Level controller
NK311 / NK312 / NK313
Operating instructions

Systems for the surveillance and controlling
of the storage and transfer of liquids

BA00.0022.00 000 02

Polytech Systeme AG, Hübelacherstrasse 15, CH-5242 Lupfig, Tel. 056 464 00 20, Fax 056 464 00 24, info@polytech.ch

Content

1 Application

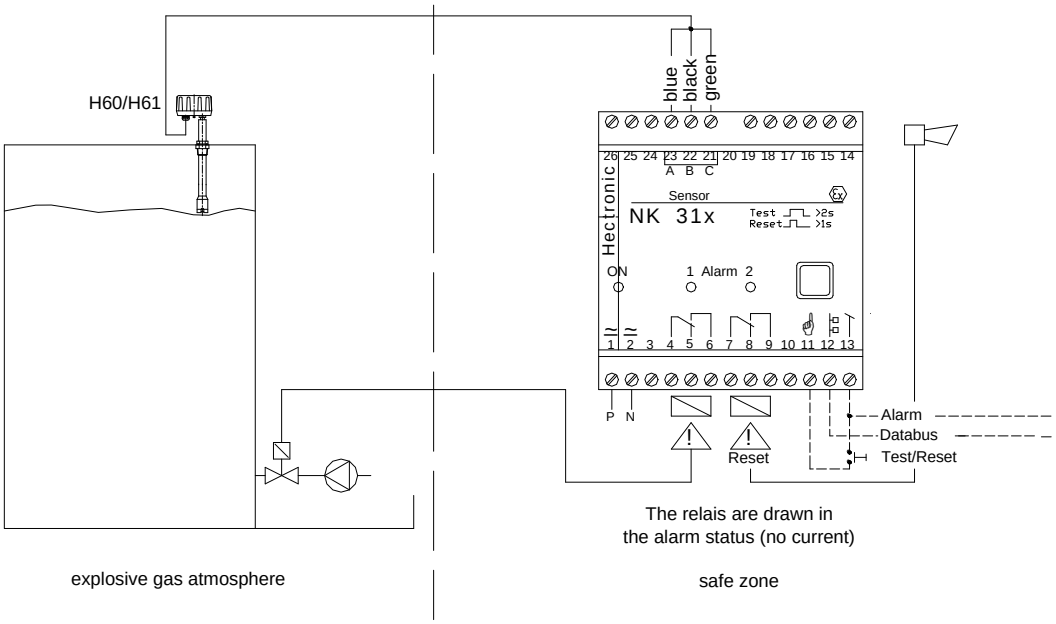
The level controller NK311, NK312 and NK313 form together with the electro-optical sensors of the series H60/H61 a measurement unit for the controlling of liquids-level limits.

The devices and sensors fulfil high requirements and are approved to:

