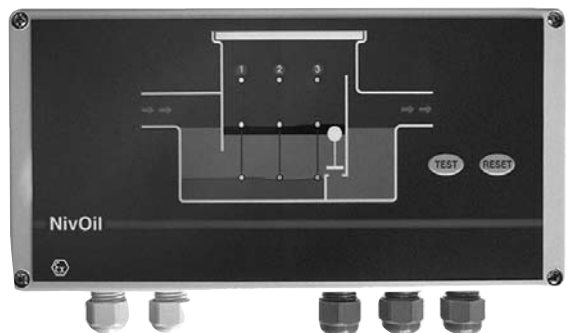


## Instructions manual



# NivOil<sup>®</sup> / 12 V DC

*Alarm system  
for oil-water separators*



# BAMO MESURES

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# Safety Precautions

*Fitting, wiring, initial start-up and maintenance operations must be done by trained technicians.*

*All European and local rules for electrical instruments must be respected.*

*The device may only be connected to intrinsically safe measuring circuits which comply with the specifications included in the technical data and on the serial plate.*

*The device must be disconnected from all sources of power during installation and maintenance work.*

*The device may only be operated under the conditions specified in the operating instructions.*

*Respect all recommendations, for installation and mounting of Ex devices, from standards EN60079-14 and EN60079 CENELEC.*

*The device should not be modified or completed with anything.*

*All cables to connect the sensor must be out of any place where electrostatic risk exists.*

**Important: It is necessary to follow the specific technical information corresponding to the mounting, fitting and starting up of the devices.**

## 1 DESCRIPTION

Designed for the monitoring of hydrocarbon fluids separators, the alarm device **NivOil** may be connected to 1, 2, or 3 sensors.

**Hydrocarbon fluid layer thickness sensor** to detect when the maximum thickness is reached.

**Overfill sensor** to detect when the fluids are on the highest level; this can occur in case of dysfunction of a filter, when a float-valve closes to prevent an overfilling, when the level of fluid is too high.

**Sludge layer sensor** to alarm when maintenance is necessary.

Detection of sludge maximal level, as soon as the sludge reaches the sensor, the alarm is switched ON.

**The 3 sensors may be connected to any input of the alarm device NivOil**

Any combination of the sensors can be wired. The instrument recognizes automatically the sensor type. A LED indicates the sensor type on the diagram on the front board. When an input is not wired, the LED is off. The alarm unit NivOil has a built-in buzzer; it is possible to disable its function by a DIP switch configuration. The alarm unit NivOil CU/12 works with a 10 to 27 V DC power supply has a low energy consumption. It is de-signed for the use of a solar powered battery or any standard electric battery (*consumption is 0.1 W – 12 V DC – with 3 sensors connected with one complete control cycle per hour*). The sleep mode allows optimal energy consumption. It is adjustable by modifying the frequency of control cycle (*from 6 minutes up to 9 days*). A continuous control mode could be switched on when there is no limit on consumption. All the components are ATEX certified. The sensors are for a location in zone 0 and the alarm unit corresponds to a zone 2.

## 2 SENSORS MOUNTING

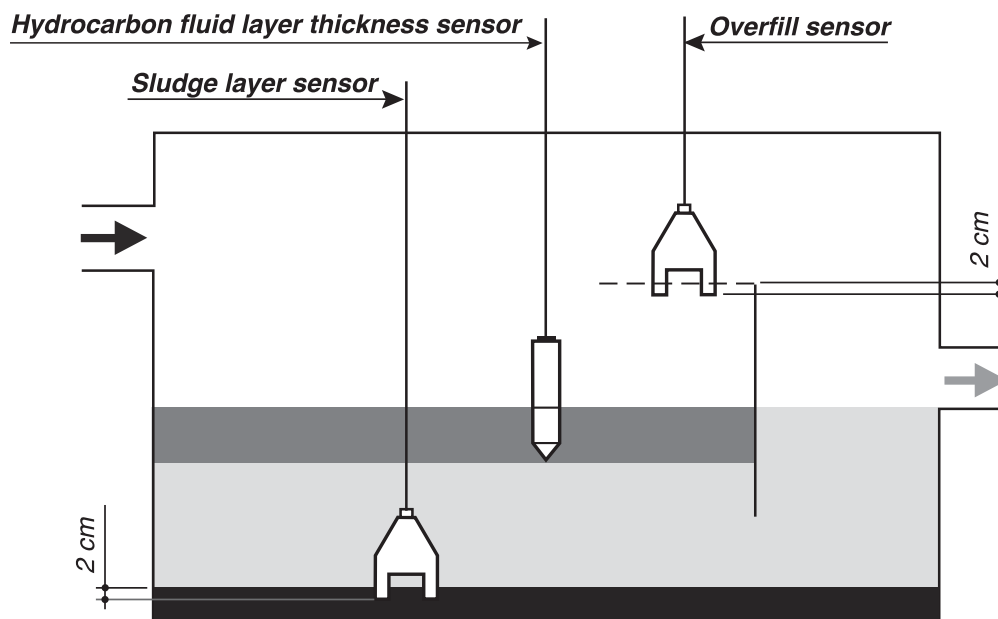
The alarm device NivOil must be mounted out of the Ex area. Cables from safe area and Ex area must pass through pressure glands or wall-ducts IP67 protection according to the standard EN 60529.

