

The change of capacitance caused by the change of material level is analyzed by the built-in electronic components and transformed into the corresponding output signal. The level is measured without blind spots over the entire length of the sensor.



Working Principle

The sensor probe of the capacitive level gauge forms a capacitance sensor with the measured medium container, as shown in Figure 1. The inner electrode 1 and the metal container 3 form a coaxial capacitance C_x , and its equivalent circuit principle is shown in Figure 2.

$$C_x = k_1 \cdot h_1 + k_2 \cdot h_2 \quad H = h_1 + h_2 \quad C_x = k_1 \cdot h_1 + k_2 \cdot (H - h_1) = k_2 \cdot H + (k_1 - k_2) \cdot h_1 \dots$$

Among them, h_1 is the liquid level height, and h_2 is the gas phase height;

k_1 and k_2 are constants related to the container structure and the dielectric constants ϵ_{liquid} and ϵ_{gas} of the medium;

$k_1 \cdot h_1$ is the coaxial capacitance formed by the liquid part;

$k_2 \cdot h_2$ is the coaxial capacitance formed by the gas part;

Therefore, it can be seen that the coaxial capacitance C_x formed between the probe 1 and the container 3 is linearly proportional to the liquid level h_1 (because $k_1 > k_2$). By detecting the change in the probe capacitance C_x , the height change of the liquid level can be measured.

In actual capacitance sensors, there is always a small amount of hanging material during operation, and the equivalent circuit of the sensor is shown in Figure 2. The capacitance C_g and resistance R_g generated by the hanging material are superimposed on the total output Z_x of the sensor, causing false liquid level measurement. The signal processor of the level gauge uses radio frequency admittance technology to improve the effect of hanging material on liquid level measurement, and the measurement accuracy is not significantly affected by slight hanging material

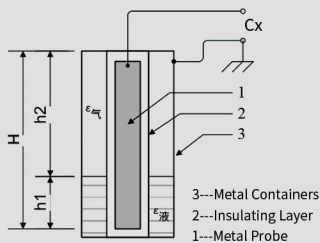


Figure 1 Principles of Capacitance Sensor Measurement

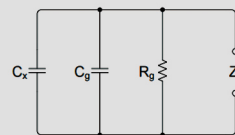


Figure 2 Equivalent Circuit of Capacitive Sensor
 C_x ---Probe Capacitance
 R_g ---Equivalent Resistance of Hanging Material
 C_g ---Hanging Material Capacitance
 Z_x ---Probe Impedance



Features

- Direct measurement of the effective liquid level capacitance value of the sensor, with factory preset parameters for plug-and-play use
- Digital filtering program with adjustable damping time for smooth and stable measurements
- Separate adjustment of zero point and range parameters for convenient correction and calibration to achieve more precise measurements
- Corrosion-resistant construction with PFA, PTFE, and stainless steel 316L materials used in the liquid-contacting parts
- The rod-type extension length can reach up to 5m, and the cable-type extension length can reach up to 25m
- Two-wire (4-20 mA) loop current supply, low power consumption (20mA max.)
- No blind measurement distance, suitable for various tanks and vessels as a liquid level transmitter.




Application

- Widely used in various industrial processes, such as food, beverage, pharmaceutical, detergent, feed, etc.
- Suitable for liquids, solids, slurries, viscous (conductive or non-conductive) materials, and harsh conditions containing steam and dust.
- Real-time monitoring of material level.
- It can also be used as overflow protection, high and low level alarms
- Pump control or limit detection
- Anti-dry rotation or pump protection.




Capacitive Level Meter

Model	CG-100	CG-110	CG-120
Image			
Application	Suitable Materials: Dielectric Constant greater than 4, Conductive Media	Suitable Materials: Low Moisture Non-Conductive Media	Suitable Materials: High Temperature Media
Measurement Range	Max.4M(20~2000pF)	Max.4M(20~2000pF)	Max.4M(20~2000pF)
Inductive Material	SUS304+PFA/PTFE coating	SUS304	SUS304/PTFE coating
Process Connection	Threads, start from 1/2" PT, 1/2" PT Flanges, start from DN25	Threads, start from 1/2" PT, 1/2" PT Flanges, start from DN25	Threads, start from 1/2" PT, 1/2" PT Flanges, start from DN25
Process Temperature	-40~80°C	-40~80°C	-40~200°C
Process Pressure	-1~32BAR (-100~3200 KPA)	-1~40BAR (-100~4000 KPA)	-1~40 BAR (-100~4000 KPA)
Measurement Accuracy	± 1% FS or ± 0.5pF	± 1% FS or ± 0.5pF	± 1% FS or ± 0.5pF
Power Supply	18~30VDC	18~30VDC	18~30VDC
Signal Output	4~20 mA/HART	4~20 mA/HART	4~20 mA/HART
Temperature Drift	<± 0.2% FS/ °C or 0.1pF/°C	<± 0.2% FS/ °C or 0.1pF/°C	<± 0.2% FS/ °C or 0.1pF/°C
Junction Box Material	Aluminum Alloy Paint	Aluminum Alloy Paint	Aluminum Alloy Paint
Certification	CE / ATEX / ISO9001	CE / ATEX / ISO9001	CE / ATEX / ISO9001
Protection Level	IP65 / IP66 / IP67	IP65 / IP66 / IP67	IP65 / IP66 / IP67

