

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

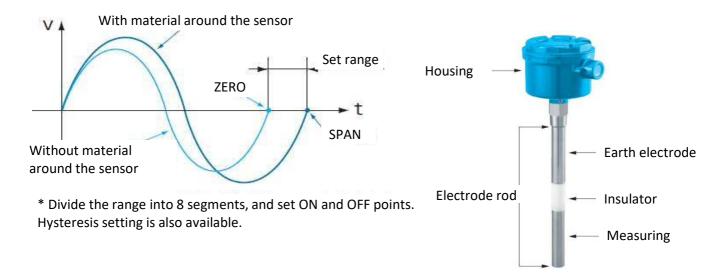
The oscillator circuit is of the parallel resonance circuit with L (coil) and C (capacitance between the electrodes comprising the rod).

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

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

With material covering the rod, the capacitance increases (C+ Δ C), and the frequency (f2) will be: f2 = 1/2 π $\sqrt{L(C+\Delta C)}$, where C+ Δ C 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.



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

Model		CG-2NK	CG-2FK	CG-3NK	CG-3FK	
		\$114 (76) Hex.29 (60) R 3/4	\$ 114 (76) (271) (4×\$12 Holes \$ 21.7	# 114 (76) Hex. 41 # 12 # 12 # 12 # 12	6114 (76) (75)	
Description		Standard			re Proof	
Mounting		R3/4 (*1)	JIS5K25A FF (*1)	R1 (*1)	JIS5K25A FF (*1)	
Cable inlet		G1/2 or equivalent				
Protection	Welted parts	I I				
class	Housing	IP65 or equivalent				
Length of Electrode		250mm (4000mm Max.) 250mm (2000mm Earth electrode+Insulator		· ·		
	Housing	Cast aluminum (ADC12), acrylic coated				
 Material	Probe	304SS (*2)				
liviateriai	Insulator	PTFE (*2)				
	O-ring	FKM (*2)				
			Dielectric cons	tant 1.2 Min.,		
Sensitivity		Capacitance between electrode 1.0pF Min. ,				
		with resistance between electrode 10k Ω or larger (L=250mm)				
		Dry contact, 1SPDT, operation selectable				
Relay Outpu	ut	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	Process	-20 to 60°C				
Temperature	Ambient	-25 to 65°C (no condensation)				
Pressure (static)		1 MPa Max. (*3) 3 MPa Max. (*3)				
Relative hu	•	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.

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

Model		CG-4NK	CG-4FK	CG-5FK	CG-6FK	
		# 114 (76) # 130 # 12 02 # 12 02	# 130 (76) # 130	\$ 114 (76) (86) (86) (87) (86) (87) (86) (87) (86) (87) (86) (87) (86) (87) (86) (87) (86) (87)	\$114 (76) (100) (105	
Description			d Heat Proof	Flat Type	Wire Type	
Mounting		R1 (*1)	JIS5K50A FF (*1)	JIS5K65A FF (*1)	JIS5K50A FF (*1)	
Cable inlet	l.,, ,, , ,	G1/2 or equivalent				
Protection	Welted parts	IP68 or equivalent				
class Housing		IP65 or equivalent			1000	
Length of Electrode		Earth electrode+insulator:500mm Max.)		65mm (1000mm Max.)	1000mm (10000mm Max.)	
	Housing	Cast aluminum (ADC12), acrylic coated				
 Material	Probe	304SS (*2)				
	Insulator	PTFE	PTFE (*2)		(*2)	
	O-ring	FKM (*2)				
Sensitivity		Dielectric constant 1.2 Min. , Capacitance between electrode 1.0pF Min. , with resistance between electrode 10k Ω or larger (L=250mm)				
		Dry contact, 1SPDT, operation selectable				
Relay Output		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	Process	-20 to 180°C -20 to 60°C		60°C		
Temperature	Ambient	-25 to 65°C (no condensation)				
Pressure (static)		3 MPa N	1ax. (*3)		500 kPa Max.(*3)	
Relative hu	•	85% RH Max.				