**Hydrocarbon fluid layer thickness sensor:** Fit the sensor such as the sensor tip corresponds to the bottom of the greater layer thickness to detect. The graduated stem (5, 10 and 15 cm marks) makes the adjustment easier.

**Overfilling sensor:** Fit the sensor such as the ends of U probe are 2 cm under the alarming level.

**Sludge layer sensor:** Fit the sensor such as the ends of U probe are 2 cm under the alarming level.

**Caution:** The sensor may be not subject to move due to turbulences. Do not knock the probe during mounting and maintenance operation.

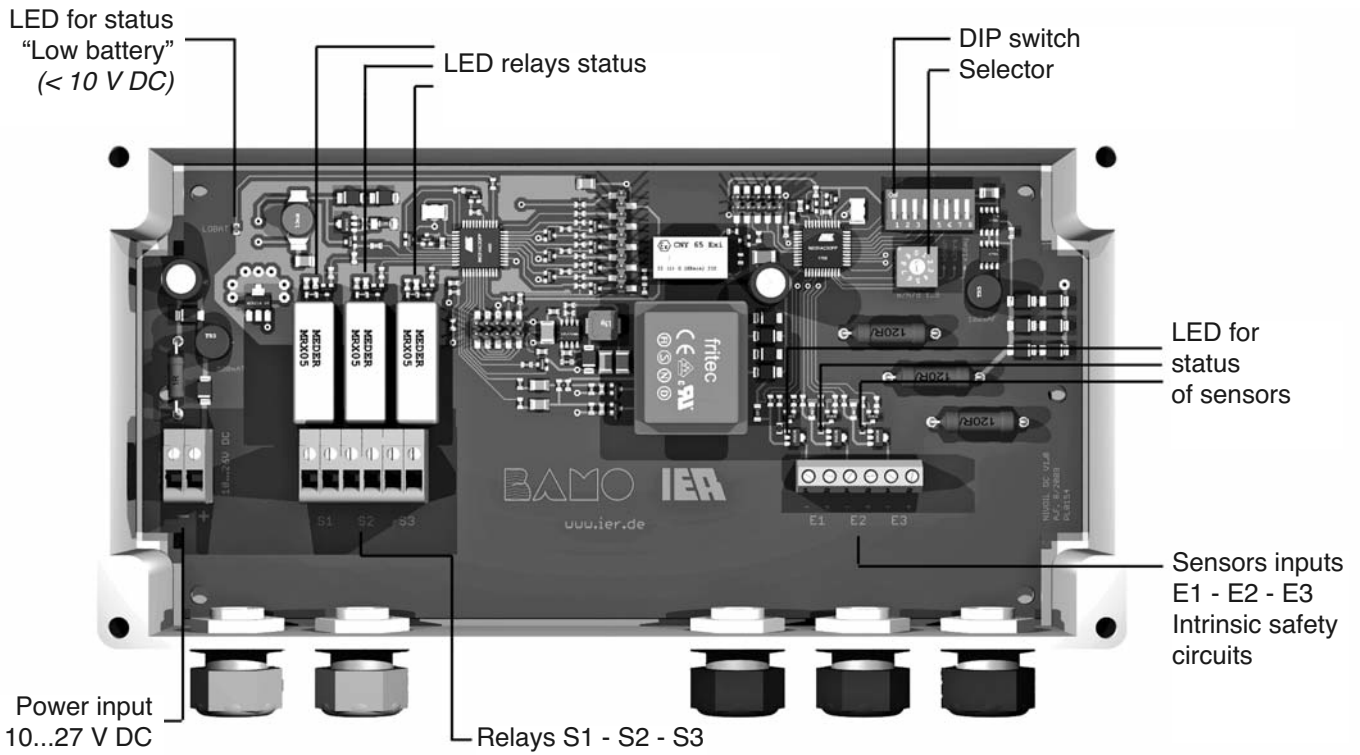


## 3 CONFIGURATION AND ELECTRICAL CONNECTIONS

1°) Open the cabinet and **carefully disconnect the ribbon cable.**



Conform to the standard rules concening Ex area.  
**Electrical circuit with intrinsic safety components may not be connected to the ground.**



