

# NIVOCAP CK

RF-CAPACITANCE LEVEL SWITCHES  
FOR SOLIDS & LIQUIDS



NIVELCO

LEVEL SWITCHES

The **NIVOCAP CK** capacitance level switches operate as capacitance meters in the RF (radio-frequency) range providing excellent immunity to deposits. **NIVOCAP CK-100** is an outstanding choice for viscous, sticky substances where the rival vibrating or the other contact measurement technologies are not suited. The mechanical construction consists of a stainless steel probe and a reference probe between two insulation layers. The microcontroller based electronics of the **NIVOCAP CK** evaluates continuously the voltage level proportional to the capacitance difference between the two probes and the housing. This way it provides more stabile measurement compared to the analog capacitance switches. The units are available only with painted aluminum housing, because one of the measurement reference points is the housing itself. The guard ring – an insulated section of the probe – makes the disregarding of material deposits possible, thus preventing false switching. The maximum probe length of the **NIVOCAP CK** series is 3 m (9.85 ft) for probes with extension cable or rod available up to 10 m (33 ft) in length. The high-temperature and the Dust-Ex approved models are suitable for harsh environments so they are ideal choice for power generation applications. In the case of liquids, only the lower, metallic part of the protruding probe allowed to be in contact with the medium!

FEATURES

- Intelligent electronic level switch
- Immune to material deposits
- Easy calibration
- Selectable sensitivity
- Fail-safe operating mode
- Extension rod or cable
- Calibration with external magnet
- High-temperature version
- Dust-Ex variants available
- 5 years warranty

APPLICATIONS

- For viscous, sticky materials
- For solids with  $\epsilon_r \geq 1.5$  relative dielectric constant and liquids
- Pharmaceutical and food industry
- Powerplant processes

CERTIFICATES

- ATEX (Ex ta/tb D)
- IEC Ex (Ex ta/tb D)

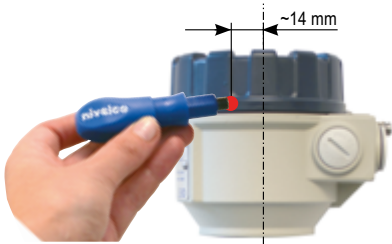
OPERATION, SET-UP

During operation, the electronics evaluates the capacitance difference of the connected measurement probe continuously. As long as the measured medium does not touch the probe, the measured capacitance is constant in reference to the housing. However, when the medium reaches the probe, the initial capacitance value starts to increase. The device picks up the change in the capacitance compared to a reference value recorded during the calibration procedure. For this reason, an empty-tank calibration must be performed after installing the instrument so that the unit can learn the default capacitance of the setup, and the learned value will be the reference capacitance value. The unit can be calibrated with an external magnet without removing the housing cover since the housing cover may not be removed in Dust-Ex environments when the unit is energized, but the unit needs power to be calibrated. The sensitivity of the unit can be selected with a push-button in 4 ranges and fine-tuned with a potentiometer within the selected range.

CALIBRATION

The instrument must be calibrated after it is installed. The purpose of the calibration process is that the electronics learns the capacitance values belonging to the particular levels and use the data as reference values. Calibration starts with pressing the CAL button or touching the marked point on the housing with the magnetic calibration tool for 5 seconds. If the unit is installed in a hazardous (Dust Ex) environment, the housing cover cannot be removed as long as the unit is powered, and the device can be calibrated with the magnet without removing the housing cover. The supplied permanent magnetic screw allows calibration through the aluminum housing. In this case, the status LED will blink blue during the calibration.

All the other settings (sensitivity range, sensitivity fine-tuning, delay, fail-safe operating mode, and turning magnetic calibration on) must be carried out outside the hazardous environment (e. g., in a control room) before mounting the instrument. Calibration can be performed multiple times.



SENSITIVITY SETTINGS

Sensitivity (range)	Capacitance value	$\epsilon_r$	Typical measured medium
1	18 pF	> 7.0	Wastewater, slurries, and water-based solutions
2	8.3 pF	4.0...7.0	Grains, fertilizers, feed
3	2.6 pF	2.0...4.0	Sand, rubber, oils, coal
4	0.5 pF	1.5...2.0	Plastics, fly ash, cement

