# OIL/LIGHT LIQUID SEPARATOR MONITORING NIvOil - (translation)



## **USER MANUAL**

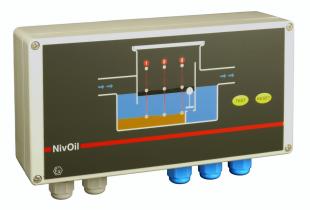


OIL/LIGHT LIQUID SEPARATOR MONITORING NivOil - (translation)

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#### **SAFETY INSTRUCTIONS**

- Installation, commissioning and maintenance may only be carried out by qualified personnel
- Only connect the unit to a power source with features in conformity with the specifications of technical data and 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.
- The applicable installation and maintenance regulations for Ex units must be observed!
- Changes or modifications must not be made to the device.
- The connecting cables of the probes may only be used in areas where no electrostatic charges can occur.

#### **DESCRIPTION**

The NivOil monitoring system is used for oil/light liquid separators. It is used for monitoring the level of the accumulating oil/light liquid layer, the maximum fill level in the case of a blockage of the drainage system and where applicable also the sludge layer that settles on the ground.

Up to a maximum of three monitoring probes can be connected to the sensor power supply unit - type: NivOil CU (BVS 07 ATEX E 090).

The oil probe - type: NivOil OP (BVS 07 ATEX E 091 X) detects the oil/light liquid layer floating on the water.

The high level probe - type: NivOil HP (BVS 07 ATEX E 092 X) detects a blockage of the drainage system. An alarm signal is triggered as soon as the inflowing water has reached a level that is too high.

The alternative high level probe - type: NivOil HPS (BVS 09 ATEX E 021 X) detects a blockage of the drainage system. An alarm signal is triggered as soon as the inflowing water has reached a level that is too high.

The sludge level probe - type: NivOil SP (BVS 09 ATEX E 021 X) detects whether a sludge layer has grown on the bottom of the separator. An alarm signal is triggered as soon as the sludge has reached a level that is too high.

All probe inputs are self-configuring.

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Therefore, one of the three different intrinsically safe probe types can be connected to each of the three intrinsically safe channels of the power supply unit (NivOil CU).

The unit detects which intrinsically safe probe type is connected to which channel and activates the corresponding LED on the front panel. If a channel is not occupied, its corresponding LEDs will remain switched off in operation.

The unit has a built-in buzzer. If necessary, it can be deactivated with DIP switch 1.

CE mark: The device fulfils the legal requirements of the applicable EU directives (see associated EU declaration of conformity).



#### **TECHNICAL DATA**

#### Sensor Supply Unit / Control Unit (NivOil CU)

Operating voltage 230V AC 50...60Hz Safety-related maximum voltage UM = 250V AC

Power consumption 9W / 11VA (if 3 probes are connected)

Wall-mounted housing 240x120x70mm

Protection IP65

Ambient temperature -20°C ... +60°C EU Type Examination Certificate BVS 07 ATEX E 090

Ex-maximum values The maximum permissible values  $(U_0, I_0, P_0 \text{ and } C_0, L_0)$  of the intrinsically safe measuring circuits were

taken from the type examination certificate/type plate for each channel and in combination with the NivOil

\_probes.

(associated electrical equipment)

Probe inputs 3 universal inputs, self-configuring, for probes of the types NivOil OP, HP / HPS or SP

Monitoring The probes are monitored for cable breakage and short circuit

Signalling Per channel: 1x green LED each for operating and 1x red LED each for alarm message

Alarm buzzer integrated, can be switched off via DIP switch

Operating Membrane push-button for test and buzzer acknowledgement internal 4-fold DIP switch

Alarm relay 3 output relays, 230V AC, 3A, one potential-free changeover contact assigned to each measuring channel

