

# PROXIMITY CAPACITIVE SENSORS SC SERIES



## WORKING PRINCIPLE

Capacitive sensors contain an oscillator transistor in the front section. The oscillating circuit R-C (resistor-capacitor) is influenced by variations in capacity in fact when any material, solid or liquid (water, wood, metals, coffee, powders, etc.) come into contact with the active surface of the sensor the capacitance increases putting into action the oscillator up until the threshold of trigger inverts. By introducing a change in the condition of the final stage and therefore in the command of the external load a potentiometer makes fine adjustments to the switching distance.

All the sensors are protected against a change of polarity and electrical disturbances of inductive origin, and they are protected against short circuits.

They can be supplied with rapid or delayed switching. The plastic parts of the AECO capacitive sensors (body, plugs, outlets and locknuts) are made of makrolon which is not toxic, non static and resistant to abrasives.

## CHOICE OF A CAPACITIVE SENSOR

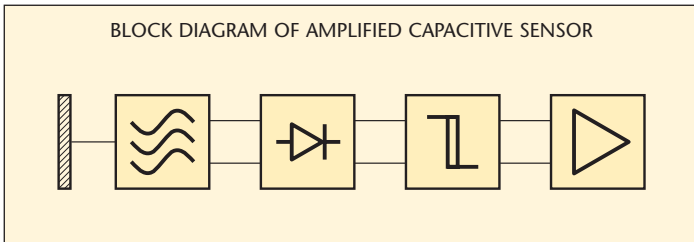
When choosing a capacitive sensor the final use should be kept in mind, that is the material to be controlled, its form and composition.

The reduction factors related to every material should be remembered and also their physical mass.

If possible it is recommended to use partially screened model, that is not mounted flush with the surface as it is possible to take advantage of the much greater sensitive field, this means that the sensor need not be set to the maximum where it would be more prone to effects from temperature variations, humidity, powder deposits, etc.

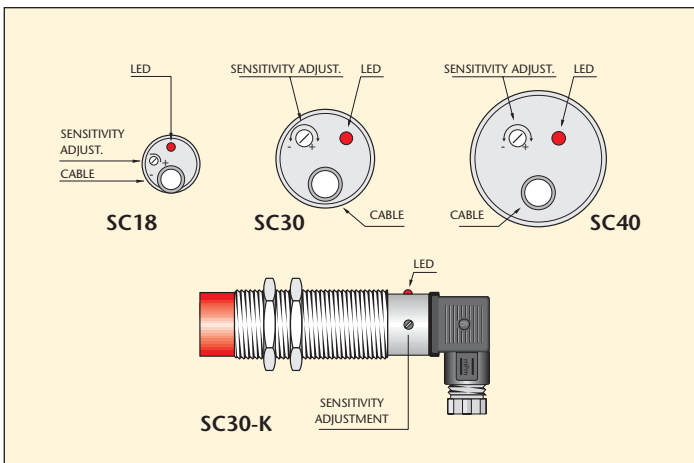
If it is necessary to install the sensor flush with the surface it is advised to make a setting which is not too close to the maximum.

The main difference between the totally screened and partially screened types of sensors is that at equal intervention distances the former requires a sensitivity of about the double of the latter and therefore functions under more critical conditions.