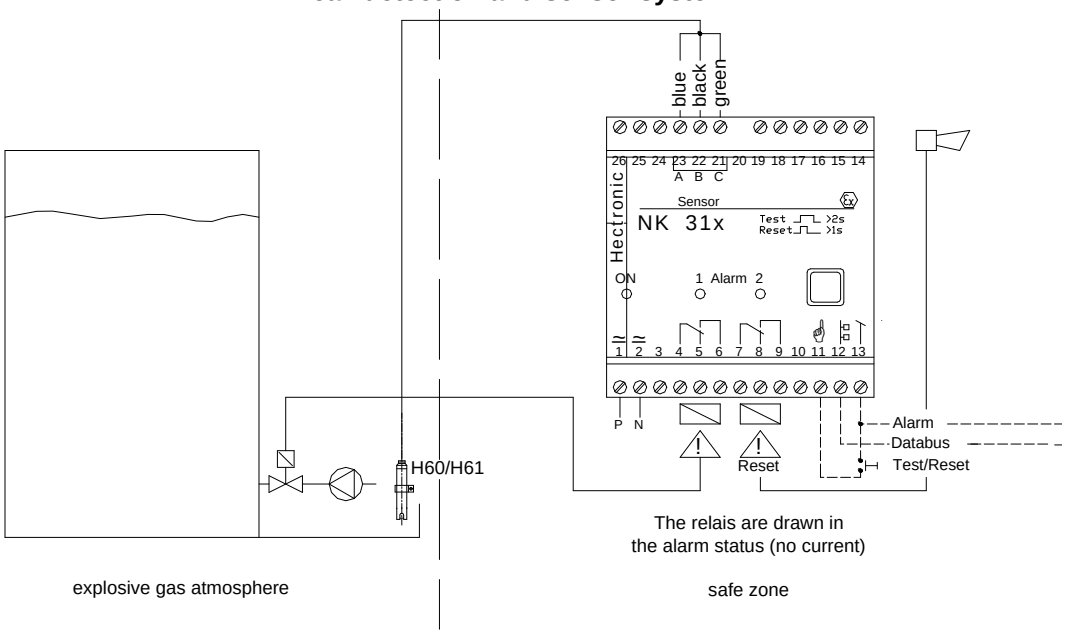
-	Industrial overfill prevention	as per VWF (CH)	Inspection certificate No. 302.01.99
-	Leak detection and sensor with feeler	as per VWF (CH)	Inspection certificate No. 307.01.99
-	Level sensor	as per WHG (D)	Z-65.14-190

Others applications with high security requirements:
- Level controlling
- Process controlling
- Pump controlling
- Dry running protection

Special fill prevention



Leak detection and sensor system



2 Function

One in the sensor cone inserted light emitter produces an optical signal, which is transferred under utilisation of the physical laws over reflection and refraction on a given path of rays into the light receptor. The immersing of the tip of probe causes a weakening of this effect, which is evaluated from the controller as alarm.

An automatic self-monitoring function tests the connected sensor every second ensuring a correct functioning of all times.