**Do not connect yet the main power**

### DIP switch setting

	Function ON	Function OFF
<b>DIP 1</b>	Audible alarm available	Audible alarm disabled
<b>DIP 2</b>	Audible alarm repeats each 24 h	Audible alarm repeat function disabled
<i>DIP 3 DIP 4</i>	<i>Do not modify the setting of DIP 3 &amp; 4, they must be in OFF position all the time</i>	
<b>DIP 5</b>	Relays are NC (when the unit is powered)	Relays are NO (when the unit is powered)
<b>DIP 6 *)</b>	Monitoring frequency: each 6 to 54 min	*)
<b>DIP 7 *)</b>	Monitoring frequency: each 3 to 37 h	*)
<b>DIP 8 *)</b>	Monitoring frequency: each 1 to 9 days	*)

Factory setting: DIP 6, 7 and 8 are in the position OFF

### Selector setting ((Duration of a monitoring cycle + sleep mode period)

	0	1	2	3	4	5	6	7	8	9
<b>DIP 6 = ON</b>	Continuous monitoring	6 min	12 min	18 min	24 min	30 min	36 min	42 min	48 min	54 min
<b>DIP 7 = ON</b>	Continuous monitoring	3 h	6 h	9 h	12 h	15 h	18 h	21 h	24 h	27 h
<b>DIP 8 = ON</b>	Continuous monitoring	1 day	2 days	3 days	4 days	5 days	6 days	7 days	8 days	9 days

**Factory setting:** in position 0 for a continuous monitoring



**\*):** When a DIP switch configuration is wrong, the alarm unit will survey continuously

(Example: none of the DIP switch 6, 7 and 8 is in ON position; or, two of them are in ON position).

## Monitoring modes: continuous monitoring, cyclic monitoring

The energy consumption is adjustable by modifying the duration of each monitoring cycle through the settings of the DIP switch and the selector. The monitoring frequency is adjustable from **6 minutes to 9 days**. Between 2 monitoring, the alarm unit is in sleep mode (*monitoring function in stand by*).

When there is not a specific sleep mode period (*selector on "0" and DIP 6, 7 and 8 are in ON position*), the alarm unit is continuously monitoring.

When the cyclic monitoring mode is set up, each monitoring cycle begins with a self-diagnostic of sensors and detection loops in order to begin an alarm routine if necessary.

With 3 sensors connected to the alarm unit, a survey monitoring is completed in about 90 seconds. The progress of each cycle is shown through a blinking LED (*each 4 seconds approx.*) on the front panel.

During the sleep mode period, by pressing the TEST button (1 second approx.) it is possible to begin directly a monitoring sequence:

- At this moment, the alarm unit begins its self-diagnostic
- In case of an alarm condition detected, it begins an alarm routine.
- After 90 seconds, the system goes back to the previous cyclic mode.

**2°) Preparing the cables:** Remove the external sheath as on the picture A and fit on a cable terminal ends

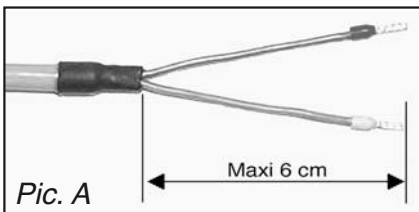
### Cable extension

The maximal length of an extension is 300 m.

Use the specific cable reference SK-PVC-2x1, ATEX certified.

The easier way to extend the cable accordingly with **ATEX** rules, is to use the **CET02** cable coupling (*Pic.B*), reference NivOil-JT, suitable to ATEX zone **0** category **1**.

The device is delivered with **2 WAGO connectors** (*Pic. C*) for fast coupling.