TECHNICAL DATA

	Standard version	With extension rod	With extension cable
Probe lenght	300...600 mm (1.3...2 ft)	0.7...3 m (2.3...10 ft)	1...10 m (3.3...33 ft)
Material of wetted parts	1.4571 / 316Ti stainless steel + PPS insulation		Probe: 1.4571 / 316Ti stainless steel + PPS Insulation; Cable: PE-coated
Process connection	¾", 1", 1½" BSP / NPT threaded connection; as per order code		
Output	See output data table		
Ambient temperature	-30...+65 °C (-22...+149 °F)		
Process temperature (for solids)	-30...+110 °C (-22...+230 °F)		-25...+80 °C (-13...+176 °F)
Process temperature [High-temperature version] (for solids)	-30...+235 °C (-22...+455 °F)		-
Process temperature (for liquids)	0...+65 °C (32...+149 °F)		
Process pressure	16 bar (232 psi)		
Response time (selectable)	0.15...15 s		
Sensitivity	Coarse settings: available with push button out of 4 ranges; 4 indication LED Fine adjustment: with potentiometer within the selected range		
Fail-safe mode	Low, high (selectable with DIP-switch)		
Calibration	With push button or external magnet		
Status display	Status LED, Calibration LED		
ε <sub>r</sub>	Min. 1.5		
Supply voltage	20...255 V AC / 20...50 V DC		
Power consumption	≤ 2.5 VA / 2 W		
Housing material	Painted aluminum		
Electrical connection	2× M20×1.5 plastic cable glands, for Ø 6...12 mm (Ø.236"...Ø.472") cable + 2× internally threaded ½" NPT connection for protective pipes; 2× terminal blocks for 0.5...1.5 mm <sup>2</sup> (AWG20...15) wire cross section		
Electrical protection	Class I		
Ingress protection	IP67		
Weight	2 kg (4.4 lb)	2 kg + 1.4 kg/m (4.4 lb + 1 lb/ft)	2 kg + 0.6 kg/m (4.4 lb + 0.4 lb/ft)

OUTPUT DATA

	Relay	Electronic
Output type	SPDT	SPST
Output rating	250 V AC, 8 A, AC1	250 V AC; 50 V DC; 1 A
Output protection	-	Overvoltage, overcurrent and overload

Ex INFORMATION

Protection		Dust Ex						
Ex marking	ATEX	Ⓔ II 1/2D Ex ta/tb IIIC T85°C...T220°C Da/Db						
	IEC Ex	Ex ta IIIC T85°C...T220°C Da/Db						
Electrical connection		2× M20×1.5 metal cable glands for Ø8...Ø13 mm (Ø.315... Ø.5") cable						
Thermal properties	With extension cable			Standard, or with extension rod				
	Standard version						High-temperature version	
Process temperature min.: -30 °C (-22 °F); Max:	+60 °C (+140 °F)	+70 °C (+158 °F)	+80 °C (+176 °F)	+60 °C (+140 °F)	+70 °C (+158 °F)	+95 °C (+203 °F)	+110 °C (+230 °F)	+220 °C (+428 °F)
Ambient temperature min.: -30 °C (-22 °F); Max:	+65 °C (+149 °F)	+60 °C (+140 °F)		+65 °C (+149 °F)	+60 °C (+140 °F)		+50 °C (+140 °F)	+35 °C (+95 °F)
Highest permissible surface temperature of the process connection	+80 °C (+176 °F)		+90 °C (+194 °F)	+80 °C (+176 °F)		+90 °C (+194 °F)	+95 °C (+203 °F)	+195 °C (+383 °F)
Temperature classes		T85 °C		T95 °C		T110 °C		T220 °C

## OPERATION

Compact and mini compact version						
Power supply	Switching		Fail-Safe switch	Status LED	Output	
					Relay	Electronic
ON	High level		High 	Blinking 	 Energized	 ON
			High 	ON 	 De-energized	 OFF
	Low level		Low 	ON 	 Energized	 ON
			Low 	Blinking 	 De-energized	 OFF
	-	Enter into calibration	High / Low	ON 		
	-	Calibration under progress		Blinking 		
OFF	-	-			 De-energized	 OFF

## ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

### NIVOCAP CK – RF-capacitance level switches

NIVOCAP C ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ <sup>(1)</sup>											
Type	Code	Probe / Process connection		Code	Code	Probe lenght		Code	Output / Ex	Code	
Standard	K	Standard <sup>(2)</sup>	¾" BSP	D	0	0 m	0 m	0	SPDT, relay output; 250 V AC, 8 A	1	
Hight temperature	M		¾" NPT	G	1	1 m	0.1 m	1	Electronic output	3	
			1" BSP	M	2	2 m	0.2 m	2	SPDT relay output / Ex ta/tb D	5	
			1" NPT	P	3	3 m	0.3 m	3	Electronic output / Ex ta/tb D	7	
			1½" BSP	H	4	4 m	0.4 m	4			
			1½" NPT	N	5	5 m	0.5 m	5			
Housing	Code	Rod extended <sup>(3)</sup>	¾" BSP <sup>(4)</sup>	E	6	6 m	0.6 m	6			
			¾" NPT <sup>(4)</sup>	F	7	7 m	0.7 m	7			
			1" BSP	V	8	8 m	0.8 m	8			
			1" NPT	Z	9	9 m	0.9 m	9			
			1½" BSP	R	A	10 m					
			1½" NPT	L							
		Cable extended <sup>(5)</sup>	1½" BSP	K							
			1½" NPT	C							

Painted aluminum 1

<sup>(1)</sup> The order code of an Ex version should end in "Ex"

<sup>(2)</sup> Probe lenght: 0.3...0.6 m (1.3...2 ft)

<sup>(3)</sup> Probe lenght: 0.7...3 m (2.3...10 ft)

<sup>(4)</sup> Up to 1.5 m (4.9 ft)

<sup>(5)</sup> Probe lenght: 1...10 m (3.3...33 ft)