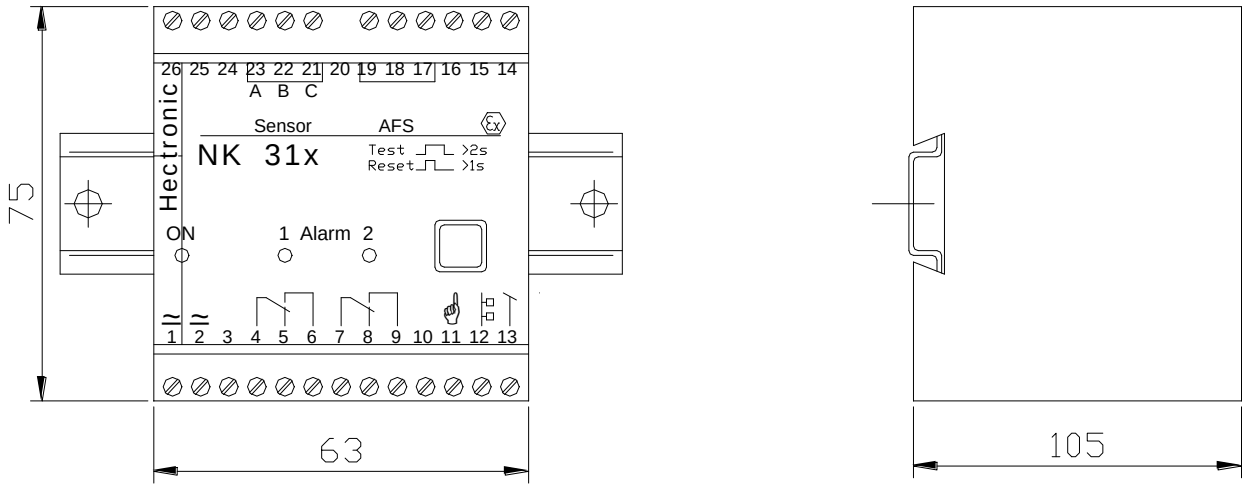
3 Technical data

Input	*Sensor circuit*	intrinsically safe EEx ia IIC
	Line data	≤ 200 Ohm, ≤ 100 nF, ≤ 1 mH
	Line length	with cable 0,75 mm² shielded max. 1500 m
	Connection with	according to Hectronic IR-approval
	Remote receipt/test	with external button
	Alarm data bus	up to 32 devices
	Line length	≤ 10 m
	Signal width	Ri 0 Ohm...10 Ohm, V (open loop) 11 VDC
Output	*Alarm 1*	potential free relay contact
	Alarm 2	potential free relay contact, acknowledgeable
	Contact load	AC; 5A/230V
		DC; 5A/30V, 1A/60V, 0,1A/100V
	AFS-connection	for the connection to tank trucks (CH)
Power supply		90...253VAC, 50...60Hz, 3.5VA
Display and operating elements		„ON“ green operation
		„Alarm 1“ red
		„Alarm 2“ red
Button		„Reset“< 1 Sec. Acknowledge the alarm 2
		„Test“ > 2 Sec. Test of the alarm functions
Operating temperature		-25...+55°C
Electrical connection		Screw terminals, max. 2,5 mm²
Housing / executions		for assembly on mounting rail T 35 (EN 50022)
	Material	ABS
	Protection class	IP 20 (DIN/EN 60529)
	Dimensions	B 67,5 x H 75 x T 105 mm
Wall housing	*Material*	Polycarbonat
	Protection class	IP 54 (DIN/EN 60529)
	Dimensions	B 95 x H 148 x T 126 mm

4 Assembly

4.1 Dimension, assembly on DIN rail

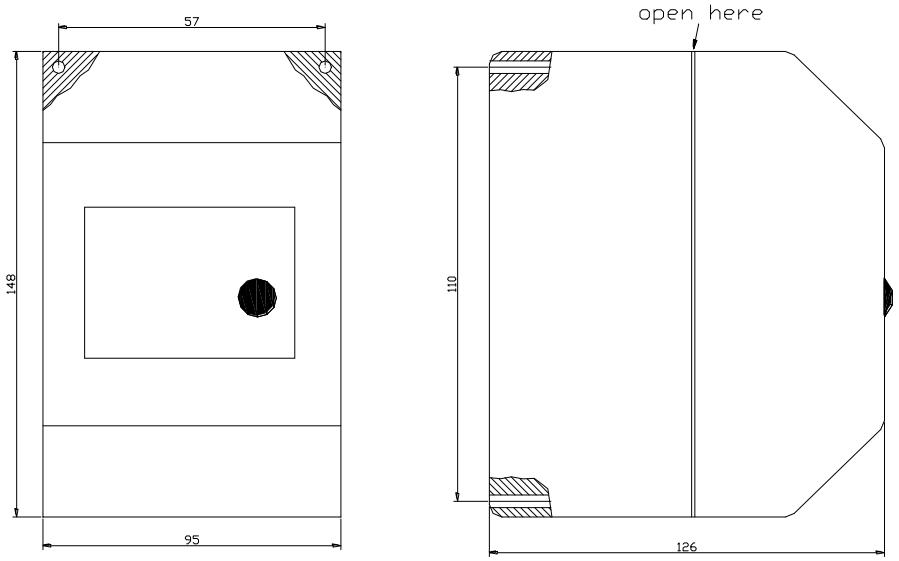
Quick pick up assembly on symmetrical mounting rail according to EN 50022 (DIN rail).



Remark:
Are several devices lined up in a switcher cabinet next to each other, the ambient temperature may not exceed +40°.

4.2 Dimension, Wall assembly

Devices for the wall assembly are available in a (IP 54) wall housing.