Cable cross section: 4 mm<sup>2</sup> as a maximum

**Protection: IP 65** (*not for a continuous immersion*)

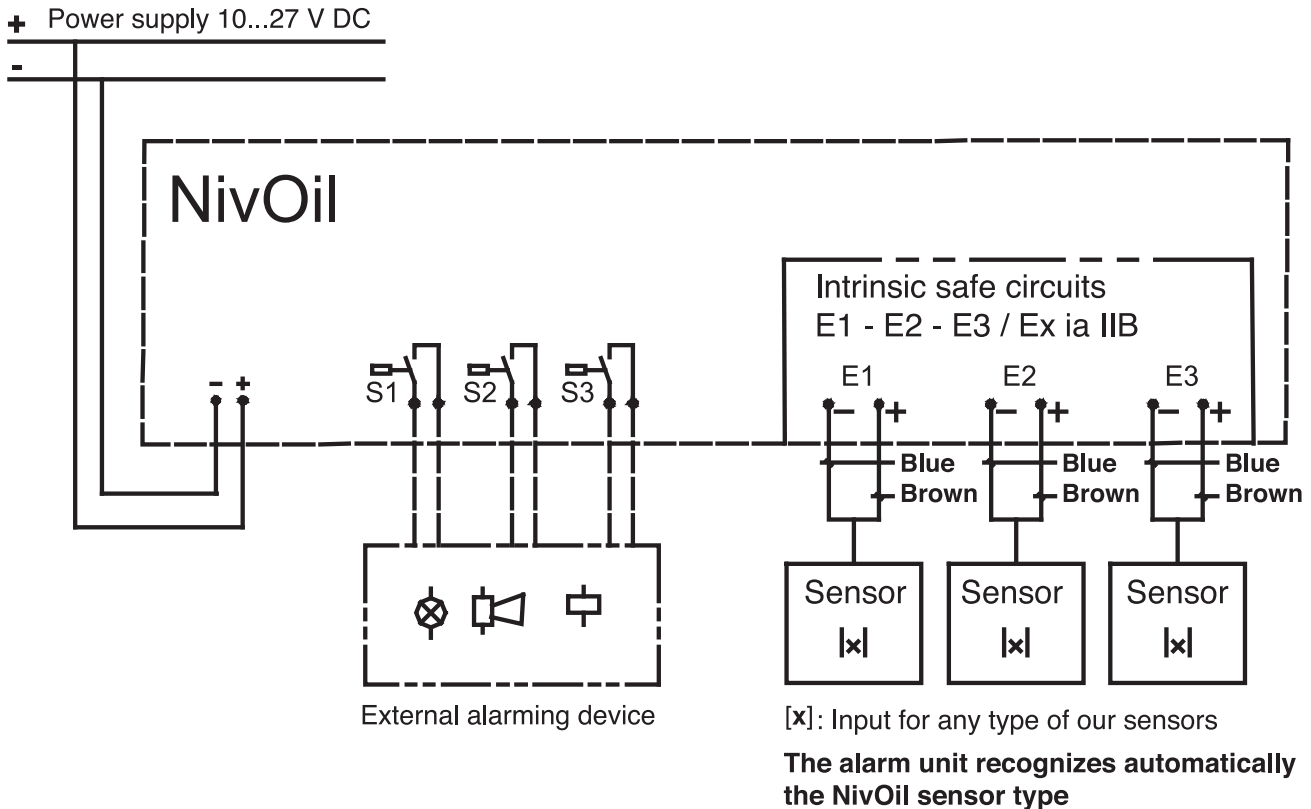
The shield must not be connected.

Both ends must be pressed to the limit and pressure cable glands well tightened.

**3°) Connect the sensors to the control unit NivOil in accordance with the obligations due to Ex area, as shown on the drawing.**

**The measuring loop, as an intrinsic safe circuit, must not be connected to the ground.**

Connect the control unit to the main power line.



**4°) Connect back**  
the ribbon cable and close  
the cabinet



## 4 START-UP – TESTS

As soon as the alarm unit is powered, it begins a test of its alarming devices (*LED and buzzer*).

- **Test of all sensors connection** (*short circuit and broken cable of measuring loops*).
- **Detection of sensor type**, if the result is positive, the corresponding LED will light on. In case of a defect detected, the 3 LED, corresponding to this input, will be flashing. For a non connected channel, the 3 LED keep OFF.

**During the first start-up, the alarm device NivOil memorizes the type of sensor connected to each channel.**

- When the TEST mode is activated, an audible signal occurs if everything is correct.  
**The factory settings are:** "without sensors"
- When you connect a new sensor on a free channel, the alarm device NivOil will identify and memorize it as soon as you switch on the power.

