

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 stable measurement compared to the analog capacitance switches. The units are available only with powder-coated 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 meter for probes with extension cable or rod available up to 10 meter 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

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

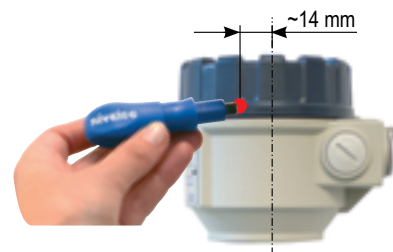
The instrument must be calibrated after it is installed. The purpose of the calibration process is that the electronics learns the capacitance values belonging to the particular levels and use the data as reference values.

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	ϵ_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 length	300...600 mm	0.7...3 m	1...10 m
Material of wetted parts	1.4571 / 316Ti stainless steel + PPS insulation		Probe: 1.4571 / 316Ti stainless steel + PPS Insulation; Cable: PE coating
Process connection	¾", 1", 1½" BSP / NPT threaded connection; as per order code		
Output	See output data table		
Ambient temperature	-30...+65 °C		
Medium temperature (for solids)	-30...+110 °C		-25 ...+80 °C
Medium temperature [High-temperature version] (for solids)	-30...+235 °C		-
Medium temperature (for liquids)	0... +65 °C		
Process pressure	16 bar (1.6 MPa)		
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 _r	Minimum 1.5		
Power supply	20...255 V AC / 20...50 V DC		
Power consumption	≤ 2.5 VA / 2 W		
Housing material	Powder-coated aluminum		
Electrical connection	2× M20×1.5 plastic cable glands, for 6...12 mm cable + Two internally threaded ½" NPT connection for protective pipes; 2× terminal blocks for 0.5...1.5 mm ² wire cross section		
Electrical protection	Class I		
Ingress protection	IP67		
Weight	2 kg	2 kg + 1.4 kg /m	2 kg + 0.6 kg/m

OUTPUT DATA

	Type	Relay	Electronic
Output type		SPDT	SPST
Output rating		250 V AC, 8 A, AC1	250 V AC, 50 V DC
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 ⁽¹⁾	Ex ta IIIC T85°C...T220°C Da/Db						
Electrical connection		2× M20×1.5 metal cable glands for Ø8...Ø13 mm cable						
Thermal properties	With extension cable			Standard, or with extension rod				High-temperature version
	Standard version							
Medium temperature min.: -30 °C; Max:	+60 °C	+70 °C	+80 °C	+60 °C	+70 °C	+95 °C	+110 °C	+220 °C
Ambient temperature min.: -30 °C; Max:	+65 °C	+60 °C	+60 °C	+65 °C	+60 °C	+60 °C	+50 °C	+35 °C
Highest permissible surface temperature of the process connection	+80 °C	+80 °C	+90 °C	+80 °C		+90 °C	+95 °C	+195 °C
Temperature classes	T85°C		T95°C	T85°C		T95°C	T110°C	T220°C

⁽¹⁾ IEC Ex compliance is optional; must be requested in the order.

NIVOCAP CK-100 with standard probe

5 years

High-frequency (RF) capacitance level switch for powders and granular solids, and for liquids
 Standard probe length: 300...600 mm

Version

C - 1 -

- K** Standard version
- M** High temperature version

Probe version / Process connection

C - 1 -

- D** Standard / 3/4" BSP
- G** Standard / 3/4" NPT
- M** Standard / 1" BSP
- P** Standard / 1" NPT
- H** Standard / 1 1/2" BSP
- N** Standard / 1 1/2" NPT

Housing

C - -

- 1** Aluminium (powder-coated)

Probe length

C - 1 -

- n n** Standard version 0.3...0.6 m

nn = 03...06 : 0.3...0.6 m

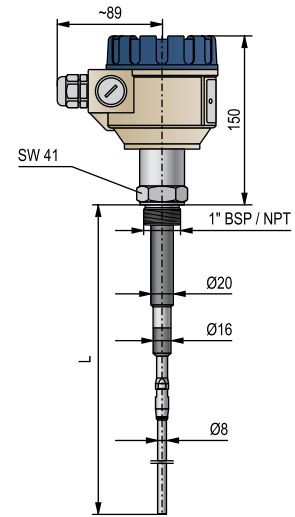
Output / Certificates

C - 1 -

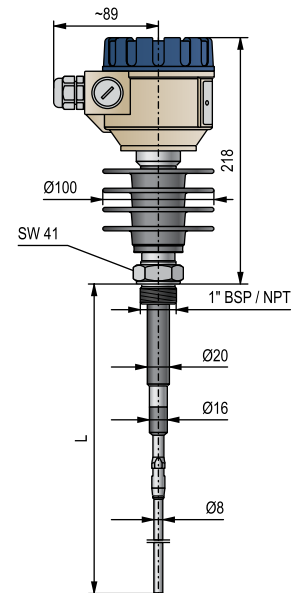
- 1** SPDT, relay; 250 V AC, 8 A
- 3** Solid-state output
- 5** SPDT, relay; 250 V AC, 8 A / Ex ta/tb D
- 7** SPST, solid-state output / Ex ta/tb D

