

CG Series

Capacitance Level Sensor (Phase Detection Principle)

Products Overview



Having more than 40 years of experience with capacitive level sensors, we have put all the expertise into this CG series. The CG sensors operate on the phase detection principle, and the incorporated microprocessor (digital circuit) translates capacitance variation into resonance frequency shift, and triggers the relay at preset level points.

Principle of Operation

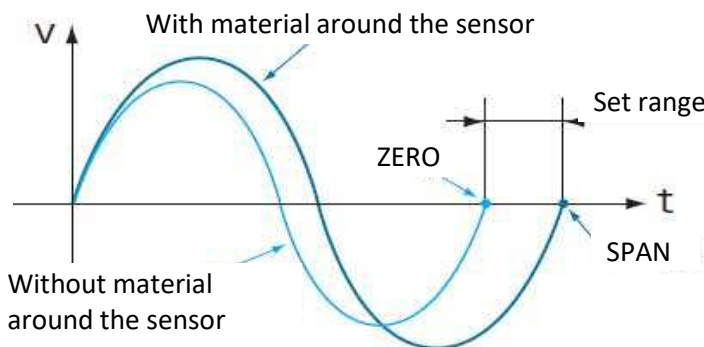
The oscillator circuit is of the parallel resonance circuit with L (coil) and C (capacitance between the electrodes comprising the rod).

The oscillation frequency (f) of this circuit is : $f = 1/2 \pi \sqrt{LC}$.

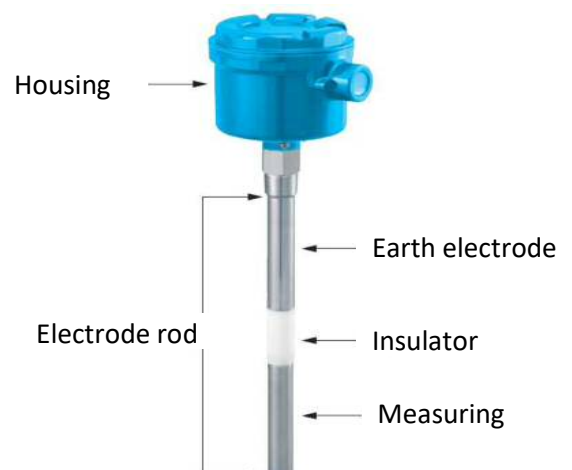
The frequency without material on the rod (f1) is: $f_1 = 1/2 \pi \sqrt{LC}$, where C is the capacitance with the dry rod (zero point).

With material covering the rod, the capacitance increases (C+ΔC), and the frequency (f2) will be: $f_2 = 1/2 \pi \sqrt{L(C+\Delta C)}$, where C+ΔC is the capacitance with material on the rod (span point).

The sensor detects the change in frequency, and gives the relay output. The frequency range is divided into 8 segments between zero and span points, and the set and reset points can be set on a desired segment, thus enabling high limit, low limit, and hysteresis settings.



* Divide the range into 8 segments, and set ON and OFF points.
Hysteresis setting is also available.



Model CG

Capacitance Level Sensor (Phase Detection Principle) Integral Type, CE Marking

Model	CG-2NK	CG-2FK	CG-3NK	CG-3FK
Description	Standard		Pressure Proof	
Mounting	R3/4 (*1)	JIS5K25A FF (*1)	R1 (*1)	JIS5K25A FF (*1)
Cable inlet	G1/2 or equivalent			
Protection class	Welded parts	IP68 or equivalent		
	Housing	IP65 or equivalent		
Length of Electrode	250mm (4000mm Max.)		250mm (2000mm Max., Earth electrode+Insulator:500mm Max.)	
Material	Housing	Cast aluminum (ADC12), acrylic coated		
	Probe	304SS (*2)		
	Insulator	PTFE (*2)		
	O-ring	FKM (*2)		
Sensitivity	Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10kΩ or larger (L=250mm)			
Relay Output	Dry contact, 1SPDT, operation selectable Rating Maximum : 250V, 3A AC (resistive), 30V, 3A DC (resistive) Minimum : 5V, 10mA DC (resistive)			
Detection Time Delay	Programmable between 0.0 to 25.5 seconds			
Power Supply	100 to 240V AC ±10%, 50/60Hz (24V DC in option)			
Power Consumption	Approx. 6VA			
Working Temperature	Process	-20 to 60°C		
	Ambient	-25 to 65°C (no condensation)		
Pressure (static)	1 MPa Max. (*3)		3 MPa Max. (*3)	
Relative humidity	85% RH Max.			

*1: The other mounting is optionally available.

*2: The other material is optionally available. *3: Excluding process connection.

*The specifications of product shall be changed by medium and condition of usage.

*The specifications are subject to change without notice.

