FOR BULK SOLIDS AND LIQUIDS

NIVOCAP CK

RF-CAPACITANCE LEVEL SWITCHES

3 YEARS WARRANTY @ NIVELCO – WHERE ELSE?

NIVELCO

LEVEL SWITCHES

NIVOCAP RF-CAPACITANCE LEVEL SWITCHES

MAIN FEATURES

- *Intelligent electronic level switch*
- *Built-up immunity*
- *Easy calibration*
- *Selectable sensitivity*
- *Fail-safe operation mode*
- *Rod or cable extended versions*
- *Calibration with external magnet*
- *High temperature version*
- *Dust-Ex models*

APPLICATIONS

- *For adhering, sticky materials*
- *For solids with εr ≥ 1.5 relative dielectric constant and liquids*
- *Pharmaceutical and food industry*
- *Power generation processes*

GENERAL DESCRIPTION

The **NIVOCAP CK-100** series new generation capacitance level switches unlike the traditional capacitive principle they operate as capacitance meters in the RF (radio-frequency) range. The most advantageous feature of this technique is that the instrument has great build-up immunity, therefore the **NIVOCAP CK-100** is an **excellent choice for those adhering, sticky substances** where the rival vibrating or the other contacting measurement technologies are not applicable.

The mechanical construction consists of a stainless steel probe and a reference probe between two insulations. The intelligent 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 analogue capacitance switches. The units are available only with paint coated aluminium housing, because one reference point of the measurement is the housing itself. An insulated section of the probe called the guard-ring allows that the material build-ups on the probe can be ignored preventing false switching.

The maximal probe length of the **NIVOCAP CK** series is 3 meter (10 feet) in case of the rod extended types and the cable extended versions can be ordered up to 10 meter (33 feet) probe length. The high temperature and the Dust-Ex approved models are suitable for using in harsh environments so they can be ideal choice for power generation applications.

OPERATION, SET-UP

During the operation the electronics evaluates continuously the capacitance difference of the connected measurement probe. Until the probe is material-free, so the measured medium doesn't reach the probe, the capacitance of the measuring and the reference probe is constant compared to the housing. When the medium reaches the probe the initial capacitance value will increase.

The intelligent electronic of the device measures this capacitance change compared to a reference value recorded by the user with the calibration procedure. For this reason after installing the instrument an empty tank calibration should be performed in which the unit "learns" the basic capacitance of its environment and then this value will be considered as the initial reference capacitance value.

The units can be calibrated by an external magnet without removing the housing cover since in Dust-Ex environment the housing cover is not allowed to remove when the unit is energized, but the unit needs to be energized for performing the calibration. The sensitivity of the unit can be selected by a push button from 4 ranges and further fine tuning can be done with a potentiometer within the selected range.

SENSITIVITY SETTINGS

Sensitivity (range)	Capacitance value	Relative dielectric constant (εr)	Typical measured medium
1 ● ○ ○ ○	18 pF	> 7.0	wastewater, slurries, any 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

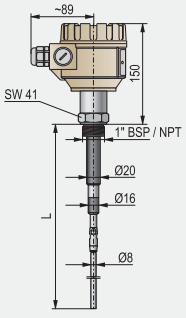
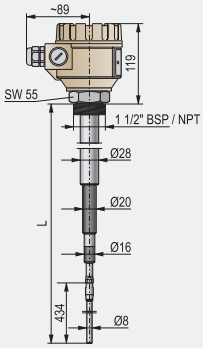
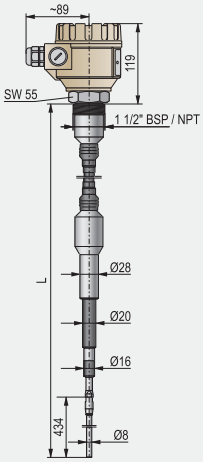
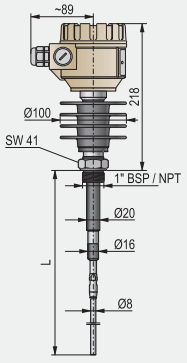
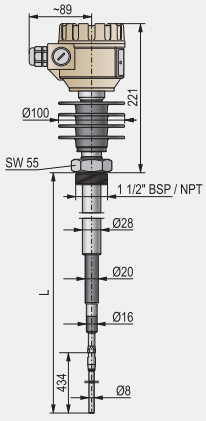
TECHNICAL DATA

