

# CG Series

## Capacitance Level Sensor (Phase Detection Principle)

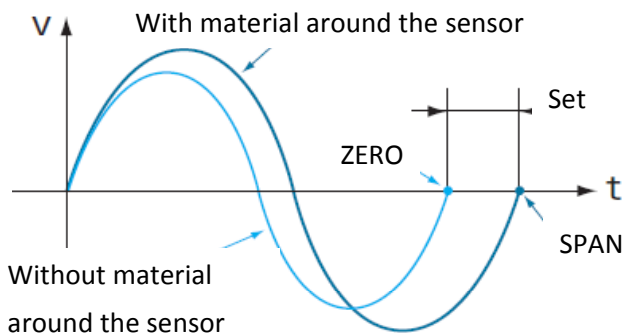
### Products Overview



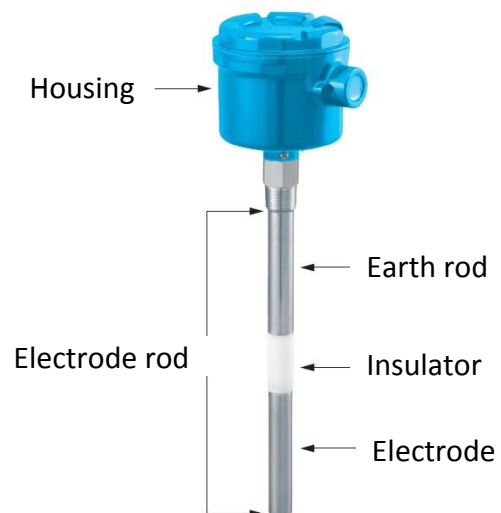
We, NOHKEN INC., have plenty of experience with capacitance level sensor for more than 30 years, and we consolidate all experience into CG series. CG series employ phase detection principle which the changing of resonance frequency is processed by microprocessor (digital circuit) and the changes in capacitance value is detected by changes in frequency value.

### Principle of Operation

The basic oscillator circuit is of the parallel resonance circuit with L (coil) and C (capacitance between the electrodes). The oscillation frequency (f) of this circuit is:  $f = 1/2 \pi \sqrt{LC}$ . The frequency without material around the sensor (f1) is:  $f_1 = 1/2 \pi \sqrt{LC}$ , where C is the capacitance without material around the sensor (zero point). With material around the sensor, the capacitance increases (C+ΔC), and the frequency (f2) is:  $f_2 = 1/2 \pi \sqrt{L(C+\Delta C)}$ , where C+ΔC is the capacitance with material around the sensor (span point). The sensor detects the frequency change from f1 to f2, and gives a relay output. The frequency range can be divided into 8 segments (between zero and span), and the set and reset points can be set on desired segments, 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
Dimensions				
Description	Standard		Pressure Proof	
Mounting	R3/4 (*1)	JIS5K25A FF (*1)	R1 (*1)	JIS5K25A FF (*1)
Cable Entry	G1/2 Equivalent			
Protection	Electrode	IP68		
	Housing	IP65		
Length of Electrode	250mm (4000mm Max.)		250mm (1000mm Max.)	
Material	Housing	ADC12 (Acrylic painting)		
	Electrode	304SS (*2)		
	Insulator	PTFE (*2)		
	O-ring	FPM/FKM (*2)		
Sensitivity	Dielectric constant 1.2 Min. Capacitance between electrode 1.0pF Min. (But resistance between electrode 10kΩ Min. at L=250mm)			
Relay Output	1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-NO: Normally open contact C-NC: Normally close contact			
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			
Operating Temperature	Electrode	-20 to 60°C (without dew)		
	Housing	-25 to 65°C (without dew)		
Operating Pressure	1 MPa Max.		3 MPa Max.	
Operating Humidity	85% RH Max.			

\*1: The other mounting is optionally available.

\*2: The other material is optionally available.