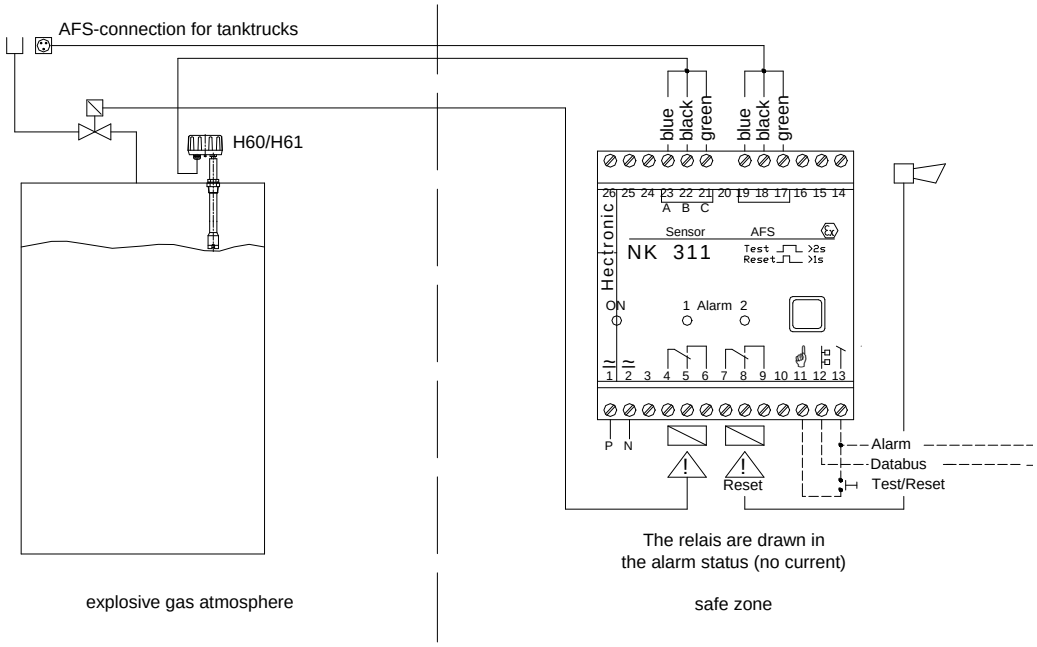


Remark:
When assembling in the wall housing, the ambient temperature may not exceed +40°.