#### Relay contact circuits

Current type	AC			DC				
Voltage	250V	250V	24V	110V	220V	24V	110V	220V
Current	5A	3A	6A	0.5A	0.3A	1.5A	0.22A	0.14A
Power	100VA	-	144W	55W	66W	20W	20W	20W
Cos	-	≥0.7	-					
L/R						≤40ms		

#### Intrinsically safe circuits

Version		Sensor supply unit (NivOil CU)		
Circuit parameters		per channel	Sum	
Channel designation		E1, E2, E3	E1 + E2 + E3	
Clamps		Terminal (+), Terminal (-)	Terminal (+), Terminal (-)	
Voltage Uo		17.8V	17.8V	
Current lo		156mA	468.5mA	
Power Po		695mW	2084mW	
Max. external capacity Co		1.84µF	1.84μF	
(no mixed parameters)		7.9µF	7.9µF	
Max. external inductance Lo		5.8mH	648µH	
(no mixed parameters)		11.6mH	1296μΗ	
Max. Inductance resistance ratio Lo/Ro		204.6μΗ/Ω	68.2μΗ/Ω	
	IIA	409.3μΗ/Ω	136.4μΗ/Ω	
Characteristic		linear		



#### **TECHNICAL DATA (continuation)**

#### Oil Probe (NivOil OP)

For connection to the sensor power supply unit (NivOil CU)!



Sensor material PE-EL with stainless steel sensor

Cable Standard with 10m oil/petrol resistant cable 2x1mm<sup>2</sup>

Other cable lengths on request

Maximum permissible cable length: 300m

 $[C \le 200 \text{ nF/km} \text{ and } L \le 1\text{mH/km}]$ 

Cable colour blue

<u>Dimensions</u> approx. Ø32x250mm incl. cable support sleeve with 5cm marks for height adjustment

Protection IP68

Measuring principle capacitive, high frequency Ambient temperature -20°C...+60°C

EU Type Examination Certificate BVS 07 ATEX E 091 X

Ex-maximum values

Ex marking

Maximum input voltage Ui17.9V DCMaximum input current li157mAMaximum input power Pi695mWMaximum internal capacity Ci60nF

(no mixed parameters)

Maximum internal inductance Li 0.3mH

(no mixed parameters) 🗟 II 1G Ex ia IIB T4 Ga

(intrinsically safe electrical equipment)

Interconnection Sensor supply unit (NivOil CU) with oil probe (NivOil OP)

#### Special conditions for safe use

The oil probe connection cable must be routed through the separation between areas with category 1G requirements and less hazardous areas in such a way that protection class IP67 in accordance with EN 60529 is guaranteed.

20-02-2024

The oil probe (NivOil OP) and the connecting cable may only be used in areas where electrostatic discharges cannot occur.

The technical information on the use of the oil probe (NivOil OP) in connection with aggressive/corrosive media must be observed.



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#### TECHNICAL DATA (continuation)

#### High Level Probe (NivOil HP)

Exclusively for connection to the sensor supply unit (NivOil CU)!



Material sensor PE-EL with PTC stainless steel sensor

Cable standard with 10m oil/petrol resistant cable 2x1mm<sup>2</sup>

Other cable lengths on request

Maximum permissible cable length: 300m

 $[C \le 200n\dot{F}/km \text{ and } L \le 1mH/km]$ 

Cable colour blue

Dimensions ca. Ø32 x 200mm

Protection IP68

Measuring principle PTC sensor, heated Ambient temperature -20°C...+60°C EU Type Examination Certificate BVS 07 ATEX E 092 X

**Ex-maximum values** 

Maximum input voltage Ui 17.9V DC Maximum input current li 157mA Maximum input power Pi 695mW Maximum internal capacity Ci 60nF

(no mixed parameters)

Maximum internal inductance Li 0.3mH

(no mixed parameters) Ex marking

(intrinsically safe electrical equipment)

Interconnection Sensor supply unit (NivOil CU) with overfill probe (NivOil HP)

#### Special conditions for safe use

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The connection line of the high level probe (NivOil HP) must be routed through the separation between areas with category 1G requirements and less hazardous areas in such a way that protection class IP67 in accordance with EN 60529 is guaranteed.