Available on request (must be specified in the text of the order)

- X32** 2" TriClamp (ISO 2852) process connection



CKM / CKP-103 / 106



CMM / CMP-103 / 106

LEVEL SWITCHES

NIVOCAP CK-100 with extension rod

5 years

High-frequency (RF) capacitance level switch for powders and granular solids, and for liquids with stainless steel extension rod up to 3 m

Version

C - 1 -

K Standard version

M High temperature version

Probe version / Process connection

C - 1 -

E With extension rod / 3/4" BSP (max. 1.5 m)

F With extension rod / 3/4" NPT (max. 1.5 m)

V With extension rod / 1" BSP

Z With extension rod / 1" NPT

R With extension rod / 1 1/2" BSP

L With extension rod / 1 1/2" NPT

Housing

C - -

1 Aluminium (powder-coated)

Probe length

C - 1 -

0 7 0.7 m

n n 0.8...3 m probe with extension rod; sold by the 0.1 m

nn = 08...30 : 0.8...3 m

Output / Certificates

C - 1 -

1 SPDT, relay; 250 V AC, 8 A

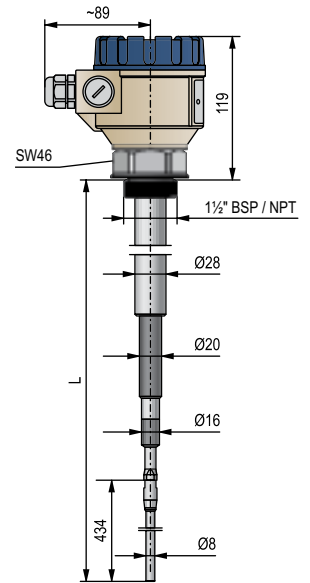
3 Solid-state output

5 SPDT, relay; 250 V AC, 8 A / Ex ta/tb D

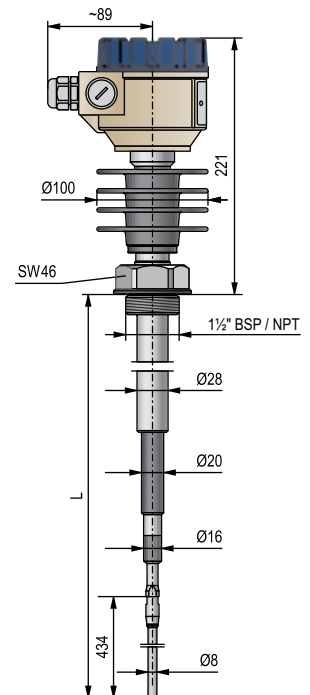
7 SPST, solid-state output / Ex ta/tb D

Available on request (must be specified in the text of the order)

X32 2" TriClamp (ISO 2852) process connection



CKR / CKL-107 / 130



CMR / CML-107 / 130

NIVOCAP CK-100 extension cable version

5 years

High-frequency (RF) capacitance level switch for powders and granular solids, and for liquids with PE-coated stainless steel extension cable up to 10 m

Version

C - 1 -

K Standard version

Probe version / Process connection

C **K** - 1 -

K With extension cable / 1½" BSP

C With extension cable / 1½" NPT

Housing

C **K** - -

1 Aluminium (powder-coated)

Probe length

C **K** - 1 -

n n 1...10 m probe with extension cable; sold by the 0.5 m

nn = 10...A0 : 1...10 m

Output / Certificates

C **K** - 1 -

1 SPDT, relay; 250 V AC, 8 A

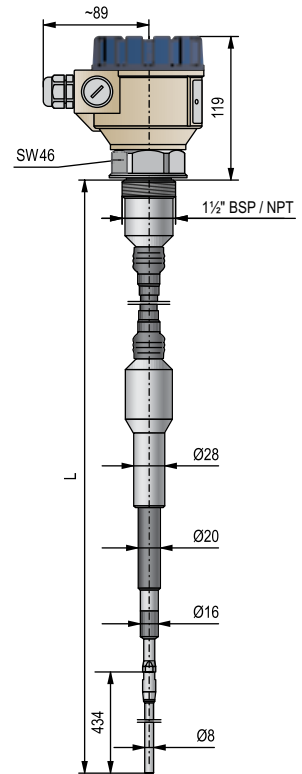
3 Solid-state output

5 SPDT, relay; 250 V AC, 8 A / Ex ta/tb D

7 SPST, solid-state output / Ex ta/tb D

Available on request (must be specified in the text of the order)

X32 2" TriClamp (ISO 2852) process connection



CKK / CKC-110 / 1A0

LEVEL SWITCHES