5 Installation and connection

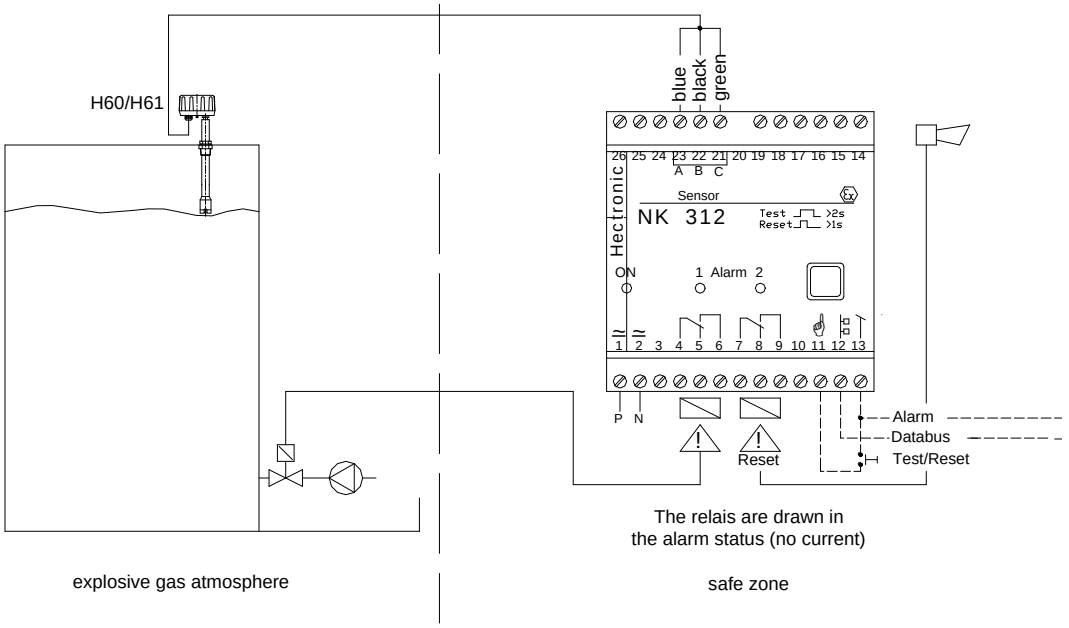
5.1 Example of use NK 311

Special fill prevention with connection plug for overfill prevention system for tank trucks AFS

