

Proximity Sensors

Capacitive Proximity Sensors

972/973CP Series

FEATURES

- Senses all materials
- Threaded 18 mm diameter metal housings
- Threaded 30 mm diameter metal and plastic housings
- Sealed to IP 65 and IP 67 for industrial environments
- Shielded and unshielded sensing
- Electrical options:
 - 10-48 VDC 3-wire sensors provide current sinking or current sourcing operation
 - 90-250 VAC 2-wire sensors operate on line voltage and are as easy to wire as mechanical switches
- Self-contained – no separate amplifier needed

TYPICAL APPLICATIONS

- Fill level detection in tanks
- Package inspection for product content
- Sense liquid level in sight glass or bottle
- Detect powder or granular material in a hopper
- Detect non-metallic objects on conveyor belts

MICRO SWITCH 900 Series capacitive proximity sensors detect targets made of glass or grain, paper, wood or water.

These sensors utilize an oscillating electric field which is sensitive to both **non-conductive** materials (glass, plastic, rubber, oil) and **conductive** materials such as metals and water. This flexibility adds solid state sensing reliability to many packaging and process control functions.

Metal housings are available in 18 and 30 mm diameters. Shielded versions allow optimum sensing of non-conductive materials, including the ability to sense longer range than certain inductive devices.

Plastic 30 mm housings are for conductive liquids. Review application information on pages B124 and B125 for more information.

Sensitivity adjustment is standard, allowing fine tuning to specific applications, the key to “seeing through” an object or material in order to sense another. The dielectric constant must be very low for material being “seen through”.

CAPACITIVE SENSOR TYPES

UNSHIELDED (Plastic body)

- Primarily used to detect conductive type materials (metal, water) at maximum distances. When detecting non-conductive materials, a path to ground is required.
- Designed to sense conductive materials through a non-conductive material (i.e., water in a glass or plastic container).

Conductive and non-conductive materials cause an increase in capacitance due to a dielectric change in comparison to air. The ground electrode is located directly across from the main electrode. This is not mechanically required, as a path to ground will accomplish the same thing.

Unshielded sensors are often used for “looking through” a non-conductive material to control the level of a conductive material. An example is a plastic section in a tank drain pipe to indicate when tank is empty.

SHIELDED (metal body)

- General purpose to sense non-conductive type materials (wood, plastic, cardboard, glass).
- Do not use in applications where condensing humidity could cause water droplets to form on the face of the shielded capacitive sensor. Water droplets on the face will cause the output to lock on.
- Used when mounting considerations such as flush mounting and surrounding metals could impact the operation of the sensor.

Shielded sensors are used when a path to ground does not always exist. By incorporating the ground electrode in the sensor, an electric field is created independently of any outside path to ground. The field functions the same as when the electrodes face each other. The shielded sensor can sense any material, grounded or ungrounded. Shielded sensors may be flush mounted in any solid material.

NOTE: Capacitance sensors will not see through metal or a material thicker than the specified sensing range.

Accessories for capacitive sensors include mounting brackets. See page B101.

Proximity Sensors

972/973CP Series

Capacitive Preloaded Sensors 3-Wire DC, 2-Wire AC

FEATURES

- Sealed to IP 65 or IP 67
- Adjustable sensitivity
- -25 to +75°C (-13 to +158°F) temperature range
- Metal or plastic housings
- Threaded and smooth housings

ORDER GUIDE

Sensor Package Style*	Sensing Range** mm (in.)	Sensor Type	Sw. Freq.	Output Type	Mtg. Dim.	Isolation Dwg.	Catalog Listing
18 mm (.71 in.) Metal, IP 65 104,3g (3.68 oz)	8 (.31) Shielded	3-wire DC	100 Hz	PNP, N.O.	A 80/3.15 B M18/.71 C 60/2.36 D —	e 36/1.42 r 9/.35 c Sr g 0	972CP8TM-A13P-L
30 mm (1.18 in.) Metal, IP 67	15 (.59) Shielded	3-wire DC	100 Hz	PNP, N.O. NPN, N.O.	A 100/3.94 B M30/1.18 C 57/2.24 D 90/3,15	e 90/3.54 r 45/1.77 c Sr g 0	972CP15TM-A13P-L 972CP15TM-A13N-L
		2-wire AC	10 Hz	N.O. N.C.	A 100/3.94 B M30/1.18 C 57/2.24 D 90/3,15	e 90/3.54 r 45/1.77 c Sr g 20/.79	973CP15TM-A11T-L 973CP15TM-B11T-L
30 mm (1.18 in.) Plastic, IP 67	15 (.59) Unshielded	3-wire DC	100 Hz	NPN, N.O.	A 100/3.94 B M30/1.18 C 57/2.24 D 80/3.15	e 90/3.54 r 45/1.77 c Sr g 20/.79	972CP15TP-A13N-L
		2-wire AC	10 Hz	N.O.	A 100/3.94 B M30/1.18 C 57/2.24 D 80/3,15	e 90/3.54 r 45/1.77 c Sr g 20/.79	973CP15TP-A11T-L