Model CG

Capacitance Level Sensor (Phase Detection Principle) Integral Type, CE Marking

Model	CG-4NK	CG-4FK	CG-5FK	CG-6FK
Description	Pressure and Heat Proof		Flat Type	Wire Type
Mounting	R1 (*1)	JIS5K50A FF (*1)	JIS5K65A FF (*1)	JIS5K50A FF (*1)
Cable inlet	G1/2 or equivalent			
Protection class	Welded parts	IP68 or equivalent		
	Housing	IP65 or equivalent		
Length of Electrode	250mm (2000mm Max., Earth electrode+Insulator:500mm Max.)		65mm (1000mm Max.)	1000mm (10000mm Max.)
Material	Housing	Cast aluminum (ADC12), acrylic coated		
	Probe	304SS (*2)		
	Insulator	PTFE (*2)	PE (*2)	
	O-ring	FKM (*2)		
Sensitivity	Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10kΩ or larger (L=250mm)			
Relay Output	Dry contact, 1SPDT, operation selectable Rating Maximum : 250V, 3A AC (resistive), 30V, 3A DC (resistive) Minimum : 5V, 10mA DC (resistive)			
Detection Time Delay	Programmable between 0.0 to 25.5 seconds			
Power Supply	100 to 240V AC ±10%, 50/60Hz (24V DC in option)			
Power Consumption	Approx. 6VA			
Working Temperature	Process	-20 to 180°C		-20 to 60°C
	Ambient	-25 to 65°C (no condensation)		
Pressure (static)	3 MPa Max. (*3)		1 MPa Max.(*3)	500 kPa Max.(*3)
Relative humidity	85% RH Max.			

*1: The other mounting is optionally available.

*2: The other material is optionally available. *3: Excluding process connection.

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Model CG

Capacitance Level Sensor (Phase Detection Principle) Integral Type, CE Marking

Model	CG-8FK	CG-9FK	CG-25FK	
Description	Adhesion Proof	Special Type	High Sensitivity	
Mounting	JIS5K50A FF (*1)			
Cable inlet	G1/2 or equivalent			
Protection class	Welded parts	IP68 or equivalent		
	Housing	IP65 or equivalent		
Length of Electrode	250mm (4000mm Max.)		250mm (2000mm Max.)	
Material	Housing	Cast aluminum (ADC12), acrylic coated		
	Probe	304SS (*2)		
	Insulator	FRP	PTFE (*2)	PE (*2)
	O-ring	FKM (*2)		
Sensitivity	Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10kΩ or larger (L=250mm)			
Relay Output	Dry contact, 1SPDT, operation selectable Rating Maximum : 250V, 3A AC (resistive), 30V, 3A DC (resistive) Minimum : 5V, 10mA DC (resistive)			
Detection Time Delay	Programmable between 0.0 to 25.5 seconds			
Power Supply	100 to 240V AC ±10%, 50/60Hz (24V DC in option)			
Power Consumption	Approx. 6VA			
Working Temperature	Process	-20 to 60°C		
	Ambient	-25 to 65°C (no condensation)		
Pressure (static)	100 kPa Max. (*3)	1 MPa Max. (*3)		
Relative humidity	85% RH Max.			

*1: The other mounting is optionally available.

*2: The other material is optionally available. *3: Excluding process connection.

*The specifications of product shall be changed by medium and condition of usage.

*The specifications are subject to change without notice.

Model CGS, CG65

Capacitance Level Sensor (Phase Detection Principle) Separate Type

Model	Standard	CGS-2N	CGS-2F	CGS-3N	CGS-3F
	Intrinsically Safety	CG65-2N	CG65-2F	CG65-3N	CG65-3F
Description		Standard		Pressure Proof	
Mounting		R3/4 (*1)	JIS5K25A FF (*1)	R1 (*1)	JIS5K25A FF (*1)
Cable inlet		G1/2 or equivalent			
Protection class	Welded parts	IP68 or equivalent			
	Housing	IP65 or equivalent			
Length of Electrode		250mm (4000mm Max.)		250mm (2000mm Max., Earth electrode+Insulator:500mm Max.)	
Material	Housing	Cast aluminum (ADC12), acrylic coated			
	Probe	304SS (*2)			
	Insulator	PTFE (*2)			
	O-ring	FKM (*2)			
Sensitivity		Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10kΩ or larger (L=250mm)			
Detection Time Delay		Programmable between 0.0 to 25.5 seconds			
Working Temperature	Process	-20 to 60°C for standard -20 to 50°C for Intrinsically Safety			
	Ambient	-25 to 65°C (no condensation) for standard -20 to 50°C (no condensation) for Intrinsically Safety			
Pressure (static)		1 MPa Max. (*3)		3 MPa Max. (*3)	
Relative humidity		85% RH Max.			
Connecting Converter		CGS1000 series for standard, CGS6000 series for Intrinsically Safety			

*1: The other mounting is optionally available.

*2: The other material is optionally available. *3: Excluding process connection.

*The specifications of product shall be changed by medium and condition of usage.