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The high level probe (NivOil HP) and the connecting cable may only be used in areas where there is no risk of electrostatic discharging.

Observe the technical information on the use of the high level probe (NivOil HP) in connection with aggressive/corrosive media.



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#### TECHNICAL DATA (continuation)

#### High Level Probe (NivOil HPS)

Exclusively for connection to the sensor supply unit (NivOil CU)!



**PVC** Material sensor

Cable Fitted with 10m oil/petrol-resistant cable as standard (2x1mm<sup>2</sup>)

Other cable lengths on request,

Maximum permissible cable length: 300m

 $[C \le 200n\dot{F}/km \text{ and } L \le 1mH/km]$ 

Cable colour blue

**Dimensions** approx. 145x90x25mm

IP68 Protection Measuring principle Ultrasound -20°C...+60°C Ambient temperature

EU Type Examination Certificate BVS 09 ATEX E 021 X

Ex-maximum values

Maximum input voltage Ui 17.9V DC Maximum input current li 157mA Maximum input power Pi 695mW Maximum internal capacity Ci 0.14nF/m

(no mixed parameters)

Maximum internal inductance Li 70uH/m

(no mixed parameters) Ex marking 🗟 II 1G Ex ia IIB T4 Ga

(intrinsically safe electrical equipment)

Interconnection Sensor supply unit (NivOil CU) with high level probe (NivOil HPS)

#### Note!

Use only in stagnant or slow-flowing media.

Strong mechanical impacts on the probe housing must be avoided during installation, maintenance work and operation. Clean only with a damp cloth, avoid electrostatic discharges!

#### Special conditions for safe use

The connection line of the high level probe (NivOil HPS) must be routed through the separation between areas with category 1G requirements and less hazardous areas in such a way that protection class IP67 in accordance with EN 60529 is guaranteed.

The high level probe (NivOil HPS) and connection cable may only be used in areas where there is no risk of electrostatic discharging.

The technical information on the use of the high level probe (NivOil HPS)

- in connection with aggressive/corrosive media
- with regard to protection against impact
- with regard to the flow velocity of the media
- Cleaning

are to be observed.



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#### TECHNICAL DATA (continued)

#### Sludge Level Probe (NivOil SP)

Exclusively for connection to the sensor supply unit (NivOil CU)!



Material sensor PVC

Cable Standard with 10m oil / petrol resistant cable 2x1mm<sup>2</sup>

Other cable lengths on request

Maximum permissible cable length: 300m

 $[C \le 200 \text{ nF/km} \text{ and } L \le 1 \text{ mH/km}]$ 

Cable colour blue

Dimensions ca. 145x90x25mm

Protection IP68
Measuring principle Ultrasound
Ambient temperature -20 °C...+60 °C

EU Type Examination Certificate BVS 09 ATEX E 021 X

Ex-maximum values

Maximum input voltage Ui 17.9V DC
Maximum input current Ii 157mA
Maximum input power Pi 695mW
Maximum internal capacity Ci 0.14nF/m

(no mixed parameters)

Maximum internal inductance Li 70µH/m

(no mixed parameters)

\_\_(intrinsically safe electrical equipment)

Interconnection Sensor supply unit (NivOil CU) with sludge level probe (NivOil SP)

#### Note!

Use only in stagnant or slow-flowing media.

Strong mechanical impacts on the probe housing must be avoided during installation, maintenance work and operation. Clean only with a damp cloth, avoid electrostatic discharges.

#### Special conditions for safe use

The connection line of the sludge level probe (NivOil SP) must be routed through the separation between areas with category 1G requirements and less hazardous areas in such a way that protection class IP67 in accordance with EN 60529 is ensured.

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The sludge level probe (NivOil SP) and connection cable may only be used in areas where electrostatic discharges cannot occur.

