L2	CCP2-1815A-B2L2	CCP1-1808A-BUL3	CCP2-1815A-BUL3
Diagrams (Units in mm)				
				

	M30		M30	
				
Sensing Distance	20mm	30mm	20mm	30mm
Operating Voltage	20-250 VAC		20-250 VAC	
Ripple	-		-	
No Load Current	<2.5mA		<2.5mA	
Max. Load Current	300mA		300mA	
Leakage Current	<2.5mA		<2.5mA	
Surge Current	5A		5A	
Min. Load Current	5mA		5mA	
Voltage Drop	<9VAC @ 300mA		<9VAC @ 300mA	
Switching Frequency	25Hz		25Hz	
Response Time	10ms/10ms		10ms/10ms	
Switching Hysteresis	<15% (Sr)		<15% (Sr)	
Repeat Accuracy	<5% (Sr)		<5% (Sr)	
Protection Category	IP67		IP67	
Operating Temperature	-25°C-+70°C		-25°C-+70°C	
Temperature Drift	<10% (Sr)		<10% (Sr)	
Short Circuit Protection	No		No	
Overload Trip Point	-		-	
Time Delay Before Availability	-		-	
EMC	RFI>3V/m / EFT>1KV / ESD>4KV (Contact)		RFI>3V/m / EFT>1KV / ESD>4KV (Contact)	
Shock / Vibration	IEC 60947-5-2, Part 7.4.1 & Part 7.4.2		IEC 60947-5-2, Part 7.4.1 & Part 7.4.2	
Active Face Material	PBT		PBT	
Housing Material	PBT		PBT	
Part Numbers				
AC 2 wire 20-250 VAC N.O.	CCP1-3020A-A2L2	CCP2-3030A-A2L2	CCP1-3020A-AUL3	CCP2-3030A-AUL3
AC 2 wire 20-250 VAC N.C.	CCP1-3020A-B2L2	CCP2-3030A-B2L2	CCP1-3020A-BUL3	CCP2-3030A-BUL3
Diagrams (Units in mm)				
				

	M18	M30
		
Sensing Distance	8mm	15mm
Sensing Distance Min./Max. (adjustable)	1 - 10	2 - 25
Operating Voltage	10 - 30 VDC	10 - 30 VDC
No Load Current	<8mA	<8mA
Max. Load Current	200mA / 2x200mA	200mA / 2x200mA
Leakage Current	<1mA	<1mA
Surge Current	<10mA	<10mA
Min. Load Current	0mA	0mA
Voltage Drop	<2.5V	<2.5V
Switching Frequency	50Hz	50Hz
Response Time	<10ms	<10ms
Switching Hysteresis	<20%	<20%
Repeat Accuracy	<1%	<1%
Protection Category	IP67	IP67
Operating Temperature	-25°C-+70°C	-25°C-+70°C
Temperature Drift	<20%	<20%
Short Circuit Protection	Yes	Yes
Overload Trip Point	typ. 250mA	typ. 250mA
Time Delay Before Availability	<20ms	<20ms
EMC	60947-5-2	60947-5-2
Shock / Vibration	60947-5-2	60947-5-2
Active Face Material	PA / PPO	PA / PPO
Housing Material	PA / PPO	PA / PPO
Part Numbers (Unshielded)		
DC 3 wire 10 - 30 VDC NPN Antivalent	CCP2-1808N-S4U2-PS	CCP2-3015N-S4U2-PS
DC 3 wire 10 - 30 VDC PNP Antivalent	CCP2-1808P-S4U2-PS	CCP2-3015P-S4U2-PS
Diagrams (Units in mm)		
		

	M18	M30
		
Sensing Distance	8mm	15mm
Sensing Distance Min./Max. (adjustable)	1 - 10	2 - 25
Operating Voltage	20 - 250 VAC/DC	20 - 250 VAC/DC
No Load Current	typ. 2.5mA	typ. 2.5mA
Max. Load Current	330mA	330mA
Leakage Current	<1mA	<1mA
Surge Current	<10mA	<10mA
Min. Load Current	5mA	5mA
Voltage Drop	≤6V	≤6V
Switching Frequency	25Hz	25Hz
Response Time	<10ms	<10ms
Switching Hysteresis	<20%	<20%
Repeat Accuracy	<1%	<1%
Protection Category	IP67	IP67
Operating Temperature	-25°C-+70°C	-25°C-+70°C
Temperature Drift	<20%	<20%
Short Circuit Protection	Yes	Yes
Overload Trip Point	typ. 250mA	typ. 250mA
Time Delay Before Availability	<20ms	<20ms
EMC	60947-5-2	60947-5-2
Shock / Vibration	60947-5-2	60947-5-2
Active Face Material	PA / PPO	PA / PPO
Housing Material	PA / PPO	PA / PPO
Part Numbers (Unshielded)		
AC 2 wire 20 - 250 VAC/DC N.O.	CCP2-1808U-A2U2-PS	CCP2-3015U-A2U2-PS
AC 2 wire 20 - 250 VAC/DC N.C.	CCP2-1808U-B2U2-PS	CCP2-3015U-B2U2-PS
Diagrams (Units in mm)		
		

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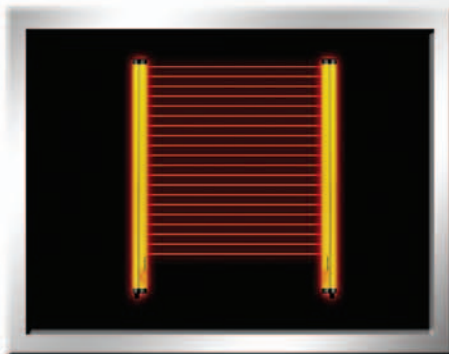
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Miniature Proximity

SAFETY LIGHT CURTAINS



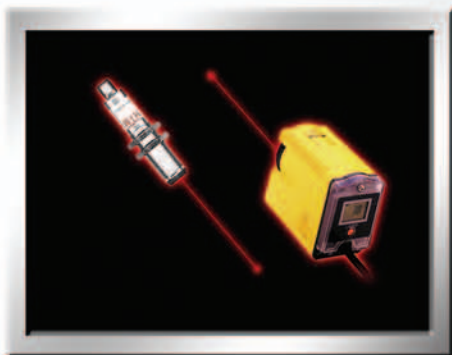
Category 4 Safety
Category 2 Safety
Finger Protection (14mm)
Hand Protection (30mm)
Body Protection (Access)

PHOTOELECTRIC SENSORS



Through Beam
Retro-reflective
Diffuse / Distance / Contrast
Background Suppression
Polarized / Clear Object

LASER SENSORS



Diffuse
Push Button Set-up
Retro-reflective
Through Beam
Temperature Sensors

CABLES & BOXES



M12 Micro & AC 1/2 20
M8 Pico & 7/8" x 16 Mini
Double Ended Cables
Distribution Boxes

SENSOR ACCESSORIES



NPN / PNP Sensor Tester
Mounting Brackets
Spring Mounts
Contact Adapters
Connectors

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