OIL/LIGHT LIQUID SEPARATOR MONITORING NivOil - (translation)



USER MANUAL



OIL/LIGHT LIQUID SEPARATOR MONITORING NivOil - (translation) 20-02-2024 M-531.01-EN-AKE

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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).



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TECHNICAL DATA

Sensor Supply Unit / Control Unit (NivOil CU)

Operating voltage	230V AC 5060Hz
Safety-related maximum voltage	UM = 250VAC
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 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.
Ex marking	© II (1)G [Ex ia Ga] IIB/IIA
6	(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	ЗA	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

Circuit parameterspChannel designationEClampsTVoltage UoTCurrent IoT		Sensor supply unit (NivOil CU)		
		per channel	Sum	
		E1, E2, E3	E1 + E2 + E3	
		Terminal (+), Terminal (-)	Terminal (+), Terminal (-)	
		17.8V	17.8V	
		156mA	468.5mA	
		695mW	2084mW	
Max. external capacity Co	IIB	1.84µF	1.84µF	
(no mixed parameters)	IIA	7.9μF	7.9μF	
Max. external inductance Lo	IIB	5.8mH	648µH	
(no mixed parameters)	IIA	11.6mH	1296µH	
Max. Inductance resistance ratio Lo/Ro	IIB	204.6μΗ/Ω	68.2μΗ/Ω	
	IIA	409.3μΗ/Ω	136.4μΗ/Ω	
Characteristic		linear		



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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 $2x1mm^2$ Other cable lengths on request Maximum permissible cable length: 300m [C $\leq 200 nF/km$ and L $\leq 1mH/km$]
Cable colour	blue
Dimensions	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	
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	 II IG 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

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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.

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 (contin	uation)
High Level Probe (NivOil H Exclusively for connection to t	HP) the sensor supply unit (NivOil CU)!
Material sensor Cable	PE-EL with PTC stainless steel sensor standard with 10m oil/petrol resistant cable 2x1mm ² Other cable lengths on request Maximum permissible cable length: 300m
Oabla aalaum	$[C \le 200nF/km and L \le 1mH/km]$
Cable colour Dimensions	blue ca. Ø32 x 200mm
Protection	IP68
Measuring principle	PTC sensor, heated
Ambient temperature	-20°C+60°C
EU Type Examination Certificate Ex-maximum values	
Maximum input voltage Ui	_17.9V DC
Maximum input current li	_157mA
Maximum input power Pi Maximum internal capacity Ci	695mW 60nF
Maximum internal capacity Ci	(no mixed parameters)
Maximum internal inductance Li	0.3mH (no mixed parameters)
Ex marking	© II 1G Ex ia IIB T3 (intrinsically safe electrical equipment)
Interconnection	Sensor supply unit (NivOil CU) with overfill probe (NivOil HP)
Special conditions for safe us	
The connection line of the high lev	vel probe (NivOil HP) must be routed through the separation between areas with category 1G requirement a way that protection class IP67 in accordance with EN 60529 is guaranteed.
	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)!



Material sensor	PVC
Cable	Fitted with 10m oil/petrol-resistant cable as standard (2x1mm ²)
	Other cable lengths on request,
	Maximum permissible cable length: 300m
	$[C \le 200nF/km and L \le 1mH/km]$
Cable colour	blue
Dimensions	approx. 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 li	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)
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 ²
	Other cable lengths on request
	Maximum permissible cable length: 300m
	$[C \le 200 \text{ nF/km and } L \le 1 \text{ mH/km}]$
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 li	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)
Ex marking	🐵 II 1G Ex ia IIB T4 Ga
	(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.

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.



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.

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- 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

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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Interior view of the device **DIP switch 1** Audible alarm (buzzer) ON / OFF DIP switch 2 Audible alarm repetition ON / OFF DIP switch 3 and DIP switch 4 Factory setting = both in OFF position Do not change! 4374 3821 96975.38 Power supply Probe connections E1 - E2 - E3 Alarm relay S1 - S2 - S3 intrinsic safety circuits Wiring diagram 230V AC L Ν Earth Sensor supply unit (NivOil CU) Intrinsic safety circuits E1 - E3 according to Ex ia IIB ιΘ IΘ g S Ž ç E1 ∣⊙ E3 I⊖ Ν **!**⊕ Î⊕ ÎÐ - blue - blue -blue - brow - brow brown ¢ \otimes 口 Probe (x) Probe (x) Probe (x) (x) Any probe types \rightarrow automatic sensor type recognition external signalling device see function description

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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 terminals

Ex marking

🐵 II 1G Ex ia IIB T4 Ga

The clamps have CAGE clamp connections with operating levers.

max. wire cross-section: $4mm^2$; 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.

Note!

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 blinking	Alarm has disappeared again		

For further explanations, see also the following diagrams

Error signals

Sensor supply unit / Control unit (NivOil CU)	Status of the probe
Channel 1, 2 or 3 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

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

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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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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



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?)

Test passed= the corresponding LED is lit in greenTest 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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