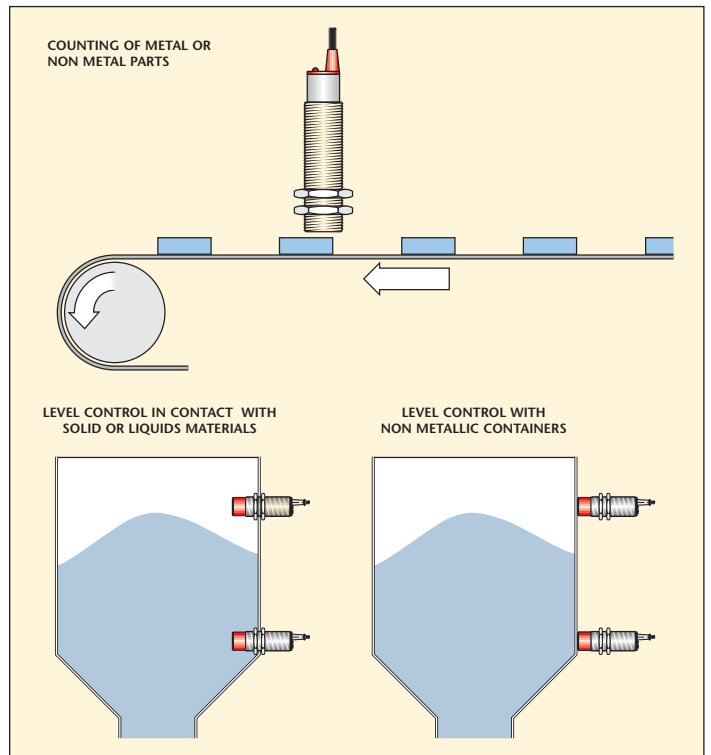
## SENSITIVITY ADJUSTMENT

It is advisable that the sensitivity adjustment be carried out when the sensor is connected in the definite operational position and should be adjusted at the intermediate position between the minimum and maximum values. In the working of the capacitive sensor the air acts as dielectric and it is necessary to take into account that strong variation of humidity can cause, if the adjustment is very fine, a variation of the same. The sensing range is determined in respect to the material and object dimensions to be controlled and can change in respect to the variation of the temperature of about 10% at a temperature of  $-20 \div +70$  °C. The sensitivity increases when the trimmer is rotated in the clockwise direction and decreases in the anti-clockwise direction. The adjustment can be carried out once the plastic protection screw is removed. If the sensor is mounted on a metallic support it is necessary to make an earth connection in order to avoid alterations in the sensing distance of the sensor.



## APPLICATIONS

Capacitive sensors are used widely as limit switches which are sensitive to all types of materials, as limit controls for sensing the maximum and minimum levels of liquids, powders, granules, etc. in silos and various containers. They can also be used for sensing or counting metallic and non metallic objects.



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## DELAYED MODELS

These are capacitive sensors which give an output signal to the load which can have an adjustable time delay up to 15 min. To its energization and deenergization switching in both N.O. and N.C. types.

They are supplied only in the Ø 40 mm model A.C.

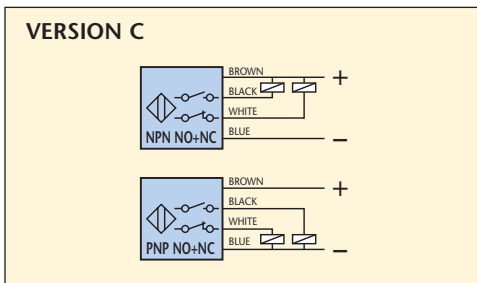
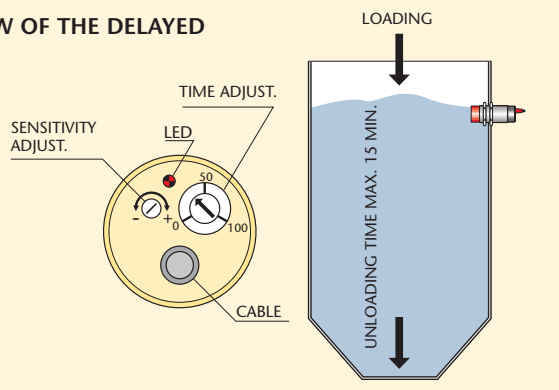
The available ranges of delay are the following:

1 sec. to 1 min. - 15 sec. to 15 min.

A trimmer for adjusting the time has a scale of 0 to 100. These sensors are used in different industrial applications, particularly in the food industry as level controls where a time delay is specifically required without having to install an external timer between the sensor and the load.

In order to carry out the adjustment of the sensitivity the timer trimmer should be zeroed. (See page 64).

## BACK VIEW OF THE DELAYED SENSOR



## SPECIFICATIONS OF C - A - R VERSIONS

### SENSORS VERSION C FOR DIRECT VOLTAGE (4 WIRES)

These are amplified D.C. sensors which contain an output amplifier in addition to the oscillator. They are supplied as 4 wires with antiphase outputs in the types NPN and PNP.

As standard, this version of sensor is protected against short circuit, absolutely protected against polarity inversion and current peaks created by the disconnection of inductive loads. These sensors can be supplied with power supplies: ALNC - ALTP. They are adapted for inputs of programmable controllers.

### SENSORS VERSION FOR ALTERNATING OR DIRECT VOLTAGE (2 WIRES)

These are amplified sensors with two wires which function both in A.C. and D.C., these products as well as having an oscillator have a mosfet output amplifier incorporated which is able to open and close a load very quickly.