* Metal housing: nickel-plated brass

Plastic 30 mm diameter: Glass fiber reinforced Polybutylenterephthalate
Operating point tolerance over +10 to +70°C: 15%

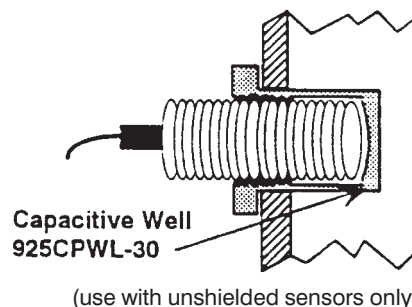
** Standard target: square of mild steel, 1 mm (.04in) thick.

WIRE SPECIFICATIONS

Cable Material	PVC
Wire Gauge – All types	22 Gauge
Jacket O.D.	
2-wire	.232 in. (5,9 mm)
3-wire	.244 in. (6,2 mm)
Length	2 M

ACCESSORIES

Capacitive Well	925CPWL-30
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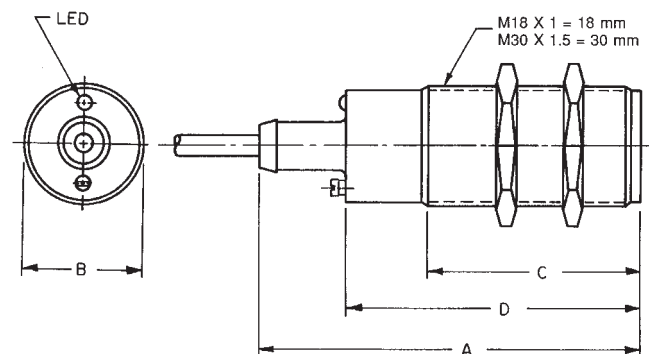
Capacitive Preloaded Sensors

3-Wire DC, 2-Wire AC

SPECIFICATIONS	972CP Series	973CP Series
Sensor Type	3-wire DC	2-wire AC (SCR output)
Supply Voltage	10-48 VDC	90-250 VAC
Load Current, min./max.	200 mA	40-300 mA*
Leakage Current, max.	—	6 mA
Voltage Drop, max.	1.5 V	8 V
Current Consumption, max.	10 mA	—
Inrush Current	—	1.2 A/20 msec
Repeatability	5%	5%
Hysteresis	15%	15%

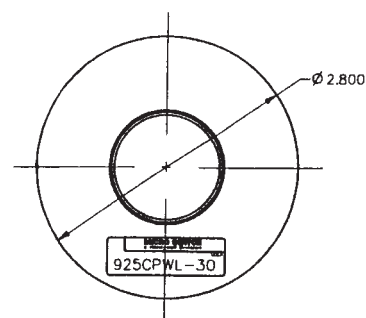
*Do not interface directly with PLC.

MOUNTING DIMENSIONS

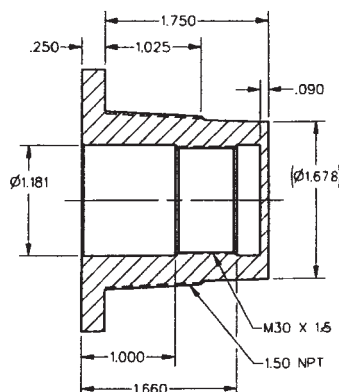


Capacitive Well

Threaded 30mm (only)

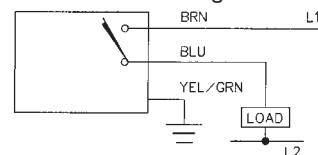


FDA approved polypropylene

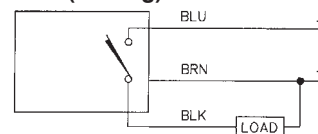


WIRING 2-WIRE AC SENSORS WITH CASE GROUND

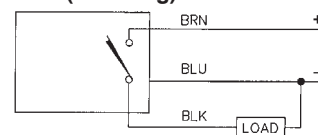
Wiring sensor w/o load will cause permanent damage. The third wire is the case ground. It should be connected as earth ground.



WIRING 3-WIRE DC SENSORS NPN (Sinking) N.O.



PNP (Sourcing) N.O.



Do not place connecting cables of DC sensors in conduit with AC control wiring. Place in separate conduit or with wiring to other low voltage low current solid state devices.

Isolation