Type	Standard	Rod extended	Cable extended
Probe length	400 ... 600 mm (1.3 ... 2 feet)	700 mm ... 3 m (2.3 ...10 feet)	1 ... 10 m (3.3 ... 33 feet)
Material of wetted parts	DIN 1.4571 / 316Ti stainless steel + PPS insulation		Probe: DIN 1.4571 / 316Ti stainless steel + PPS Insulation; Cable: PE coating
Process connection	¾", 1", 1 ½" BSP / NPT threaded connection; as per order codes		
Output	see output data table		
Ambient temperature	-30 °C ... +65 °C (-22 °F ... + 149 °F)		
Medium temperature	Standard: -30 °C ... +110 °C (-22 °F ... 230 °F), High temperature type: -30 °C ... +235 °C (-22 °F ... 455 °F)		-25 °C ... +90 °C (-13 °F ... + 194 °F)
Process pressure	Max. 3 bar g (0.3 MPa / 43.5 psi g)		
Response time (selectable)	0.15 - 15 sec		
Sensitivity	Coarse settings: Selectable 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	Min. 1.5		
Power supply	20 – 255 V AC/DC		
Power consumption	≤ 2.5 VA / 2 W		
Housing material	Paint coated aluminium		
Electrical connection	2 x M20x1.5 plastic cable glands, for 6...12 mm (0.25...0.5 inch) cable + 2 x NPT ½ " internal thread for cable protective pipe 2 pcs. terminal blocks for 0.5...1.5 mm² (AWG 20 ... AWG 15) wire cross section		
Electrical protection	Class I.		
Ingress protection	IP67		
Mass	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

Type	Relay	Electronic
Output type	SPDT	SPST
Output rating	250 V AC, 8A, AC1	250 V, AC/DC, 2A
Output protection	–	Overvoltage, overcurrent and overload

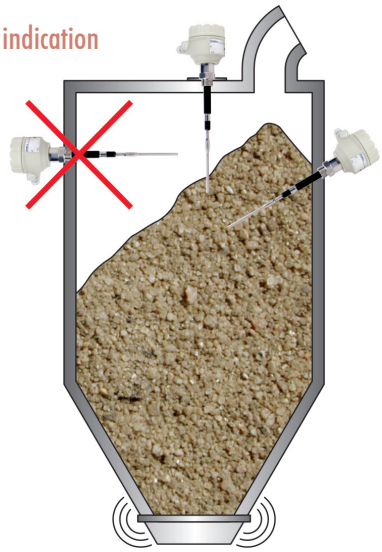
DIMENSIONS

Standard type			High temperature type	
Standard probe	Rod extended	Cable extended	Standard probe	Rod extended
				

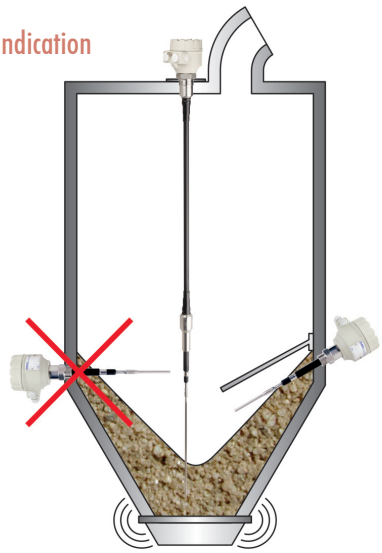
INSTALLATION

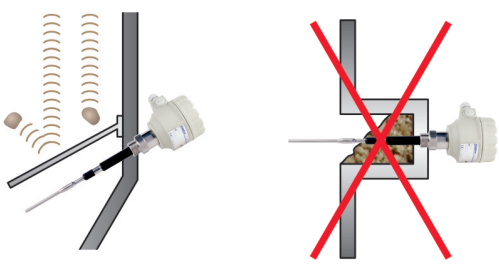
The probe should be protected against strong material inflow by appropriate selection of the mounting position or by using an overhead protective shield. When the capacitance level switch is mounted on the side of the tank, coning or arching of the material should be taken into consideration. In dusty mediums the inclination of the side mounted probe should be greater than the angle of repose, to prevent too big amount of powder deposition on the probe that might cause false switching. Also avoid mounting the unit near to the filling entry or near to medium accumulation. In case of tanks that are likely to be exposed to intense vibrations the electronic output versions should be applied!