The load which is connected in series with the sensor is passed through by the same residual current that it is supplied by. It is particularly important to pay attention to the low consumption relay, in fact it is important to ensure that:

- the required current for the switching of the relay is EQUAL to or SUPERIOR to the minimum output current required by the sensor;
- the current required of the secure releasing of the

relay is SUPERIOR to the residual current of the sensor.

If these parameters are not respected there will be an uncertain switching of the relay.

Furthermore attention must be given to high impedance input connections of electronic commands as the residual current in the sensor could be sufficient to cause activation.

In the closed state a voltage drop can be found this should be taken into account especially when there is a low voltage supply.

All AC/DC capacitive sensors are short circuit protected (up to 50 Vdc and 250 Vac).

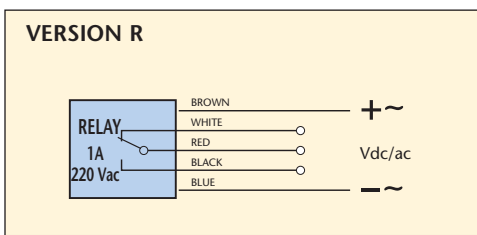
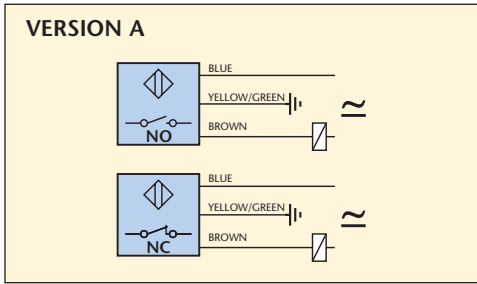
They are also protected against voltage transients coming from the power supply or generated by the load. They are compatible with P.L.C. units.

### SENSORS VERSION R WITH RELAY (5 WIRES)

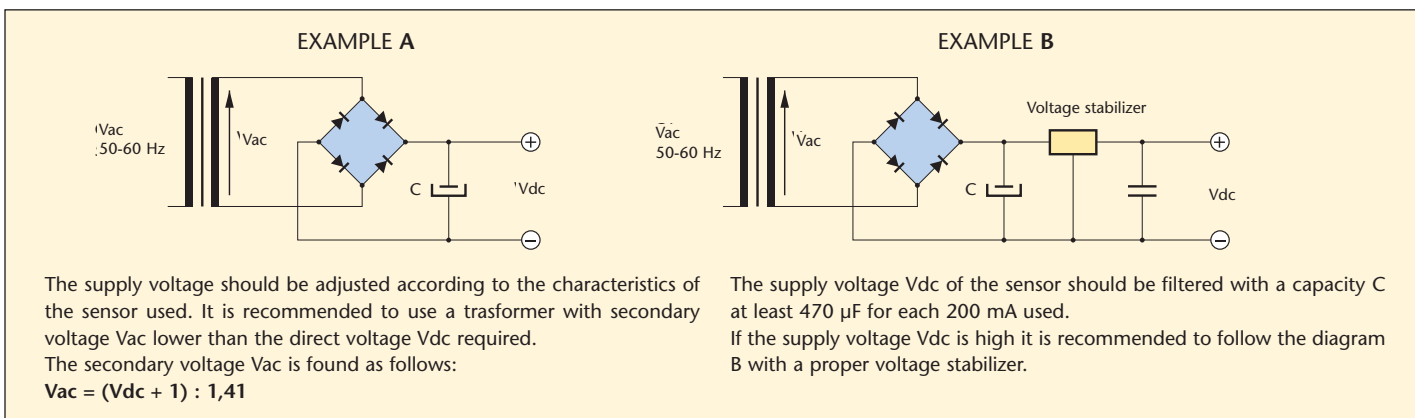
These are amplified sensors which can operate with both AC and DC power supplies.

The sensors as well as the oscillator and amplifier have incorporated a relay which provides one changeover output contact from 1Amp. at 220 Vac. The external load can be connected to the NO or NC contact of the relay, this solution guarantees greater security in the presence of high loads (up to 1A) which is different to sensors with output.

Types with instantaneous intervention are available (page 62) or delayed with programmable functions (page 64).



## SUGGESTION FOR SUPPLYING VOLTAGE TO CAPACITIVE SENSORS



CAPACITIVE