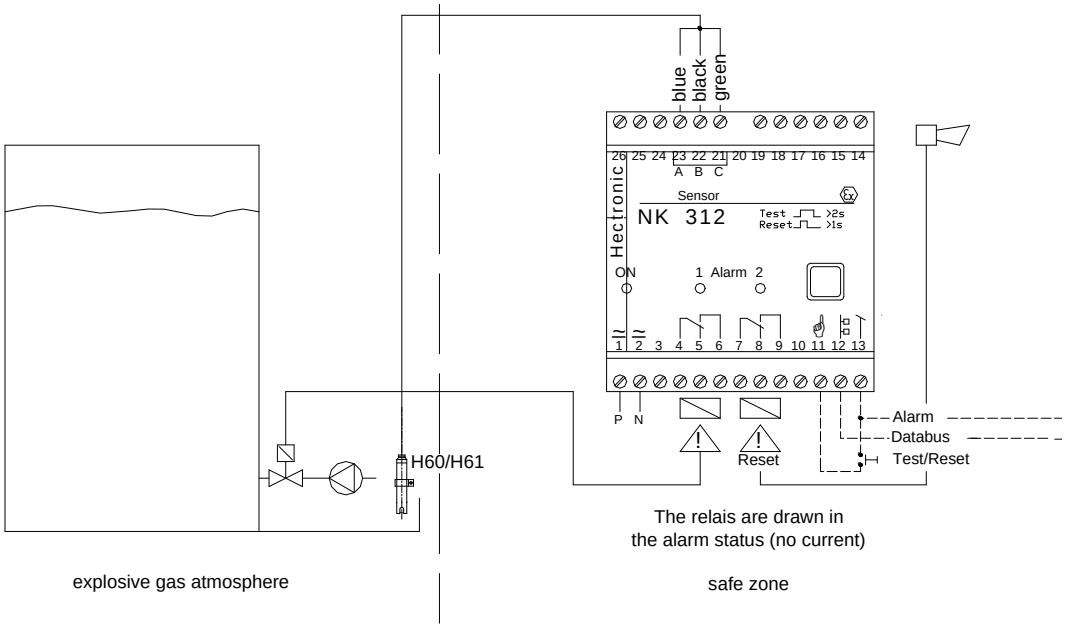


5.2 Example of use NK 312

Special fill prevention

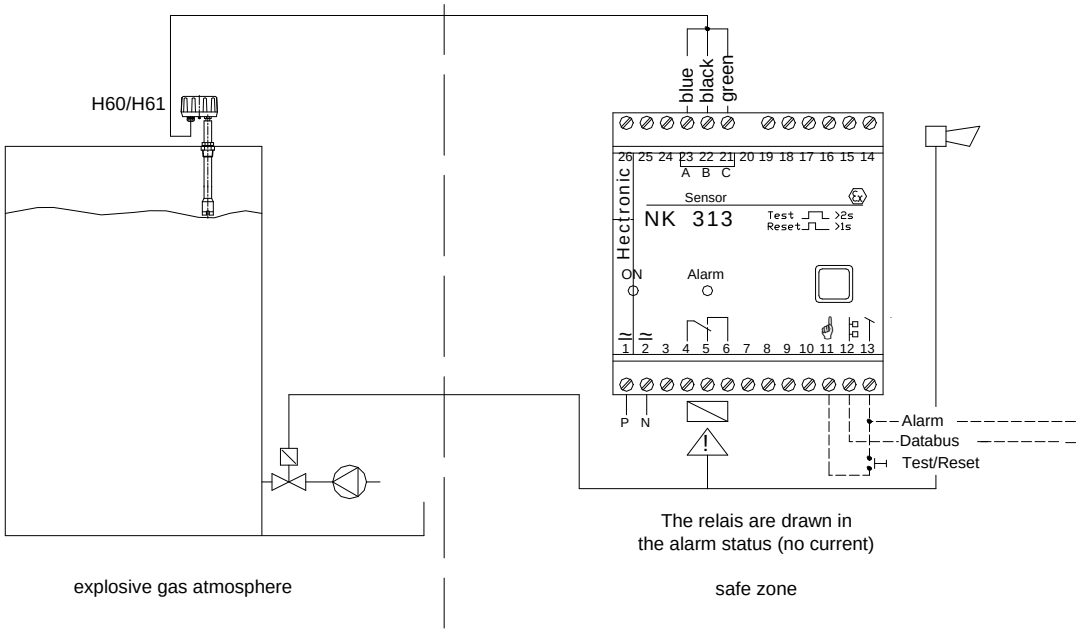


Leak detection system

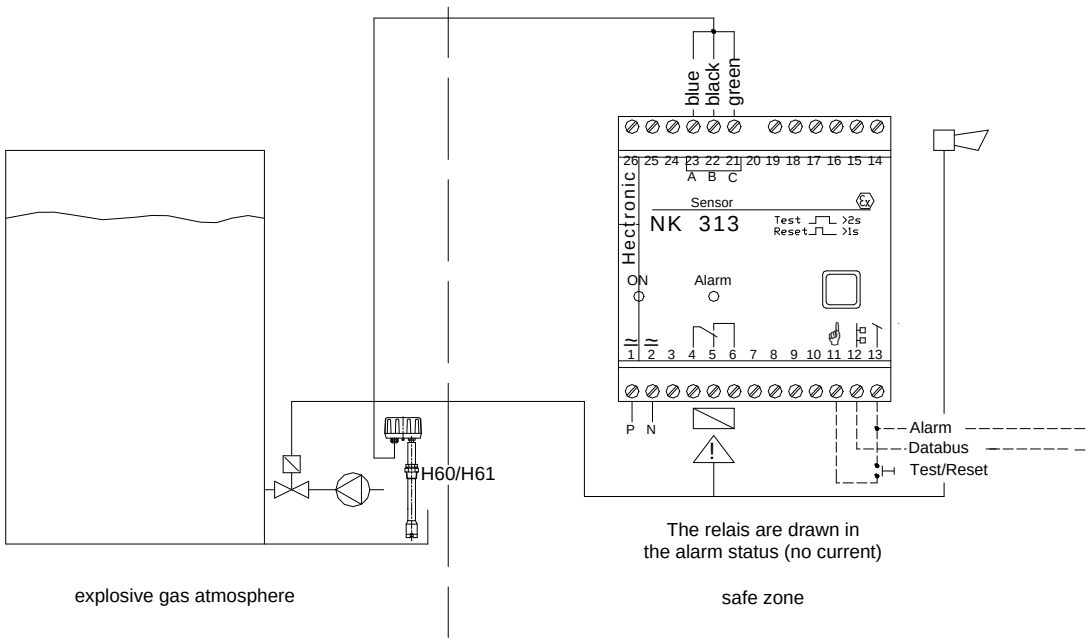


5.3 Example of use NK 313

Special filling safety device



Leak detection system



5.4 Connection of the probes H60 / H61

Connection of the sensors H60/H61 over 3-pin line, min. 0,5 mm². If sensor cables are laid beside cables for power installation, then screened cables are to be used. The screen is connected on the sensor side.

