

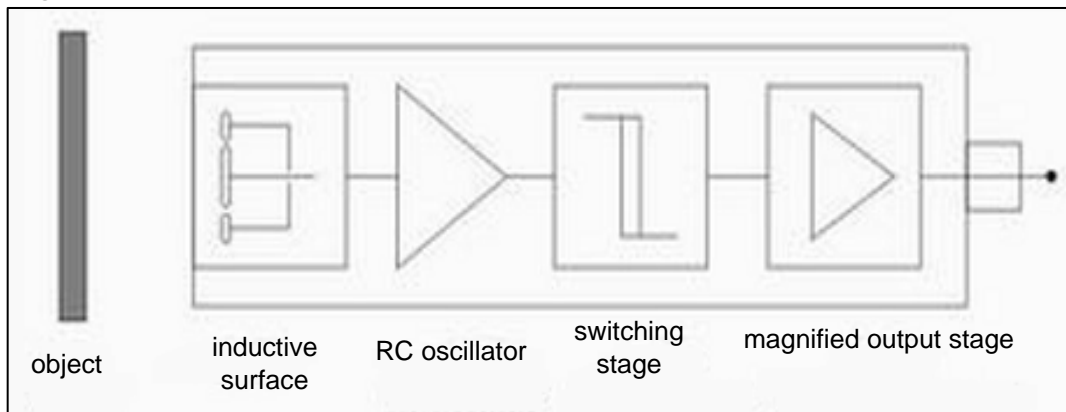
# Capacitance Sensor

## ■ Model explanation of capacitance sensor

CM 18 - 30 05 N A □  
 1 2 3 4 5 6 7

| No. | Composition          | Code and definition  |
|-----|----------------------|--|
| 1   | Switch Category      | LM: inductance type;      CM: capacitance type;                          |
|     |                      | AM: safety explosion-proof type;      XM: mimic linear type;             |
|     |                      | SM: Hall type;      HM: reed type  |
| 2   | Appearance Code      | □: cylinder type;      F□: angular column type                           |
| 3   | Working Voltage      | 30: 6~36VDC;      310: 5~24VDC;      320: 12~60VDC;                      |
|     |                      | 20: 90~250VAC;      210: 24~250VAC;      220: 380VAC;                    |
|     |                      | 40: 12~240VDC/24~240VAC;      50: special voltage                        |
| 4   | Detection Distance   | 01: 1mm;      05: 5mm;      10: 10mm                                     |
| 5   | Output Form          | N: three-wire DC NPN output  |
|     |                      | P: three-wire DC PNP output  |
|     |                      | L: two-wire DC output      □: AC two-wire output                         |
|     |                      | W: AC three-wire output      J: relay contact output                     |
|     |                      | NP: NPN+PNP double output  |
| 6   | Output State         | A: normally open;      B: normally close;                                |
|     |                      | C: NO+NC;      MU: mimic voltage;      MI: mimic current                 |
| 7   | Subsidiary Functions | T: with aviation connector;      Y: water proof、oil proof;               |
|     |                      | I: special requirement;      H: high temp. resistance;      R: ring type |

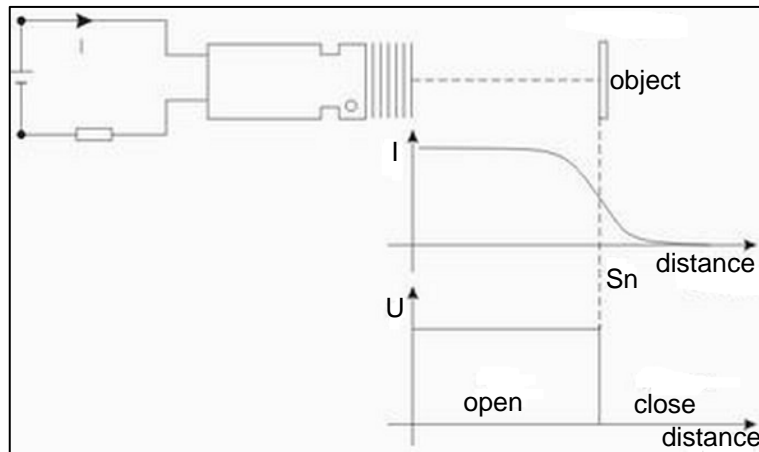
## ■ Working principle of capacitance sensor



The induction surface of capacitance sensor is composed of two coaxial metal electrodes, which form a capacitor and connected on RC oscillation circuit, just like an open capacitor electrode.