\*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
Dimensions				
Description	Pressure and Heat Proof		Flat Type	Wire Type
Mounting	R1 (*1)	JIS5K50A FF (*1)	JIS5K65A FF (*1)	JIS5K50A FF (*1)
Cable Entry	G1/2 Equivalent			
Protection	Electrode	IP68		
	Housing	IP65		
Length of Electrode	250mm (1000mm Max.)		65mm (1000mm Max.)	100mm (1000mm Max.)
Material	Housing	ADC12 (Acrylic painting)		
	Electrode	304SS (*2)		
	Insulator	PTFE (*2)	PE (*2)	
	O-ring	FPM/FKM (*2)		
Sensitivity	Dielectric constant 1.2 Min. Capacitance between electrode 1.0pF Min. (But resistance between electrode 10kΩ Min. at L=250mm)			
Relay Output	1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-NO: Normally open contact C-NC: Normally close contact			
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			
Operating Temperature	Electrode	-20 to 180°C (without dew)		-20 to 60°C (without dew)
	Housing	-25 to 65°C (without dew)		
Operating Pressure	3 MPa Max.		1 MPa Max.	500 kPa Max.
Operating Humidity	85% RH Max.			

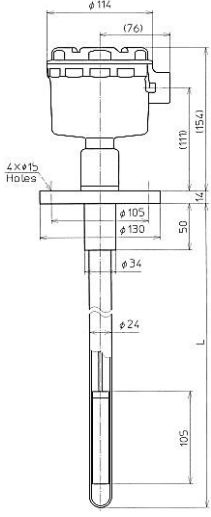
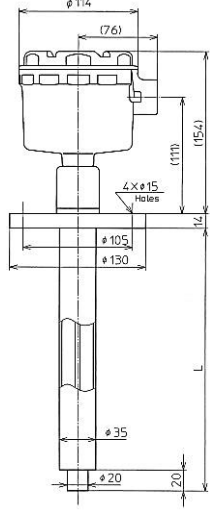
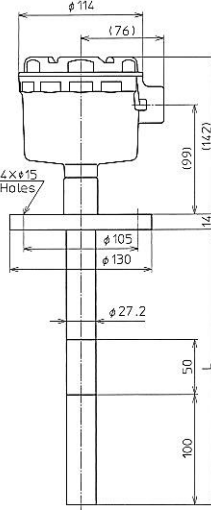
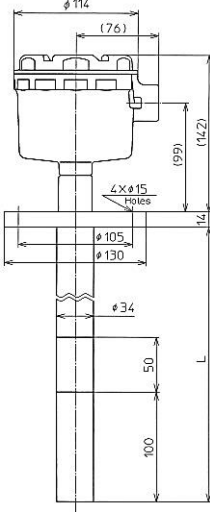
\*1: The other mounting is optionally available.

\*2: The other material is optionally available.

\*The specifications are subject to change without notice.

# Model CG

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

Model	CG-7FK	CG-8FK	CG-9FK	CG-25FK	
Dimensions					
Description	Pipe Type	Adhesion Proof	Special Type	High Sensitivity	
Mounting	JIS5K50A FF (*1)				
Cable Entry	G1/2 Equivalent				
Protection	Electrode	IP68			
	Housing	IP65			
Length of Electrode	250mm (2000mm Max.)	250mm (4000mm Max.)		250mm (2000mm Max.)	
Material	Housing	ADC12 (Acrylic painting)			
	Electrode	C3604BD	304SS (*2)		
	Insulator	FEP (Pipe)	FRP	PTFE (*2)	PE (*2)
	O-ring	FPM/FKM (*2)			
Sensitivity	Dielectric constant 1.2 Min. Capacitance between electrode 1.0pF Min. (But resistance between electrode 10kΩ Min. at L=250mm)				
Relay Output	1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-NO: Normally open contact C-NC: Normally close contact				
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				
Operating Temperature	Electrode	-20 to 60°C (without dew)			
	Housing	-25 to 65°C (without dew)			
Operating Pressure	100 kPa Max.	1 MPa Max.			
Operating Humidity	85% RH Max.				

\*1: The other mounting is optionally available.

\*2: The other material is optionally available.