The technical information for using the sludge level probe (NivOil SP)

- in connection with aggressive/corrosive media
- with regard to protection against impact
- with regard to the flow velocity of the media
- Cleaning

are to be observed.

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#### MOUNTING

Always mount the sensor supply unit (NivOil CU) outside the hazardous areas ("safe area").

#### Mount probes:

The routing of the connecting lines of the probes through the separation between the areas with category 1G requirements and less hazard areas must be carried out in such a way that the degree of protection IP67 in accordance with EN 60529 is ensured.

#### Oil probe (NivOil OP):

Install the sensor in such a way that the tip of the probe is positioned at the height of the desired alarm point.

The probe tube has three circumferential markings at a distance of 5cm, 10cm and 15cm from the probe tip (= switching point). They are used to easily set the desired alarm point.

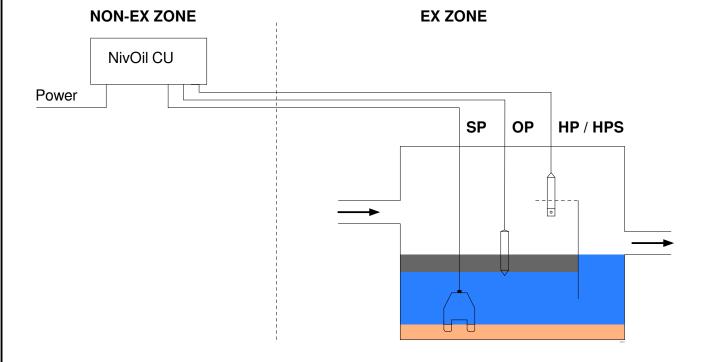
#### High level probe (NivOil HP):

Mount in the inlet chamber, the lateral hole must be at the height of the desired max. permissible accumulation level.

#### High level probe (NivOil HPS):

Mount the probe so that the lower edge of the ultrasonic fork is at the height of the desired max. permissible inflation level. Sludge level probe (NivOil SP):

Mount the probe so that the lower edge of the ultrasound fork is approx. 2cm lower than the desired alarm point.





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#### START UP

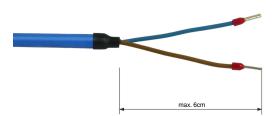
- Wiring the probes.

Observe regulations for laying cables in potentially explosive atmospheres!

The intrinsic safety input circuits must not be earthed!

- When extending the probe cable, shielded cable (min. 2x1mm²) should be used, the maximum cable length is 300m.
- Remove the cover of the sensor power supply unit (NivOil CU), carefully pull the ribbon cable to the front panel off the connector.
- Connect the probes according to the wiring diagram.

#### Note!



- Strip the probe and power supply cables to a max. length of 6cm and fit them with grommets or heat shrink tubing.
- Connect the sensor power supply unit (NivOil CU) properly to the power supply
- Plug the ribbon cable back onto the connector and screw the front panel tight.



- Switch on the supply voltage.
- Sensor supply unit (NivOil CU) performs self-testing (lamp test of all LEDs and the buzzer).
- The correct connection of the probes (short circuit/line break test) is checked.
- The probe / type recognition is running, i.e. the corresponding probe (NivOil OP, HP / HPS or SP) is recognised and assigned to the input channel accordingly.
- If the test is successful, the corresponding LED on the front panel lights up green.
- Successful check = a LED is lit permanently.
- Wrong probe = all 3 LEDs blinking.
- Channels that are not in use remain switched off.
- Inventory list:

When the unit is switched on for the first time, the electronics "remember" which probe is connected to which input in an inventory list. A signal tone is emitted 2x during the test (factory setting = no probes connected).

This makes it possible to determine at any time whether the respective probes are working properly.