*The specifications are subject to change without notice.

Model CGS, CG65

Capacitance Level Sensor (Phase Detection Principle) Separation Type

Model	Standard	CGS-4N	CGS-4F	CGS-5F	CGS-6F
	Intrinsically Safety	CG65-4N	CG65-4F	CG65-5F	CG65-6F
Description		Pressure and Heat Proof		Flat Type	Wire Type
Mounting		R1 (*1)	JIS5K50A FF (*1)	JIS5K65A FF (*1)	JIS5K50A FF (*1)
Cable inlet		G1/2 or equivalent			
Protection class	Welded parts	IP68 or equivalent			
	Housing	IP65 or equivalent			
Length of Electrode		250mm (2000mm Max., Earth electrode+Insulator:500mm Max.)		65mm (1000mm Max.)	1000mm (10000mm Max.)
Material	Housing	Cast aluminum (ADC12), acrylic coated			
	Probe	304SS (*2)			
	Insulator	PTFE (*2)		PE (*2)	
	O-ring	FKM (*2)			
Sensitivity		Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10kΩ or larger (L=250mm)			
Detection Time Delay		Programmable between 0.0 to 25.5 seconds			
Working Temperature	Process	-20 to 180°C for standard		-20 to 60°C for standard	
		-20 to 180°C for Intrinsically Safety		-20 to 50°C for Intrinsically Safety	
Ambient	-25 to 65°C (no condensation) for standard				
	-20 to 50°C (no condensation) for Intrinsically Safety				
Pressure (static)		3 MPa Max.(*3)		1 MPa Max.(*3)	500 kPa Max.(*3)
Relative humidity		85% RH Max.			
Connecting Converter		CGS1000 series for standard, CGS6000 series for Intrinsically Safety			

*1: The other mounting is optionally available.

*2: The other material is optionally available. *3: Excluding process connection.

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*The specifications are subject to change without notice.

Model CGS, CG65

Capacitance Level Sensor (Phase Detection Principle) Separation Type

Model	Standard	CGS-8F	CGS-9F	CGS-25F
	Intrinsically Safety	—	CG65-9F	CG65-25F
Description		Adhesion Proof	Special Type	High Sensitivity
Mounting		JIS5K50A FF (*1)		
Cable inlet		G1/2 or equivalent		
Protection class	Welded parts	IP68 or equivalent		
	Housing	IP65 or equivalent		
Length of Electrode		250mm (4000mm Max.)		250mm (2000mm Max.)
Material	Housing	Cast aluminum (ADC12), acrylic coated		
	Probe	304SS (*2)		
	Insulator	FRP	PTFE (*2)	PE (*2)
	O-ring	FKM (*2)		
Sensitivity		Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10kΩ or larger (L=250mm)		
Detection Time Delay		Programmable between 0.0 to 25.5 seconds		
Working Temperature	Process	-20 to 60°C for standard -20 to 50°C for Intrinsically Safety		
	Ambient	-25 to 65°C (no condensation) for standard -20 to 50°C (no condensation) for Intrinsically Safety		
Pressure (static)		100 kPa Max.(*3)	1 MPa Max.(*3)	
Relative humidity		85% RH Max.		
Connecting Converter		CGS1000 series for standard, CGS6000 series for Intrinsically Safety		

*1: The other mounting is optionally available.

*2: The other material is optionally available. *3: Excluding process connection.

*The specifications of product shall be changed by medium and condition of usage.

*The specifications are subject to change without notice.

Model CGS, CG65

Capacitance Level Sensor (Phase Detection Principle) Separation Type

Model	Standard	CGS1000	CGS1010	CGS1100	CGS1110	
	Intrinsically Safety	CGS6000	CGS6010	CGS6100	CGS6110	
Description		Wall Mount		Rack Mount		
Material		AC		SECC (acrylic coated)		
Protection		IP54 or equivalent		IP20 or equivalent		
Cable inlet		3 × G1/2 or equivalent		2 × ϕ 15 holes		
Mounting		2 × ϕ 7 holes		2 × ϕ 4.5 holes		
Relay Output		Dry contact, 1SPDT, operation selectable Rating Maximum : 250V, 3A AC (resistive), 30V, 3A DC (resistive) Minimum : 5V, 10mA DC (resistive)				
Operating Temperature		-10 to 60°C (no condensation)				
Power Supply		100-240V AC \pm 10%, 50/60Hz	24V DC	100-240V AC \pm 10%, 50/60Hz	24V DC	
Power Consumption		Approx. 6VA				
Connecting Sensor		CGS series for standard, CG65 series for Intrinsically Safety				

*The safety barrier must be connected between sensor and amplifier for Intrinsically Safety.

*Z787 (PEPPERL + FUCHS) is recommended for CGS6000 and CGS6010.

*CGS6200 and CGS6210 are safety barrier (Z787) built-in type.

*The specifications are subject to change without notice.

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