**If a sensor is removed, the corresponding 3 LED will be flashing (defect alarm).**

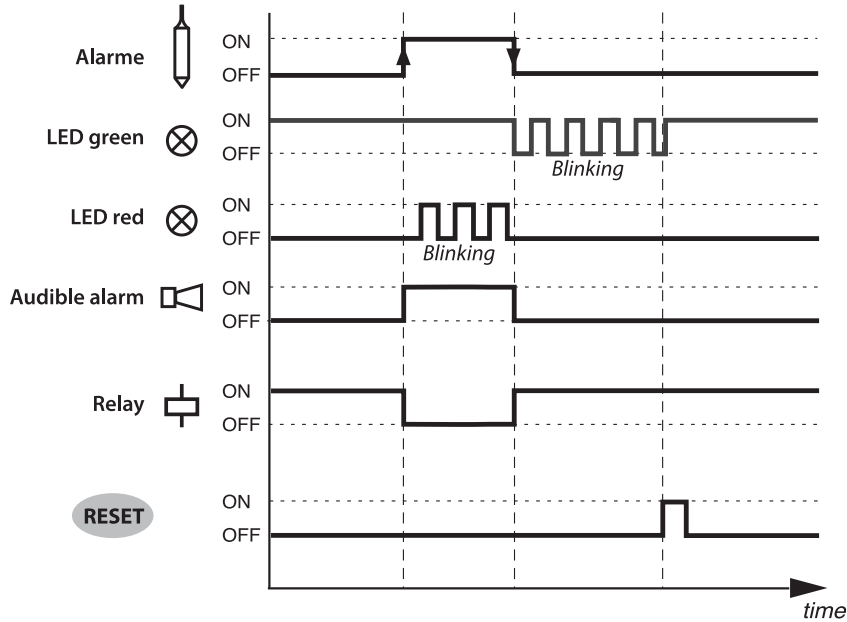
Proceed to a reset, pressing the **RESET** button at least **5 seconds** to confirm the removal of the sensor.

- When a sensor is removed without a complete RESET, then all the LED will be flashing to alarm of this error status.

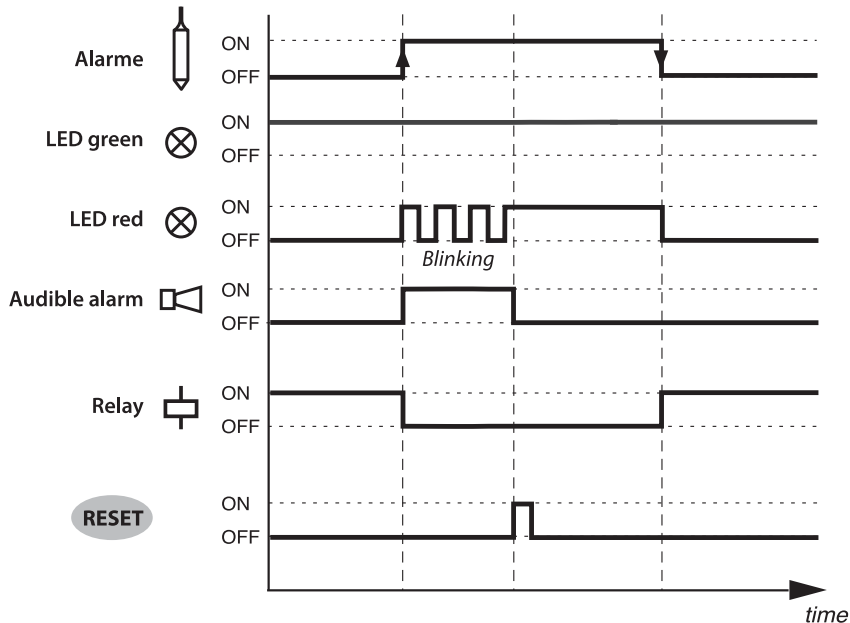
# 5 ALARM SYNOPTIC DIAGRAMS

For hydrocarbon fluid layer thickness and overfilling sensors (DIP3 = OFF)