\*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 Safe	CG65-2N	CG65-2F	CG65-3N	CG65-3F
Dimensions					
Description		Standard		Pressure Proof	
Mounting		R3/4 (*1)	JIS5K25A FF (*1)	R1 (*1)	JIS5K25A FF (*1)
Cable Entry		G1/2 Equivalent			
Protection	Electrode	IP68			
	Housing	IP65			
Length of Electrode		250mm (4000mm Max.)		250mm (1000mm Max.)	
Material	Housing	ADC12 (Acrylic painting)			
	Electrode	304SS (*2)			
	Insulator	PTFE (*2)			
	O-ring	FPM/FKM (*2)			
Sensitivity		Dielectric constant 1.2 Min. Capacitance between electrode 1.0pF Min. (But resistance between electrode 10kΩ Min. at L=250mm)			
Detection Time Delay		Programmable between 0.0 to 25.5 seconds			
Operating Temperature	Electrode	-20 to 60°C (without dew) for standard			
		-20 to 50°C (without dew) for Intrinsically Safe			
Operating Temperature	Housing	-25 to 65°C (without dew) for standard			
		-20 to 50°C (without dew) for Intrinsically Safe			
Operating Pressure		1 MPa Max.		3 MPa Max.	
Operating Humidity		85% RH Max.			
Connecting Converter		CGS1000 series for standard, CGS6000 series for Intrinsically Safe			

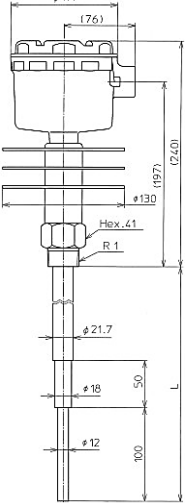
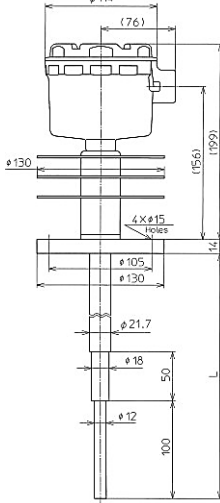
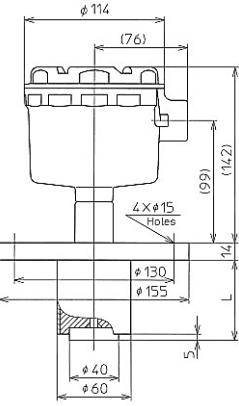
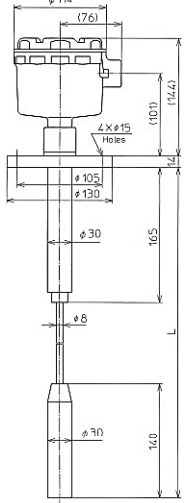
\*1: The other mounting is optionally available.

\*2: The other material is optionally available.

\*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 Safe	CG65-4N	CG65-4F	CG65-5F	CG65-6F
Dimensions					
Description		Pressure and Heat Proof		Flat Type	Wire Type
Mounting		R1 (*1)	JIS5K50A FF (*1)	JIS5K65A FF (*1)	JIS5K50A FF (*1)
Cable Entry		G1/2 Equivalent			
Protection	Electrode	IP68			
	Housing	IP65			
Length of Electrode		250mm (1000mm Max.)		65mm (1000mm Max.)	100mm (1000mm Max.)
Material	Housing	ADC12 (Acrylic painting)			
	Electrode	304SS (*2)			
	Insulator	PTFE (*2)		PE (*2)	
	O-ring	FPM/FKM (*2)			
Sensitivity		Dielectric constant 1.2 Min. Capacitance between electrode 1.0pF Min. (But resistance between electrode 10kΩ Min. at L=250mm)			
Detection Time Delay		Programmable between 0.0 to 25.5 seconds			
Operating Temperature	Electrode	-20 to 180°C (without dew) for standard		-20 to 60°C (without dew) for standard	
		-20 to 180°C (without dew) for Intrinsically Safe		-20 to 50°C (without dew) for Intrinsically Safe	
	Housing	-25 to 65°C (without dew) for standard			
		-20 to 50°C (without dew) for Intrinsically Safe			
Operating Pressure		3 MPa Max.		1 MPa Max.	500 kPa Max.
Operating Humidity		85% RH Max.			
Connecting Converter		CGS1000 series for standard, CGS6000 series for Intrinsically Safe			