Remark:

Lightning protection: Upon installation of sensors into over ground containers for stored liquid with flash point under 55°C (Ex-Zone 0) lightning protection mechanisms must be installed. Please give attention to the corresponding installation instruction.

Maximum line length see „3 Technical Data“.

5.5 Connection AFS – Plug for tank trucks

AFS-connection over 3-wire-cable, min. 0,5 mm², to connection-box for tank trucks.

5.6 Connection alarm data bus

Several NK 31x devices can be interconnected (max. 32) using clamps 12 (ca. 11VDC) / 13 (Equipment mass). For function see chapter 7.1 „Operation of several device connected over the alarm data bus“.

5.7 Connection of external button for Test / Reset

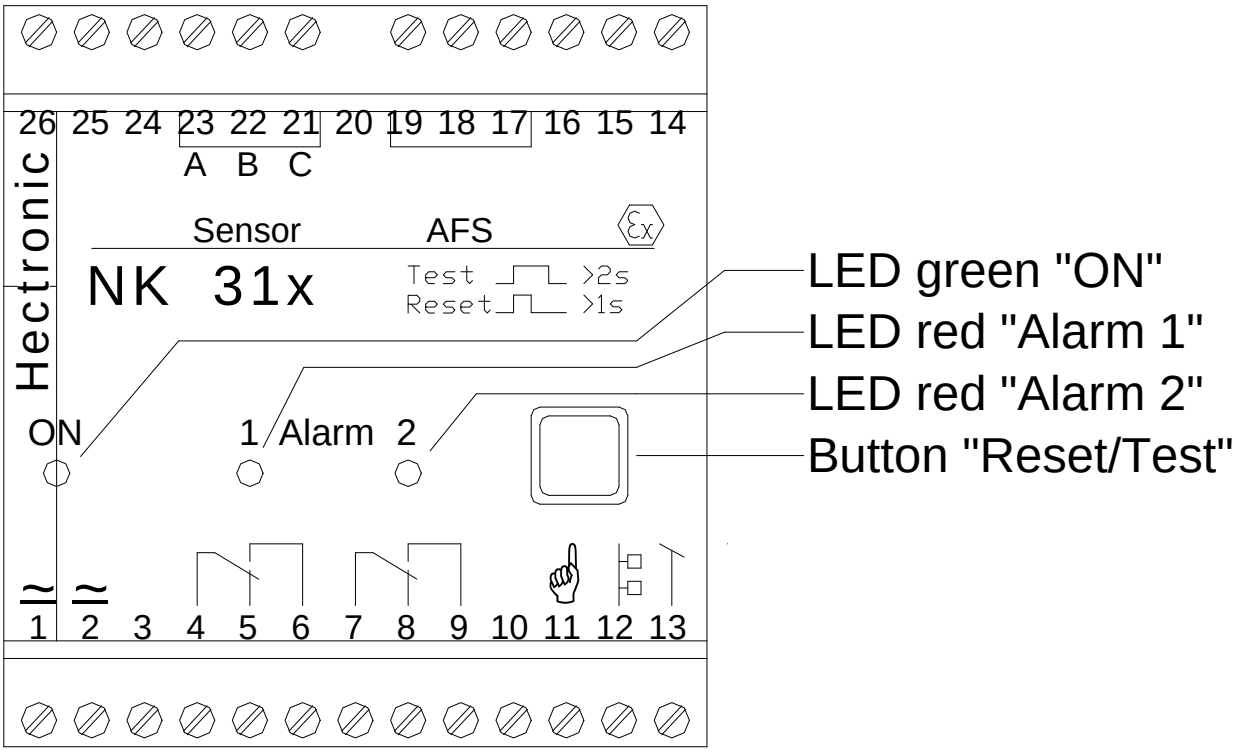
An external button can be connected to the equipment and/or system using clamps 11 and 13 (approx. 11VDC). For function see chapter 7 „Installation and operation“.

Attention:

Pay attention to correct polarity!