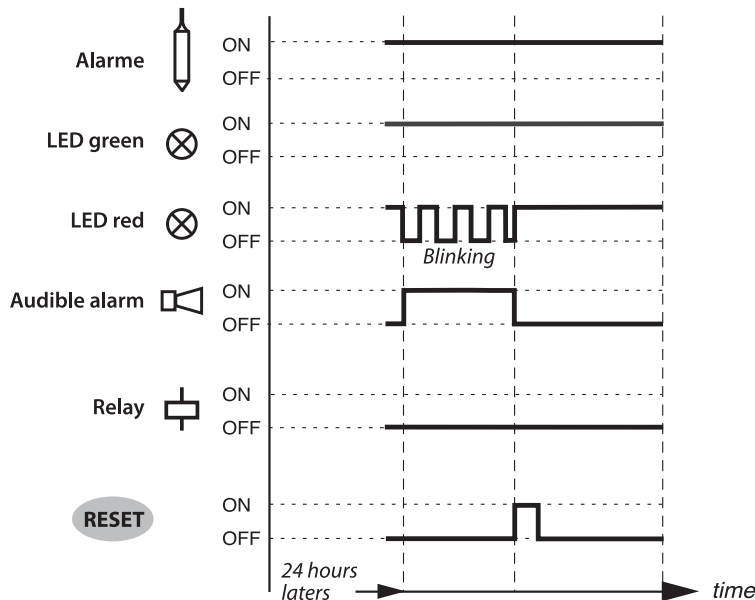
**Note:** To avoid false alarms a 10 seconds delay is factory set up.



**Event 1:** Waves on the fluid surface.  
Status alarm is ON and resets by itself.  
The green LED is then reseted



**Event 2:** Status alarm is ON and keeps on  
Press RESET button, to reset the alarm.  
The red LED shuts OFF when the alarm origin disappears.



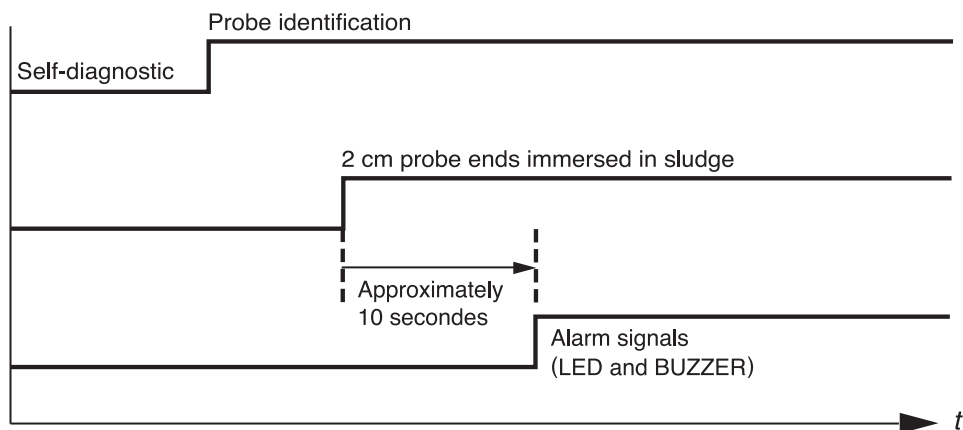
### Repeat alarm function:

The alarm repeat function is disabled or activated with the DIP switch 2. When DIP 2 is in position "ON" the alarm will repeat again 24 hours after the first event, if the alarm event is not corrected.

**Event 3:** Alarm have been on reset, but default origin still exists. After 24 hours the alarm set ON again and red LED is blinking.

For sludge probe (DIP3 = OFF)

### TEST mode



The test could be completed with the probe outside the separator and totally immersed in water. After the auto diagnostic sequence, the control unit recognized the sludge probe and will:

- Alarming when the probe ends are in the air
- Or/and*
- When probe ends are inside 1 cm or 2 cm inside sludges (*sand, soils etc.*)

The alarm synoptic diagrams for the sludge probe are identical to the diagrams for hydrocarbon fluid layer thickness and overflowing sensors



## 6 ALARM SIGNALS

### When the unit starts up (and after the self diagnostic)

Defect	Signal
Short circuit in the measuring loop	<ul style="list-style-type: none"> <li>⇒ All the green LED are blinking</li> <li>⇒ Audible alarm is ON</li> <li>⇒ Relays are OFF</li> </ul>
Measuring loop cable is broken	<ul style="list-style-type: none"> <li>⇒ All the LED are shut OFF</li> <li>⇒ Audible alarm is shut OFF</li> <li>⇒ Relays are OFF</li> </ul>
Wrong polarity on sensor wiring	<ul style="list-style-type: none"> <li>⇒ All the LED are shut OFF</li> <li>⇒ Audible alarm is shut OFF</li> <li>⇒ Relays are OFF</li> </ul>