High level indication



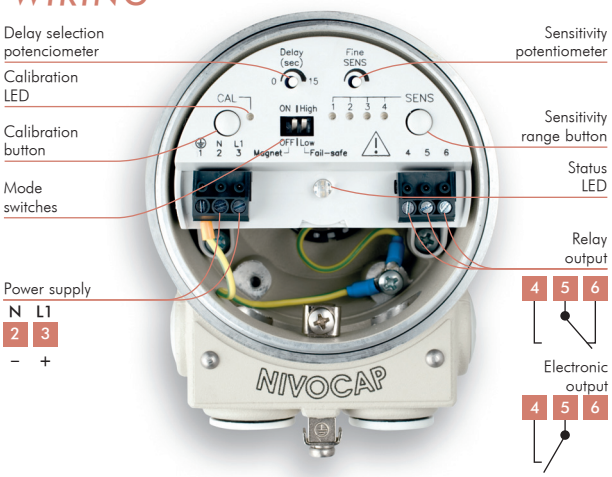
Low level indication





Recommended Not recommended

WIRING



MODE SWITCHES

Magnet	
ON	Calibration with external magnet is enabled
OFF	Calibration with external magnet is disabled

Fail-Safe		
High	High fail-safe	Fail-safe alarm is indicated with de-energised relay or ON state of the electronic output.
Low	Low fail-safe	

CALIBRATION

The instrument should be calibrated after the installation. The calibration procedure contribute that after the installation the capacitance change occurring in the tank will be learned by the electronics and considered as initial reference capacitance value. The calibration starts by pressing the CAL button or contacting the external magnet to the marked point on the housing for 5 seconds.

If the unit is installed in hazardous (Dust Ex) environment where the housing cover is not allowed to remove when the unit is energized, the calibration can be done without removing the housing cover by a magnet. The supplied permanent magnetic screw allows performing the calibration procedure through the aluminium housing. This case the status LED will blink blue during the calibration. All the other configuration settings (Sensitivity range selection, Sensitivity fine adjustment, Delay adjustment, Fail-safe operation mode selection and switching the Magnetic Calibration switch to ON state) should be carried out outside the hazardous environment (e.g. in the control room) before mounting the instrument.

The calibration can be performed multiple times.

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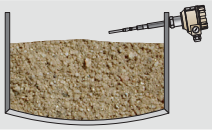
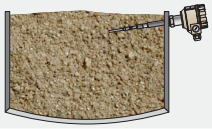
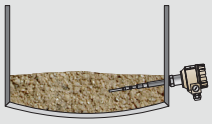
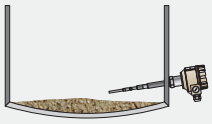
OPERATION

Power supply	Switching		Fail-Safe switch	Status LED	Output	
					Relay	Electronic
ON	High level		High	Blinking	Energised	ON
			High	ON	De- energised	OFF
	Low level		Low	ON	Energised	ON
			Low	Blinking	De- energised	OFF
	–	Enter into calibration	High or Low	ON		
	–	Calibration under progress		Blinking		
OFF	–	–			De- energised	OFF

ORDER CODES (NOT ALL COMBINATIONS AVAILABLE)

NIVOCAP RF-capacitance level switches

NIVOCAP C■■– 1 ■■–■ (1)

Type	Code
Standard	K
High temperature	M

Process connection		Code
Standard	¾" BSP	D(2)
	¾" NPT	G(2)
	1" BSP	M
	1" NPT	P
	1 ½" BSP	H
	1 ½" NPT	N
Rod extended	¾" BSP	E(2)
	¾" NPT	F(2)
	1" BSP	V
	1" NPT	Z
	1 ½" BSP	R
	1 ½" NPT	L
Cable ext.	1 ½" BSP	K(3)
	1 ½" NPT	C(3)

Code	Probe length		Code
0	0 m	0 m	0
1	1 m	0.1 m	1
2	2 m	0.2 m	2
3	3 m	0.3 m	3
4	4 m	0.4 m	4
5	5 m	0.5 m	5
6	6 m	0.6 m	6
7	7 m	0.7 m	7
8	8 m	0.8 m	8
9	9 m	0.9 m	9
A	10 m		

Power supply / Output / Ex	Code
20-255 V AC/DC / relay	1
20-255 V AC/DC / electronic	3
20-255 V AC/DC / relay / Ex tD	5(4)
20-255 V AC/DC / electronic / Ex tD	7(4)

(1) The order code of an Ex version should end in "Ex"
(2) The maximal probe length is 1.5 m in case of ¾" connection
(3) High temperature version in not available
(4) Under approval

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