When connecting to power supply, RC oscillator does not work. When an object is close to capacitor electrode, the capacitor capacity will increase, and the oscillator will vibrate. Through the treatment of behind stage circuit, both signals of stop oscillation and oscillation will be converted to switch signs for checking the existence of object. This sensor can detect both metal and non-metal objects. For the metal object, the max. action distance can be obtained, but to nonmetal object, the action distance is determined by material dielectric constant, the more dielectric constant, the more action distance will be obtained.

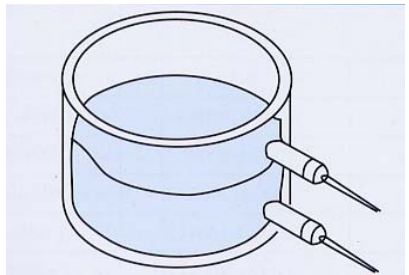
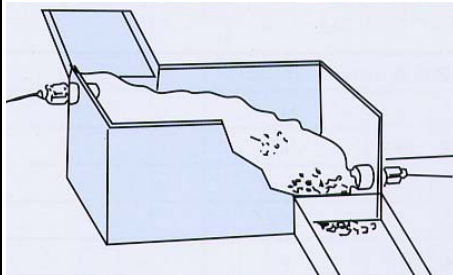
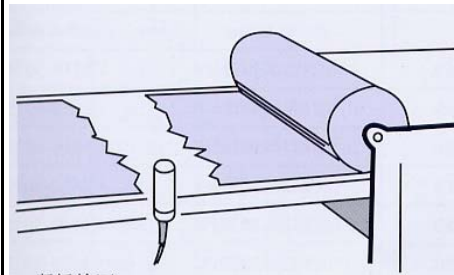
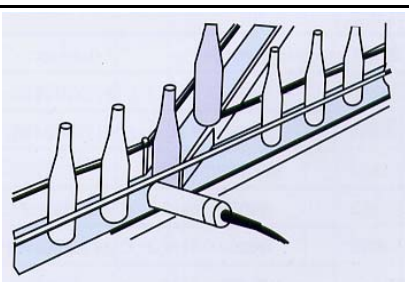
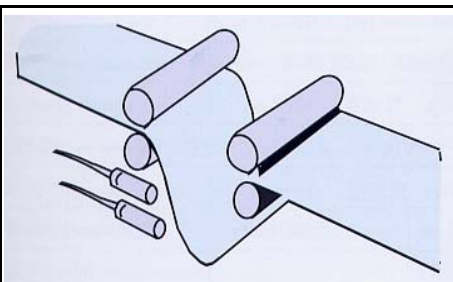
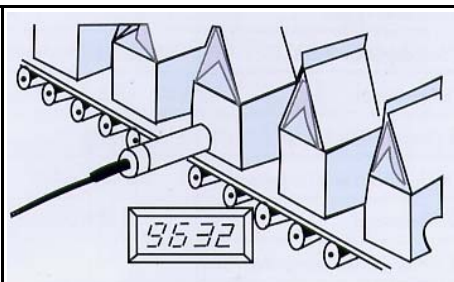
## Capacitance Sensor







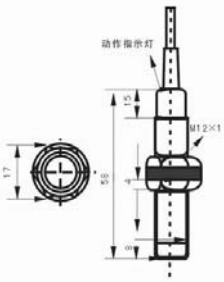
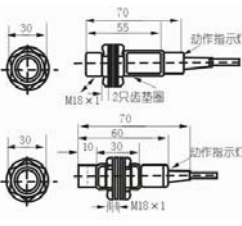
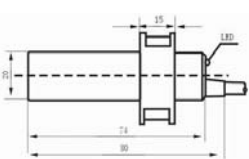
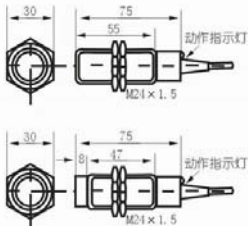
■ The dielectric constants for some important materials are as listed as below :