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

Model		CG-8FK	CG-8FK CG-9FK CG-25F				
		# 114 (76) 4 × 15 Holes # 130 # 35	\$114 (76) (76) (86) (86) (86) (71) (86) (87) (86) (87) (87) (87) (87) (87) (87) (87) (87	\$114 (76) (66) (4x\$15 Holes \$130 05			
Description		Adhesion Proof	Special Type	High Sensitivity			
Mounting			JIS5K50A FF (*1)				
Cable inlet		G1/2 or equivalent					
Protection	Welted parts	IP68 or equivalent					
class	Housing		IP65 or equivalent				
Length of Electrode		250mm (400	250mm (2000mm Max.)				
	Housing	Cast aluminum (ADC12), acrylic coated					
Material	Probe	304SS (*2)					
liviateriai	Insulator	FRP	PTFE (*2) PE (*2)				
	O-ring		FKM (*2)				
1 -		Dielectric constant 1.2 Min. ,					
Sensitivity		Capacitance between electrode 1.0pF Min. ,					
		with resistance between electrode 10k Ω or larger (L=250mm)					
		Dry contact, 1SPDT, operation selectable					
Relay Outpu	ut	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	Process	-20 to 60°C					
Temperature	Ambient -25 to 65°C (no condensation)			on)			
Pressure (static)		100 kPa Max. (*3) 1 MPa Max. (*3)					
Relative humidity		85% RH Max.					

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Model CGS, CG65 Capacitance Level Sensor (Phase Detection Principle) Separate Type

Standard	CGS-2N	CGS-2F	CGS-3N	CGS-3F	
ntrinsically Safety	CG65-2N	CG65-2F	CG65-3N	CG65-3F	
	# 114 (76) Hex. 29 R 3/4 # 21.7	\$ 114 (76) (76) (4×\$12 Holes (975) (995) (995) (4×20) (900)	#Ex. 41 ### ### ### ### ### ### ### ### #### ####	4112 4X \$12 Holes 975 995 \$21.7	
n		Standard		re Proof	
	R3/4 (*1)	· · · · ·	• • • • • • • • • • • • • • • • • • • •	JIS5K25A FF (*1)	
	G1/2 or equivalent				
	IP68 or equivalent				
Housing	IP65 or equivalent				
Electrode	250mm (4000mm Max.) 250mm (2000mm Max., Earth electrode+Insulator:500mm Max.)				
Housing	Cast aluminum (ADC12), acrylic coated				
Probe	304SS (*2)				
Insulator	PTFE (*2)				
O-ring	FKM (*2)				
	Dielectric constant 1.2 Min. ,				
′	Capacitance between electrode 1.0pF Min.,				
	with resistance between electrode 10k Ω or larger (L=250mm)				
Time Delay	Programmable between 0.0 to 25.5 seconds				
Process	-20 to 60°C for standard				
FIOCESS	-20 to 50°C for Intrinsically Safety				
e Amahiant	-25 to 65°C(no condensation)for standard				
Ambient	-20 to 50°C (no condensation) for Intrinsically Safety				
(static)	1 MPa Max. (*3) 3 MPa Max. (*3)				
umidity	85% RH Max.				
g Converter	CGS1000 series for standard, CGS6000 series for Intrinsically Safety				
	t Welted parts Housing Probe Insulator O-ring Process Ambient (static) umidity	ntrinsically Safety CG65-2N Stand R3/4 (*1) t Welted parts Housing Electrode Probe Insulator O-ring Cap with resistand Time Delay Process Ambient (static) Umidity CG65-2N CG65-2N Stand R3/4 (*1) Cap with resistand Cap With resista	Time Delay Process Process Process Ambient Time Delay Process Proces	Intrinsically Safety CG65-2N CG65-2F CG65-3N CG65-2F CG65-3N CG65-3N CG65-3N CG65-2F CG65-2F CG65-3N CG65-2F CG65-2F	

