

Info card

efectoriso
Capacitive sensors

ifm electronic



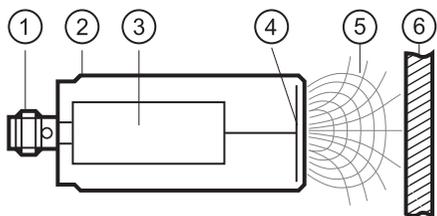
i This info card serves as a supplement to the main position sensors catalogue and to the individual data sheets. For further information and contact addresses please visit our homepage at www.ifm.com.

Operating principle of a capacitive proximity sensor

The active electrode of the sensor builds up a capacitance in relation to the environment. The capacitance depends on the distance, the size and the material properties (dielectric constant) of the environment.

A change in the external capacitance is evaluated and leads to a switching signal.

The sensor can detect liquid, solid, conductive and non conductive media.

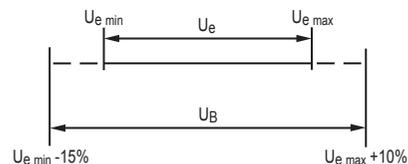


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|---------------------------|--|
| 1: Connection | 4: Electrode system |
| 2: Housing | 5: Alternating electric field = active zone |
| 3: Evaluation electronics | 6: Target (environment) conductive or non conductive |

Glossary of important terms

Active zone	Area above the active face in which the sensor reacts to a change in the environment or an approaching target.
Response time	$< 1/f$ (typical $1/2 f$) unless stated otherwise (f = switching frequency)
Type and highest rating of the short-circuit protective devices	Pulsed short circuit protection for short-circuit-proof units. Where relevant, fuse according to data sheet.
Output function	<p>Normally open: Object within the active zone > output switched.</p> <p>Normally closed: Object within the active zone > output blocked.</p> <p>Programmable: Choice between normally closed or normally open.</p> <p>Positive switching: Positive output signal (to L-).</p> <p>Negative switching: Negative output signal (to L+).</p>

Rated operating voltage U_e



Rated insulation voltage	Units with protection class I + II: 250 V Units with protection class III: 60 V DC
Rated short-circuit current	For short-circuit-proof units: 100 A

Rated impulse withstand voltage	Protection class I: 4 kV Protection class II: 6 kV Protection class III: 0.8 kV
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Power-on delay time	The time the sensor needs to be ready for operation after application of the operating voltage (typically < 300 ms).
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Operating voltage U_e	Voltage range in which the sensor function is reliable. A stabilised and smoothed direct voltage should be used.
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EMC	Capacitive sensors meet the requirements of EN 60947-5-2 so that <ul style="list-style-type: none"> • there are no noise levels that affect other equipment in their intended operation. • they are insensitive to electromagnetic interference to be expected during intended operation.
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Utilisation category	AC units: AC-140 (control of small electromagnetic loads with holding currents < 200 mA) DC units: DC-13 (control of solenoids)
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Hysteresis	Difference between the switch-on and the switch-off point.
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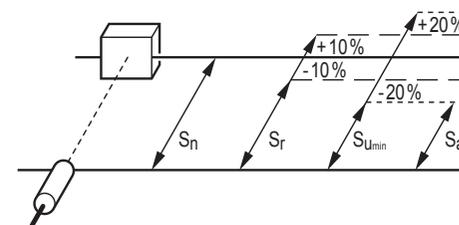
Short-circuit protection	ifm sensors which are protected against excessive current by means of a pulsed short-circuit protection. The inrush current of incandescent lamps, electronic relays and low resistance loads may cause this protection to cut in and turn the sensor off!
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Minimum load current	Smallest operating current to maintain the conductivity of the switching element.
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Product standard	EN 60947-5-2
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Leakage current	Current flowing in the load circuit with blocked output. Current for the internal supply of 2-wire units.
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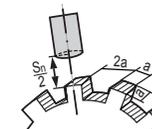
Sensing ranges	<p>Nominal sensing range S_N</p> <p>Real sensing range S_R: $S_N \pm 10\%$</p> <p>Useful sensing range S_U: typically $S_R \pm 20\%$</p> <p>Assured sensing range S_A: $0...72\%$ of S_N</p>
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Referred to a square-shaped grounded steel plate of a thickness of 1 mm with a side length equal to the diameter of the sensing face or $3 \times S_N$, depending on which value is the highest (standard target).

Switch point drift	The shifting of the switch point owing to changes in the ambient temperature.
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Switching frequency f	Damping with standard target at half S_N . The ratio damped to undamped (tooth to gap) = 1 : 2.
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Protection rating	Describes the protection of electric equipment by means of housings, covers, enclosures and is indicated by the IP code.
Voltage drop	Voltage across the output switching element in the conductive state.
Current consumption	No-load current for internal supply of 3 or 4-wire DC units.
Degree of soiling	Capacitive proximity sensors are designed for degree of soiling 3.
Repeatability	Difference between any two Sr measurements. Typically < 10 % of Sr.