| Materials     | Dielectric constant | Materials    | Dielectric constant | Materials                | Dielectric constant |
|---------------|---------------------|--------------|---------------------|--------------------------|---------------------|
| Solicon       | 2.8                 | Styrene      | 3                   | Alcohol                  | 25.8                |
| Mica          | 6                   | Porcelain    | 4.4                 | Glass                    | 5                   |
| Ebonite       | 4                   | Earth wax    | 2.2                 | Cardboard                | 4.5                 |
| Marble        | 8                   | Quartz sand  | 4.5                 | Cable rubber compound    | 2.5                 |
| Paper         | 2.3                 | Quartz glass | 3.7                 | Gasoline                 | 2.2                 |
| Organic glass | 3.2                 | Soft rubber  | 2.5                 | Polyvinyl                | 2.9                 |
| Chamber       | 2.7                 | Water        | 80                  | Synthetic resin adhesive | 3.6                 |





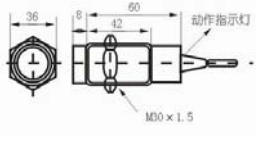
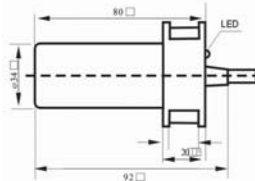
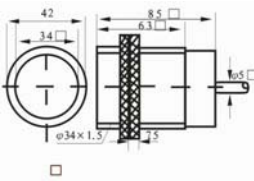
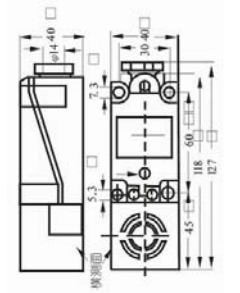
### ■ Application

|  |  |  |
|--|--|--|
|  <p>Liquid Level Measurement (plastic or glass container)</p> |  <p>Material Level Measurement</p>            |  <p>Checking Broken Board</p>               |
|  <p>Count the Bottles</p>                                     |  <p>Detect the Tightness of Conveyor Belt</p> |  <p>Count and Detect the Material Level</p> |


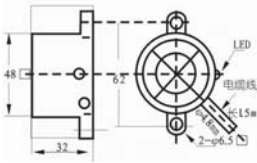
## Capacitance Sensor

| Code                  |                   |     |       | CM12  | CM18  | CM20   | CM24  |
|-----------------------|-------------------|-----|-------|---|---|--|---|
| Picture               |                   |     |       |  |  |  |  |
| Dimensions            |                   |     |       |  |  |  |  |
| Detection Distance    |                   |     |       |   | 0-5mm   |  | 0-8mm   |
| Flush                 | 6~36<br>VDC       | NPN | NO    |   | CM18-3005NA   |  | CM24-3008NA   |
|                       |                   |     | NC    |   | CM18-3005NB   |  | CM24-3008NB   |
|                       |                   |     | NO+NC |   | CM18-3005NC   |  | CM24-3008NC   |
|                       |                   | PNP | NO    |   | CM18-3005PA   |  | CM24-3008PA   |
|                       |                   |     | NC    |   | CM18-3005PB   |  | CM24-3008PB   |
|                       |                   |     | NO+NC |   | CM18-3005PC   |  | CM24-3008PC   |
| 90~<br>250<br>VAC     | SCR               | NO  |       | CM18-2005A  |   | CM24-2008A   |   |
|                       |                   | NC  |       | CM18-2005B  |   | CM24-2008B   |   |
| Detection Distance    |                   |     |       | 0-4mm   | 0-8mm   | 0-10mm   | 0-12mm  |
| Non-flush             | 6~36<br>VDC       | NPN | NO    | CM12-3004NA   | CM18-3008NA   | CM20-3010NA  | CM24-3012NA   |
|                       |                   |     | NC    | CM12-3004NB   | CM18-3008NB   | CM20-3010NB  | CM24-3012NB   |
|                       |                   |     | NO+NC |   | CM18-3008NC   | CM20-3010NC  | CM24-3012NC   |
|                       |                   | PNP | NO    | CM12-3004PA   | CM18-3008PA   | CM20-3010PA  | CM24-3012PA   |
|                       |                   |     | NC    | CM12-3004PB   | CM18-3008PB   | CM20-3010PB  | CM24-3012PB   |
|                       |                   |     | NO+NC |   | CM18-3008PC   | CM20-3010PC  | CM24-3012PC   |
|                       | 90~<br>250<br>VAC | SCR | NO    |   | CM18-2008A  | CM20-2010A   | CM24-2012A  |
|                       |                   |     | NC    |   | CM18-2008B  | CM20-2010B   | CM24-2012B  |
| Detectable Object     |                   |     |       | conductor and dielectric body   |   |  |   |
| Consumption Current   |                   |     |       | DC=12V,I=8mA、DC=24V,I=15mA; AC:≤10mA  |   |  |   |
| Output Current        |                   | DC  |       | 200mA   |   |  |   |
|                       |                   | AC  |       | 300mA   |   |  |   |
| Output voltage Drop   |                   |     |       | DC(NPN、PNP):≤3V; AC:≤7V   |   |  |   |
| Response Frequency    |                   | DC  |       | 50Hz  |   |  |   |
|                       |                   | AC  |       | 10Hz  |   |  |   |
| Shell Material        |                   |     |       | Metal   | ABS/Metal   | ABS  | Metal   |
| Ambient Temperature   |                   |     |       | -25℃~70℃  |   |  |   |
| Insulation Resistance |                   |     |       | 50MΩ  |   |  |   |
| Protection Grade      |                   |     |       | IP54  |   |  |   |