#### Behaviour when connecting an additional probe or when an existing probe is dismantled or reconnected:

- If a new probe is connected to a previously unoccupied channel, it is added to the inventory list when the supply voltage is switched on again or by pressing the test button.
- If a probe is disconnected or reconnected, the probe is deleted from the inventory list as follows:

Press the reset button and hold it down for at least 5 seconds. (Buzzer beeps 5x)

- If a probe is disconnected and not deleted of the inventory, it is reported as faulty with the respective LED blinking.

#### **ALARM REPETITION**

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The "Alarm Repetition" function can be switched on and off via DIP 2.

With DIP 2 = ON, the buzzer is triggered again 24 hours after an alarm has been acknowledged and is still pending. (see case 3 of the alarm logic)

If this function is unwanted, DIP 2 must be switched to OFF.



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#### **WIRING**

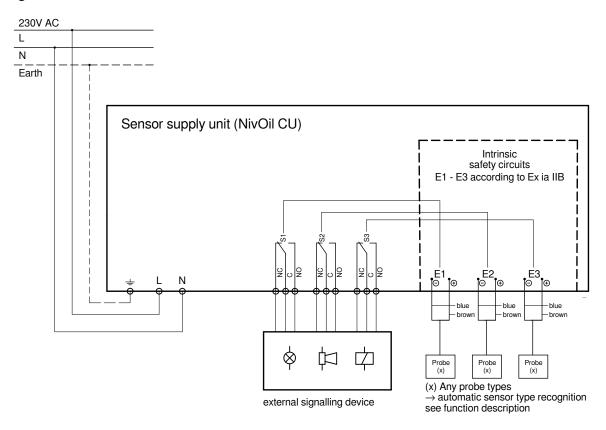
#### Interior view of the device

Probe connections

E1 - E2 - E3 intrinsic safety circuits

DIP switch 1

### Wiring diagram





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#### **CABLE EXTENSION**

The separately available cable clamp tube CET03 can be used to easily extend the connection cable. The clamping tube may be used as simple aparatus in potentially explosive areas (including zone 1/ category 2).





Delivery includes two WAGO 222

Ex marking

II 1G Ex ia IIB T4 Ga

The clamps have CAGE clamp connections with operating levers.

max. wire cross-section: 4mm<sup>2</sup>; conductor type = e+f

The cable shield of the extension cable is not connected. The two end plugs have an O-ring seal and must be inserted completely into the pipe after the cable connection as far as it will go, then the cable glands must be tightened.

The protection class IP65 according to EN 60529 of the connection cable extension is not suitable for permanent immersion in oil separators!

#### ALARM OIL, HIGH LEVEL AND SLUDGE LEVEL PROBE

#### Alarm delay

In order to avoid false alarms, an alarm is only signalled when it is permanently present for a longer period of time.

For the oil probe (NivOil OP) and the high level probes (NivOil HP / HPS) 10 seconds.

For the sludge probe (NivOil SP) 15 minutes.

In the first 15 minutes after switching on, the sludge probe (NivOil SP) reacts after only 10 seconds for testing purposes.

#### Operating states

Control Unit (NivOil CU) Channel 1, 2 or 3	Status of the probe			
No LED lights up; relay de-energised	No probe registered			
Green LED lights up	Probe logged in ready for operation			
Red LED blinking; relay de-energised; buzzer on	Alarm is currently reported			
Red LED lights up; Relay de-energised	Alarm is currently signalled and alarm was acknowledged			
One green LED is blinking	Alarm was not acknowledged and			
One green LED is billiking	Alarm has disappeared again			

For further explanations, see also the following diagrams

#### **Error signals**

Sensor supply unit / Control unit (NivOil CU) Channel 1, 2 or 3	Status of the probe
No LED is lit	No probe is registered due to cable breakage or incorrect polarity
One green LED blinking; relay de-energised; buzzer on	Short circuit or interruption of the sensor circuit
All 3 green LEDs blinking; relay de-energised; buzzer on	Incorrect or defective probe

#### Reset

If a probe is disconnected or reconnected, the inventory list must be read in again.