### When the device is operating during MONITORING MODE

Sensor status	Alarm status	Signals
Without defect	No alarm	<b>Green LED</b> (on corresponding function) ⇒ <b>Light on</b>
No reset defect	No alarm	<b>All green LED</b> (on corresponding channel) ⇒ <b>Blinking + buzzer</b>
Reset defect, but not corrected	No alarm	<b>All green LED</b> (on corresponding channel) ⇒ <b>Blinking</b>
Without defect	No reset alarm	<b>Red LED</b> (on corresponding channel) <b>Green LED</b> (on corresponding function) ⇒ <b>Blinking + buzzer</b> ⇒ <b>Light on</b>
Without defect	Reset alarm, but not corrected	<b>Red LED</b> (on corresponding channel) ⇒ <b>Light on</b> <b>Green LED</b> (on corresponding function) ⇒ <b>Light on</b>

### When the device is operating during SLEEP MODE

Sensor status	Alarm status	Signals
Without defect	No alarm	<b>Green LED</b> (on corresponding function) ⇒ <b>Blinking</b>
No reset defect	No alarm	<b>All green LED</b> (on corresponding channel) ⇒ <b>Doubled blinking</b>
Reset defect, but not corrected	No alarm	<b>All green LED</b> (on corresponding channel) ⇒ <b>Doubled blinking</b>
Without defect	No reset alarm	<b>Red LED</b> (on corresponding channel) <b>Green LED</b> (on corresponding function) ⇒ <b>Doubled blinking</b> ⇒ <b>Blinking</b>
Without defect	Reset alarm, but not corrected	<b>Red LED</b> (on corresponding channel) ⇒ <b>Blinking</b> <b>Green LED</b> (on corresponding function) ⇒ <b>Blinking</b>

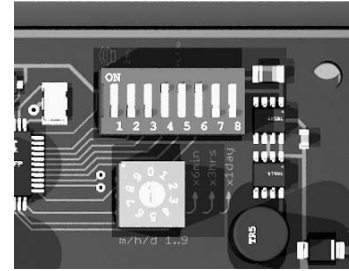
## 7 AUDIBLE ALARM

To disable the audible alarm use the DIP switch 1 inside the cabinet. Therefore the alarm status is indicated by the LED (only).



### **Caution**

*Disconnect from the main power  
Before opening the cabinet*



## 8 TEST MODE

The NivOil alarm device NivOil runs an auto-diagnostic sequence each time you need to test the system:

- Press the "TEST" button (*at least 1 second*)
- ➔ Auto-diagnostic routine begins, LED are blinking (*LED test*)
- ➔ The buzzer is switch ON (*Audible alarm test*)
- ➔ Check out of sensor parameters (*test of sensor type, short-circuit, broken cable*)

**Positive test:** Corresponding LED are ON

**Negative test:** Corresponding green LED are blinking

## 9 MAINTENANCE

The alarm device and its sensors do not require any maintenance operation in normal operation.

**After an alarm occurred, the sensors must be cleaned as the separator is drained.**

To clean out a sensor use a wetted rag, with a house cleaning and degreasing liquid.

## 10 PRECAUTION


### **Hydrocarbon fluid layer thickness sensor**

Thickness detection cannot be performed properly in contact with existing chemical substances such as emulsifiers and surface active wetting agents (*detergent*). The sensor must be in contact only with liquids compatible with polyethylene.

# 11 TECHNICAL FEATURES

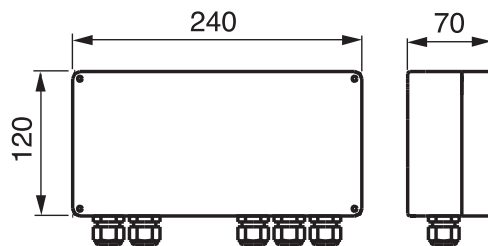
## NivOil CU/12 – Alarm device

Main power supply:	10...27 V DC
Power consumption:	0.1 W / 12 V DC (3 sensors operating, 1 monitoring per hour)
Housing protection:	IP65, according EN 60529
Temperature limits:	-20...+60 °C
Sensor inputs:	3 inputs with automatic sensor type detection for hydrocarbon fluids layer thickness, overfill level, sludge layer level
Monitoring:	The alarm device NivOil has an auto-diagnostic of measuring loop. An alarm signal occurs in case of dysfunction due to a short circuit or a broken cable.
Display and signals:	1 function signal LED ( <i>green</i> ) on each channel 1 alarm signal LED ( <i>red</i> ) on each channel Built-in audible alarm, disabled by DIP switch configuration
Front panel:	2 push buttons for diagnostic test and alarm clearance
Outputs:	3 relay outputs, 250 V AC / 0.45 A / 10 W, potential free change over contacts