## Capacitance Sensor

| Code                  |                     | CM30  | CM34  | CM35   | CM37  |                             |                              |
|-----------------------|---------------------|---|---|--|---|-----------------------------|------------------------------|
| Picture               |                     |  |  |  |  |                             |                              |
| Dimensions            |                     |  |  |  |  |                             |                              |
| Flush                 | Detection Distance  |   | 0-10mm  |  |   |                             |                              |
|                       | 6~36 VDC            | NPN   | NO  | <a href="#">CM30-3010NA</a>  |   |                             |                              |
|                       |                     |   | NC  | <a href="#">CM30-3010NB</a>  |   |                             |                              |
|                       |                     |   | NO+NC   | <a href="#">CM30-3010NC</a>  |   |                             |                              |
|                       | 90~250 VAC          | SCR   | NO  | <a href="#">CM30-2010A</a>   |   |                             |                              |
|                       |                     |   | NC  | <a href="#">CM30-2010B</a>   |   |                             |                              |
|                       |                     |   |   |  |   |                             |                              |
| Non-flush             | Detection Distance  |   | 0-15mm  | 0-20mm   | 0-25mm  | 0-25mm                      |                              |
|                       | 6~36 VDC            | NPN   | NO  | <a href="#">CM30-3015NA</a>  | <a href="#">CM34-3020NA</a>   | <a href="#">CM35-3025NA</a> | <a href="#">CMF37-3025NA</a> |
|                       |                     |   | NC  | <a href="#">CM30-3015NB</a>  | <a href="#">CM34-3020NB</a>   | <a href="#">CM35-3025NB</a> | <a href="#">CMF37-3025NB</a> |
|                       |                     |   | NO+NC   | <a href="#">CM30-3015NC</a>  | <a href="#">CM34-3020NC</a>   | <a href="#">CM35-3025NC</a> | <a href="#">CMF37-3025NC</a> |
|                       |                     | PNP   | NO  | <a href="#">CM30-3015PA</a>  | <a href="#">CM34-3020PA</a>   | <a href="#">CM35-3025PA</a> | <a href="#">CMF37-3025PA</a> |
|                       |                     |   | NC  | <a href="#">CM30-3015PB</a>  | <a href="#">CM34-3020PB</a>   | <a href="#">CM35-3025PB</a> | <a href="#">CMF37-3025PB</a> |
|                       |                     |   | NO+NC   | <a href="#">CM30-3015PC</a>  | <a href="#">CM34-3020PC</a>   | <a href="#">CM35-3025PC</a> | <a href="#">CMF37-3025PC</a> |
|                       | 90~250 VAC          | SCR   | NO  | <a href="#">CM30-3015A</a>   | <a href="#">CM34-2020A</a>  | <a href="#">CM35-2025A</a>  | <a href="#">CMF37-2025A</a>  |
|                       |                     |   | NC  | <a href="#">CM30-3015B</a>   | <a href="#">CM34-2020B</a>  | <a href="#">CM35-2025B</a>  | <a href="#">CMF37-2025B</a>  |
|                       | Detectable Object   |   | conductor and dielectric body   |  |   |                             |                              |
|                       | Consumption Current |   | DC=12V,I=8mA、DC=24V,I=15mA; AC:≤10mA  |  |   |                             |                              |
| Output Current        | DC                  | 200mA   |   |  |   |                             |                              |
|                       | AC                  | 300mA   |   |  |   |                             |                              |
| Output voltage Drop   |                     | DC(NPN、PNP):≤3V; AC:≤7V   |   |  |   |                             |                              |
| Response Frequency    | DC                  | 50Hz  |   |  |   |                             |                              |
|                       | AC                  | 10Hz  |   |  |   |                             |                              |
| Shell Material        |                     | ABS/Metal   | ABS   |  |   |                             |                              |
| Ambient Temperature   |                     | -25℃~70℃  |   |  |   |                             |                              |
| Insulation Resistance |                     | 50MΩ  |   |  |   |                             |                              |
| Protection Grade      |                     | IP54  |   |  |   |                             |                              |