Capacitive Level Meter

Model	CG-200	CG-210	CG-220
Image			
Application	Suitable Materials: Dielectric Constant greater than 4	Suitable Materials: Low Moisture Non-Conductive Media	Suitable Materials: High Temperature Media
Measurement Range	Max.50M(20~2000pF)	Max.50M(20~2000pF)	Max.50M(20~2000pF)
Inductive Material	SUS304 steel cable+PFA/PTFE coating	SUS304 steel cable	SUS304 steel cable/PTFE coating
Process Connection	Threads, start from 1" PT, 1" PT Flanges, start from DN50	Threads, start from 1" PT, 1" PT Flanges, start from DN50	Threads, start from 1" PT, 1" PT Flanges, start from DN50
Process Temperature	-40~80°C	-40~80°C	-40~200°C
Process Pressure	-1~32BAR (-100~3200 KPA)	-1~40BAR (-100~4000 KPA)	-1~40 BAR (-100~4000 KPA)
Tensile Strength	2000Kgf	2000Kgf	2000Kgf
Measurement Accuracy	± 1% FS or ± 0.5pF	± 1% FS or ± 0.5pF	± 1% FS or ± 0.5pF
Power Supply	18~30VDC	18~30VDC	18~30VDC
Signal Output	4~20 mA/HART	4~20 mA/HART	4~20 mA/HART
Temperature Drift	<± 0.2% FS/ °C or 0.1pF/°C	<± 0.2% FS/ °C or 0.1pF/°C	<± 0.2% FS/ °C or 0.1pF/°C
Junction Box Material	Aluminum Alloy Paint	Aluminum Alloy Paint	Aluminum Alloy Paint
Certification	CE / ATEX / ISO9001	CE / ATEX / ISO9001	CE / ATEX / ISO9001
Protection Level	IP65 / IP66 / IP67	IP65 / IP66 / IP67	IP65 / IP66 / IP67

Capacitive Level Meter

Model	CG-300	CG-320	CG-400
Image			
Application	Suitable Materials: Low Moisture Non-Conductive Media	Suitable Materials: High Temperature Media	Suitable Materials: Low Moisture Non-Conductive Media Low Dielectric Coefficient Material
Measurement Range	Max.4M(20~2000pF)	Max.4M(20~2000pF)	Max.1.5M(20~2000pF)
Inductive Material	Coaxial SUS304+PFA/PTFE coating	Coaxial SUS304+PTFE coating	SUS304+PTFE coating
Process Connection	Threads, start from 1" PT, 1" PT Flanges, start from DN25	Threads, start from 1" PT, 1" PT Flanges, start from DN50	Flanges, start from DN50
Process Temperature	-40~80°C	-40~200°C	-40~200°C
Process Pressure	-1~40BAR (-100~4000 KPA)	-1~40BAR (-100~4000 KPA)	-1~40 BAR (-100~4000 KPA)
Measurement Accuracy	± 1% FS or ± 0.5pF	± 1% FS or ± 0.5pF	± 1% FS or ± 0.5pF
Power Supply	18~30VDC	18~30VDC	18~30VDC
Signal Output	4~20 mA/HART	4~20 mA/HART	4~20 mA/HART
Temperature Drift	<± 0.2% FS/ °C or 0.1pF/°C	<± 0.2% FS/ °C or 0.1pF/°C	<± 0.2% FS/ °C or 0.1pF/°C
Junction Box Material	Aluminum Alloy Paint	Aluminum Alloy Paint	Aluminum Alloy Paint
Certification	CE / ATEX / ISO9001	CE / ATEX / ISO9001	CE / ATEX / ISO9001
Protection Level	IP65 / IP66 / IP67	IP65 / IP66 / IP67	IP65 / IP66 / IP67

Dimensional Diagram