Press the reset button until the buzzer has beeped 5 times (approx. 5 seconds).

This logs out all probes for a short time, checks what is connected and adds it to the inventory list accordingly.



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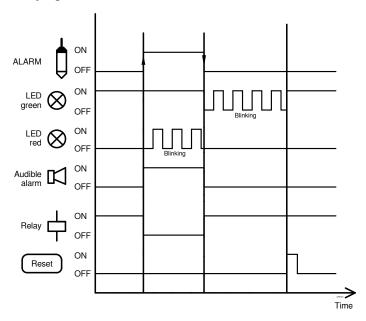
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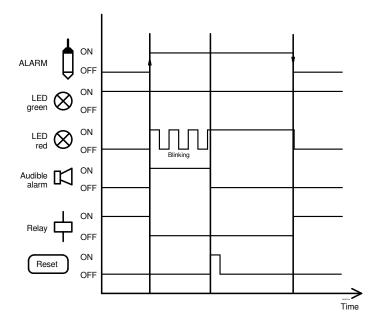
#### **ALARM UNIT WITH OIL, HIGH LEVEL AND SLUDGE PROBE (continued)**

#### Alarm message oil probe (NivOil OP) and high level probes (NivOil HP / HPS)

To avoid false alarms, an alarm is only signalled after it has been on for more than 10 seconds.



Case 1: Alarm comes and disappears again by itself (for example due to wave movement of the liquid surface), the blinking green LED is then acknowledged with the RESET button.



Case 2: Status alarm is ON and keeps on → Press RESET button to reset the alarm. The red LED shuts Off when the alarm disappears.

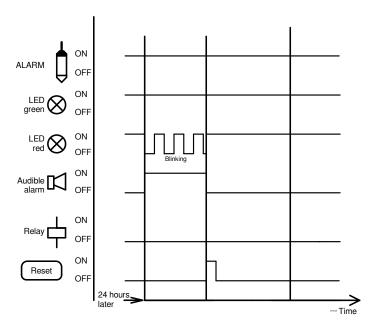
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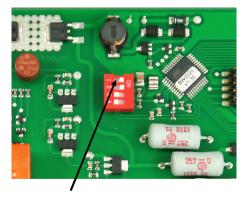
#### **ALARM OIL, HIGH LEVEL AND SLUDGE PROBE (continued)**

Alarm message oil probe (NivOil OP) and high level probes (NivOil HP / HPS)



Case 3: Alarm was acknowledged and continues to apply  $\rightarrow$  after about 24 hours, the buzzer is triggered anew and the red LED starts blinking again.

## **AUDIBLE ALARM**



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The buzzer can be switched off permanently with DIP switch 1 on the circuit board in the control unit. The alarm is then only signalled visually and via the built-in alarm relays.



Caution!
Before opening the enclosure → Switch off mains voltage!

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#### **TEST MODE**

The device has an integrated test function. It can be activated as follows:

- Press the test button (at least 1 second)
- Self-check is started
- LEDs are blinking...
- Controlling the buzzer
- Checking the connection values of the corresponding probe (correct type?, short circuit?, broken cable?)

= the corresponding LED is lit in green Test passed Test not passed = the corresponding LED is blinking in green

#### **MAINTENANCE**

When used as intended, the sensor supply unit / control unit (NivOil CU) and the probes are maintenance-free. After an alarm has been detected, the probes must also be cleaned after cleaning the light liquid separator. The probes can be cleaned of the adhesive grease/oil film with commercially available, grease-dissolving cleaners. Note!

Electrostatic discharging must be prevented during cleaning. Clean with a damp cloth only!

#### SPECIAL CHARACTERISTICS

#### Oil probe (NivOil OP)

The oil/light liquid layer can no longer be detected correctly, if it is mixed with other chemicals such as surfactants, emulsifiers, etc.

#### Sludge probe (NivOil SP)

The probe may only be used in liquids to which PVC is sufficiently resistant.



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