**Ex protection class:**  **I 3 (1) G Ex nAC [ia Ga] IIB / IIA T4 Gc**  
**ATEX certificate:** **BVS 10 ATEX E 011**

**CE Marks:** According to **EC** directives,  
Low Voltage Guidelines: **RL 2006/95/EG & RL93/68/EWG**,  
EMV Guidelines: **RL 89/336/EWG** (EN 61326)


**ATEX:** RL 94/9/EG (ATEX 95)  
**EN 60079-0** (General requirements)  
**EN 60079-11** (Intrinsic safety)  
**EN 60079-26** (Group II; category 1G)

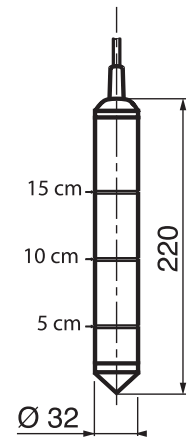


- (1) The alarm device NivOil may be installed in zone 2.
- (2) For intrinsic safety parameters [ $U_o$ ,  $I_o$ ,  $P_o$  and  $C_o$ ,  $L_o$ ], see details in the ATEX certificate.

## NivOil-OP/10 – Hydrocarbon fluid layer thickness sensor


(Only for use with an alarm device NivOil)

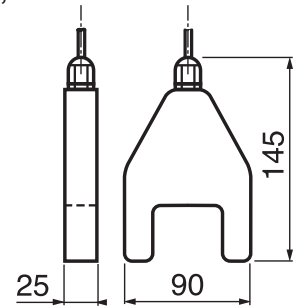
Sensor type:	Capacitive, high frequency
Wetted parts:	Antistatic PE stem; Stainless steel end probe
Cable:	Elastomer resistant to oils and hydrocarbon fluids, blue colour; wires 2x1mm <sup>2</sup> , connections to the alarm device NivOil on screw connectors; 10 m long cable (max length is 300 m)
Protection:	IP68 acc. EN 60529
Temperature limits:	-20...+60°C
Ex protection class:	 II 1 G Ex ia IIB T4 (Intrinsic safety)
ATEX certificate:	BVS 07 ATEX E 091X



## NivOil-HPS/10 – Overfilling sensor


(Only for use with an alarm device NivOil)

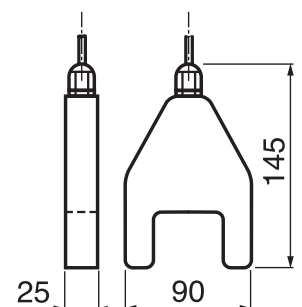
Sensor type:	Ultrasonic detector type
Wetted parts:	PVC
Cable:	Elastomer resistant to oils and hydrocarbon fluids, blue colour; wires 2x1mm <sup>2</sup> , connections to the alarm device NivOil on screw connectors; 10 m long cable (max length is 300 m)
Protection:	IP68 acc. EN 60529
Temperature limits:	-20...+60°C
Ex protection class:	 II 1 G Ex ia IIB T4 (Intrinsic safety)
ATEX certificate:	BVS 09 ATEX E 021X



## NivOil-SP/10 – Sludge layer sensor

(Only for use with an alarm device NivOil)

Sensor type:	Ultrasonic detection type
Wetted parts:	PVC
Cable:	Elastomer resistant to oils and hydrocarbon fluids, blue colour; wires 2x1mm <sup>2</sup> , connections to the alarm device NivOil on screw connectors; 10 m long cable (max length is 300 m)
Protection:	IP68 acc. EN 60529
Temperature limits:	-20...+60°C
Ex protection class:	 II 1 G Ex ia IIB T4 (Intrinsic safety)
ATEX certificate:	BVS 09 ATEX E 021X



- (1) These sensors may be installed in zone 0
- (2) For intrinsic safety parameters [U<sub>i</sub>, I<sub>i</sub>, P<sub>i</sub> and C<sub>i</sub>, L<sub>i</sub>], see the details in the ATEX certificate for each sensor.