## Capacitance Sensor

|                       |                    |   |        |                             |  |  |  |
|-----------------------|--------------------|---|--------|-----------------------------|--|--|--|
| Code                  |                    | CM48  |        |                             |  |  |  |
| Picture               |                    |  |        |                             |  |  |  |
| Dimensions            |                    |  |        |                             |  |  |  |
| Flush                 | Detection Distance |   |        |                             |  |  |  |
|                       | 6~36<br>VDC        | NPN   | NO     |                             |  |  |  |
|                       |                    |   | NC     |                             |  |  |  |
|                       |                    |   | NO+NC  |                             |  |  |  |
|                       | 90~<br>250<br>VAC  | SCR   | NO     |                             |  |  |  |
|                       |                    |   | NC     |                             |  |  |  |
|                       |                    |   | NO+NC  |                             |  |  |  |
| Non-flush             | Detection Distance |   | 0-20mm |                             |  |  |  |
|                       | 6~36<br>VDC        | NPN   | NO     | <a href="#">CM48-3020NA</a> |  |  |  |
|                       |                    |   | NC     | <a href="#">CM48-3020NB</a> |  |  |  |
|                       |                    |   | NO+NC  | <a href="#">CM48-3020NC</a> |  |  |  |
|                       | 90~<br>250<br>VAC  | PNP   | NO     | <a href="#">CM48-3020PA</a> |  |  |  |
|                       |                    |   | NC     | <a href="#">CM48-3020PB</a> |  |  |  |
|                       |                    |   | NO+NC  | <a href="#">CM48-3020PC</a> |  |  |  |
|                       | 90~<br>250<br>VAC  | SCR   | NO     | <a href="#">CM48-2020A</a>  |  |  |  |
|                       |                    |   | NC     | <a href="#">CM48-2020B</a>  |  |  |  |
| Detectable Object     |                    | conductor and dielectric body   |        |                             |  |  |  |
| Consumption Current   |                    | DC=12V,I=8mA、dc=24V,I=15mA; AC:≤10mA  |        |                             |  |  |  |
| Output Current        | DC                 | 200mA   |        |                             |  |  |  |
|                       | AC                 | 300mA   |        |                             |  |  |  |
| Output voltage Drop   |                    | DC(NPN、PNP):≤3V; AC:≤7V   |        |                             |  |  |  |
| Response Frequency    | DC                 | 50Hz  |        |                             |  |  |  |
|                       | AC                 | 10Hz  |        |                             |  |  |  |
| Shell Material        |                    | ABS   |        |                             |  |  |  |
| Ambient Temperature   |                    | -25℃~70℃  |        |                             |  |  |  |
| Insulation Resistance |                    | 50MΩ  |        |                             |  |  |  |
| Protection Grade      |                    | IP54  |        |                             |  |  |  |