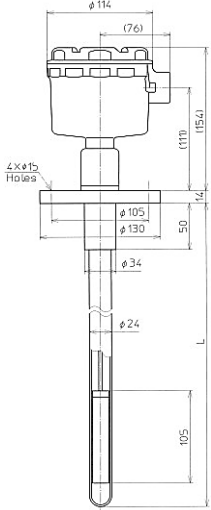
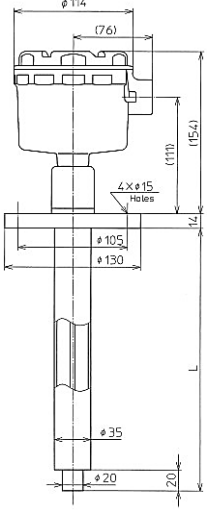
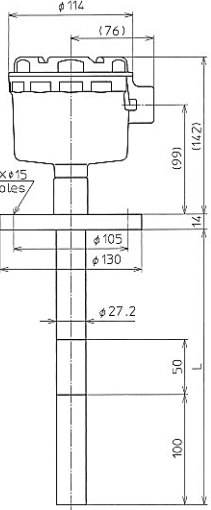
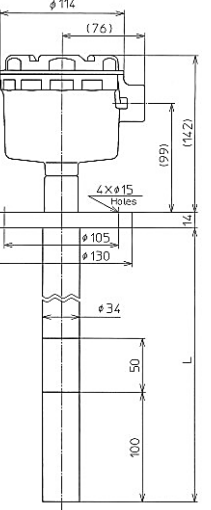
\*1: The other mounting is optionally available.

\*2: The other material is optionally available.

\*The specifications are subject to change without notice.

# Model CGS, CG65

## Capacitance Level Sensor (Phase Detection Principle) Separation Type

Model	Standard	CGS-7F	CGS-8F	CGS-9F	CGS-25F
	Intrinsically Safe	CG65-7F	CG65-8F	CG65-9F	CG65-25F
Dimensions					
Description		Pipe Type	Adhesion Proof	Special Type	High Sensitivity
Mounting	JIS5K50A FF (*1)				
Cable Entry	G1/2 Equivalent				
Protection	Electrode	IP68			
	Housing	IP65			
Length of Electrode	250mm (2000mm Max.)	250mm (4000mm Max.)		250mm (2000mm Max.)	
Material	Housing	ADC12 (Acrylic painting)			
	Electrode	C3604BD	304SS (*2)		
	Insulator	FEP (Pipe)	FRP	PTFE (*2)	PE (*2)
	O-ring	FPM/FKM (*2)			
Sensitivity	Dielectric constant 1.2 Min. Capacitance between electrode 1.0pF Min. (But resistance between electrode 10kΩ Min. at L=250mm)				
Detection Time Delay	Programmable between 0.0 to 25.5 seconds				
Operating Temperature	Electrode	-20 to 60°C (without dew) for standard			
		-20 to 50°C (without dew) for Intrinsically Safe			
Operating Temperature	Housing	-25 to 65°C (without dew) for standard			
		-20 to 50°C (without dew) for Intrinsically Safe			
Operating Pressure	100 kPa Max.	1 MPa Max.			
Operating Humidity	85% RH Max.				
Connecting Converter	CGS1000 series for standard, CGS6000 series for Intrinsically Safe				

\*1: The other mounting is optionally available.

\*2: The other material is optionally available.

\*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 Safe	CGS6000	CGS6010	CGS6200	CGS6210	
Dimensions						
Description	Wall Mount			Rack Mount		
Material	AC			SPCC (Acrylic painting)		
Protection	IP54			IP20		
Cable Entry	3 × G1/2			2 × φ 15 holes		
Mounting	2 × φ 7 holes			2 × φ 4.5 holes		
Relay Output	1 SPDT, 250V 3A AC, 30V 3A DC (Resistive) C-NO: Normally open contact C-NC: Normally close contact					
Operating Temperature	-20 to 60°C (without dew)					
Power Supply	100-240V AC ±10%, 50/60Hz	24V DC	100-240V AC ±10%, 50/60Hz	24V DC		
Power Consumption	Approx. 6VA					
Connecting Sensor	CGS series for standard, CG65 series for Intrinsically Safe					

\*The safety barrier must be connected between sensor and amplifier for intrinsically safe.

\*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.