6 Signal and control elements

LED green „ON“	dark		⇨ No supply / device defect
	steady light		⇨ Ready
	flashing light		⇨ Sensor dirty or defect
			⇨ Alarm signal short circuit
			⇨ Button line short circuit
LED red „Alarm 1“	dark	sensor exchanged	⇨ Normal operation
	steady light	sensor dived in	⇨ Not acknowledged
	flashing light	sensor dived in	⇨ acknowledged
LED red „Alarm 2“	dark	sensor exchanged	⇨ Normal operation
	flashing light	sensor dived in	⇨ Not acknowledged
	dark light	sensor dived in	⇨ acknowledged
Button „Reset“/„Test“	< 1 Sec.	Acknowledgement	
	> 2 Sec.	Test	⇨ Function test (see chapter 7 „Installation and operation“)



The relais are drawn in the alarm status (no current)

7 Installation and operation

1. Attach the device according to the diagram of connections. If possible use a 230VAC-supply at which continuous consumers are attached (oil firing, elevator, light, etc.).
2. Set the device under tension. The green LED „ON“ lights up. The relays alarm 1 and alarm 2 close. (fail-safe).
   If an alarm is present, the device remains in the alarm condition ⇨ Examine wiring and sensor.
3. The automatic self check is continuously accomplished and ***not*** indicated.
4. Function test (only possible with exchanged sensor). Press the key during < 2 seconds. The relays of alarm 1 and 2 fall for approx. 4 seconds off and the two LED's shine.
5. If the probe dives in, the relays alarm 1 and alarm 2 drop ant the two LED's flash. After the acknowledgement of the alarm, the LED „alarm 1“ shines continuously, relay 1 remains dropped. The LED „alarm 2“ expires and the relay 2 closes again.

7.1 Operation of several devices connected over the alarm data bus

1. An alarm arising in the system is transmitted to all devices and releases on all devices the „alarm 2“ (relay 2 drops and LED „alarm 2“ flashes).
2. By operation of any local or external button all devices are acknowledged (relay 2 closes and LED „alarm 2“ is deleted).

7.2 Alarm settings

Attention:
The setting of the alarm may be implemented (changed) only by technical personnel of Hectronic.

Jumper „J601“ equipped (Standard)

With equipped Jumper the alarm is reset automatically, once the optical sensor is no more in alarm position.

Jumper „J601“ not equipped

With lining up the alarm (sensor dived in) „alarm 2“ can be acknowledged over the local or external button.

If the alarm conditions is removed (sensor not immersed) „alarm 1“ remains “on” until acknowledged using the ??? external button.

Jumper „J602“

Hectronic service mode. May not be put.

8 Table of errors / defects

1. All LED dark, acknowledge not possible	⇨ No voltage on the device ⇨ Controller defect
2. Green LED „ON“ is shining Red LED „alarm 1“ and LED „alarm 2“ is flashing The two alarm relays dropped, acknowledge is possible	⇨ Sensor dived in ⇨ Sensor defect ⇨ Sensor not or falsely wire ⇨ Isolation defect on the sensor cable ⇨ Short circuit or interruption on the probe cable ⇨ Foreign light influence ⇨ Probe outside of tolerance ⇨ Line covering too largely ⇨ Prove analysis of the controller defect
3. Green LED „ON“ flashing Red LED „alarm 1“ and „alarm 2“ dark Both alarm relays are closed	⇨ Sensor dirty, function however still ensured ⇨ Short circuit on the button line or wiring errors
4. Green LED „ON“ flashing Alarm condition see chapter 2	⇨ Sensor defect, test cycle is not answered
5. Green LED „ON“ flashing Alarm relay 2 dropped LED „alarm 2“ flashing, acknowledge possible	⇨ Short circuit on the alarm signal line ⇨ Any device in the system is defect or wiring error
6. Alarm relay 2 dropped and LED „alarm 2“ flashing, acknowledge possible	⇨ Any controller in the system releases „alarm 2” over the alarm signal line“, possibilities of errors see chapter 2.

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