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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	
		\$11.6 (76) \$13.0 (80) \$13.0	6130 6130 6130 6130 6130 6130 6130 6130 6130 6130	(76) (76) (77) (66) (77) (66) (77) (77)	\$114 (776) (777) (100) (100) (130) (
Description			d 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		IP68 or equivalent				
class	Housing	IP65 or eq		· · · · · · · · · · · · · · · · · · ·		
Length of Electrode		` 165mm (1000mm Max)I			1000mm (10000mm Max.)	
	Housing	Cast aluminum (ADC12), acrylic coated				
Material	Probe	304SS (*2)				
iviateriai	Insulator	PTFE (*2)		PE ((*2)	
	O-ring	FKM (*2)				
		Dielectric constant 1.2 Min. ,				
Sensitivity	/	Capacitance between electrode 1.0pF Min. ,				
		with resistance between electrode 10k Ω or larger (L=250mm)				
Detection Time Delay		Programmable between (en 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				
	re Ambient	-25 to 65°C (no condensation) for standard				
	AIIIDICIIL	-20 to 50°C (no condensation) for Intrinsically Safety				
Pressure (static)		3 MPa Max.(*3) 1 MPa Max.(*3) 500 kPa Max.(*3)				
TTC33UTC	(
Relative h	· · · · · · · · · · · · · · · · · · ·		85% R	H Max.		

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Capacitance Level Sensor (Phase Detection Principle) Separation Type

Model Standard Intrinsically Safety		CGS-8F	CGS-9F	CGS-25F		
		— CG65-9F		CG65-25F		
		# 114 (76) # 105 # 130 # 130 # 20 # 20 # 20	# (76) #	(76) (76) (76) (77) (77) (77) (77) (77)		
Description		Adhesion Proof	Special Type	High Sensitivity		
Mounting		JIS5K50A FF (*1)				
Cable inlet		G1/2 or equivalent				
Protection	<u> </u>	IP68 or equivalent				
class	Housing		IP65 or equivalent	250		
Length of Electrode		250mm (4000mm Max.) 250mm				
Housing		Cast aluminum (ADC12), acrylic coated				
	Probe	304SS (*2)				
Material	Insulator	FRP	PTFE (*2)	PE (*2)		
	O-ring	110	FKM (*2)	1 2 (2)		
	10 18	Dielectric constant 1.2 Min. ,				
Sensitivity	,	Capacitance between electrode 1.0pF Min. ,				
		with resistance between electrode 10k Ω or larger (L=250mm)				
Detection	Time Delay	Programmable between 0.0 to 25.5 seconds				
		-20 to 60°C for standard				
Working Temperature	Process	-20 to 50°C for Intrinsically Safety				
	re	-25 to 65°C (no condensation) for standard				
	Ambient	-20 to 50°C (no condensation) for Intrinsically Safety				
Pressure (static)		100 kPa Max.(*3) 1 MPa Max.(*3)				
Relative humidity		85% RH Max.				
	ng Converter	CGS1000 series for standard, CGS6000 series for Intrinsically Safety				
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Model CGS, CG65 Capacitance Level Sensor (Phase Detection Principle) Separation Type

Model Standard	CGS1000	CGS1010	CGS1100	CGS1110		
Intrinsically Sa	ofety CGS6000	CGS6010	CGS6100	CGS6110		
	104 712 2×*	2330	83	20 20 20 20 20 20 20 20 20 20 20 20 20 2		
	(£8) 90 90		w ⊗ ⊗ (2×≠15			
Description	Wall f	Wall Mount		Mount		
Material	Δ	AC		rlic coated)		
Protection	IP54 or e	IP54 or equivalent		quivalent		
Cable inlet	3 × G1/2 o	3 × G1/2 or equivalent		$2 \times \phi$ 15 holes		
Mounting	2 × φ	$2 \times \phi$ 7 holes		$2 \times \phi$ 4.5 holes		
	Dr	Dry contact, 1SPDT, operation selectable				
Relay Output	Rating Maximum	Rating Maximum: 250V, 3A AC (resistive), 30V, 3A DC (resistive)				
	Minimum	Minimum : 5V, 10mA DC (resistive)				
Operating Temperat	ure	-10 to 60°C (no condensation)				
Power Supply	100-240V AC ±10%, 50/60Hz	100-240V AC ±10%, 50/60Hz 24V DC 100-240V AC ±10%, 50/60Hz 24V DC		24V DC		
Power Consumption	ı	Approx. 6VA				
Connecting Sensor	CGS series	CGS series for standard, CG65 series for Intrinsically Safety				

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

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

^{*}CGS6200 and CGS6210 are safety barrier (Z787) buit-in type.

^{*}The specifications are subject to change without notice.