



## ***Instruction Manual***

### ***FKE.NS20K***

***Electrode relay for conductive level switches***



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## Description

Level-Relays NS 20 K for conductive liquids can be used as monitors for 1 Level and for controlling a level between 2 electrodes.

- 3 elektrodes for MIN/MAXcontrol
- 2 elektrodes (E2 open) as level monitor
- Sensitivity adjustable 5 k $\Omega$ ...250 k $\Omega$
- LED for state of relay
- Function of relay reversible (picks up or releases at top electrode)
- Switching-delay adjustable 0,1...10 s
- Housing 35 mm wide, mounting height 55 mm
- Universal supply-voltage AC/DC 24-240 V

### Application level monitor:

Protection from running dry or overflow, monitoring of pumps for leaks, detection of leaks.

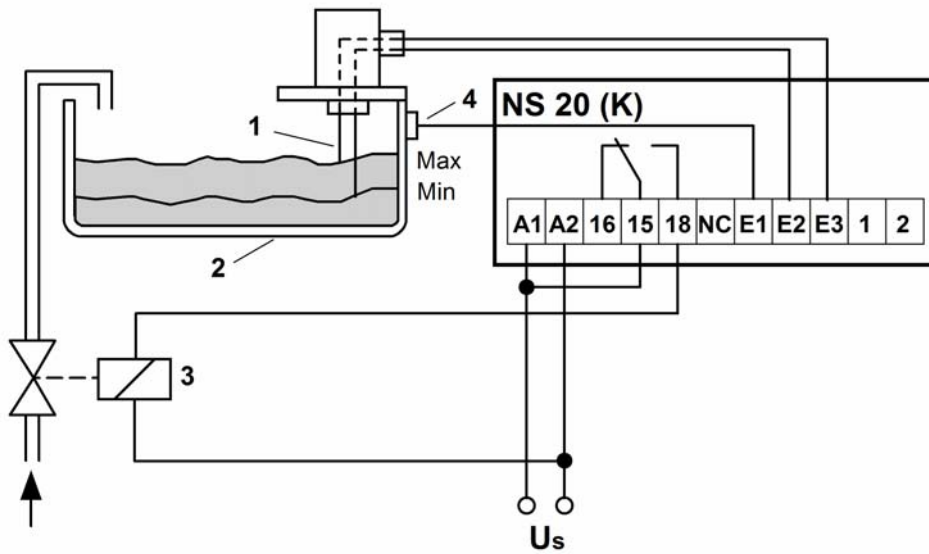
### Application Min/Max:

Controlling a level between minimum (elektrode E2) and maximum (E3). As long as E3 is dry, a magnetic valve is opened (or a pump is running) and liquid is influencing. As soon as maximum (E3) is reached, the NS 20 K closes the valve. When the level falls below E2, the cycle starts new.

In reverse also discharging of a container can be controlled.

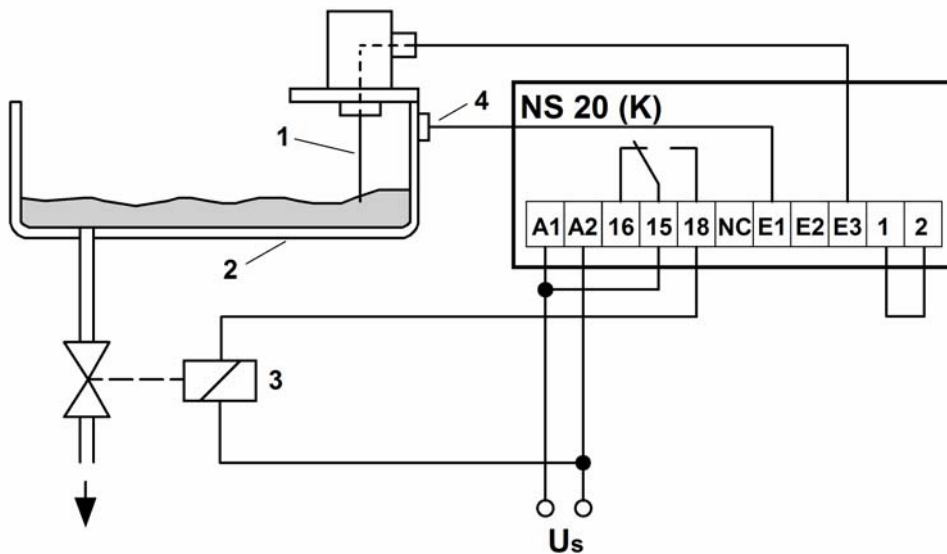
## Connection Plan

**fillung tank with 2 electrode** (E3 dipped, relay off 15 – 16 closed)



- 1 electrode
- 2 tank
- 3 magnetic valve
- 4 basic electrode

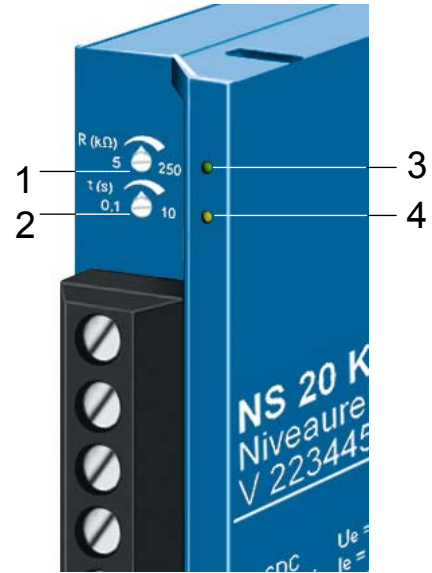
**monitoring of liquid with 1 electrode** (E3 dipped, relay on 15 – 18 closed)



- 1 electrode
- 2 tank
- 3 magnetic valve
- 4 basic electrode

# Display and Operating Elements

1. Potentiometer for Sensitivity
2. Potentiometer Switching-delay
3. LED Power
4. LED Relay On

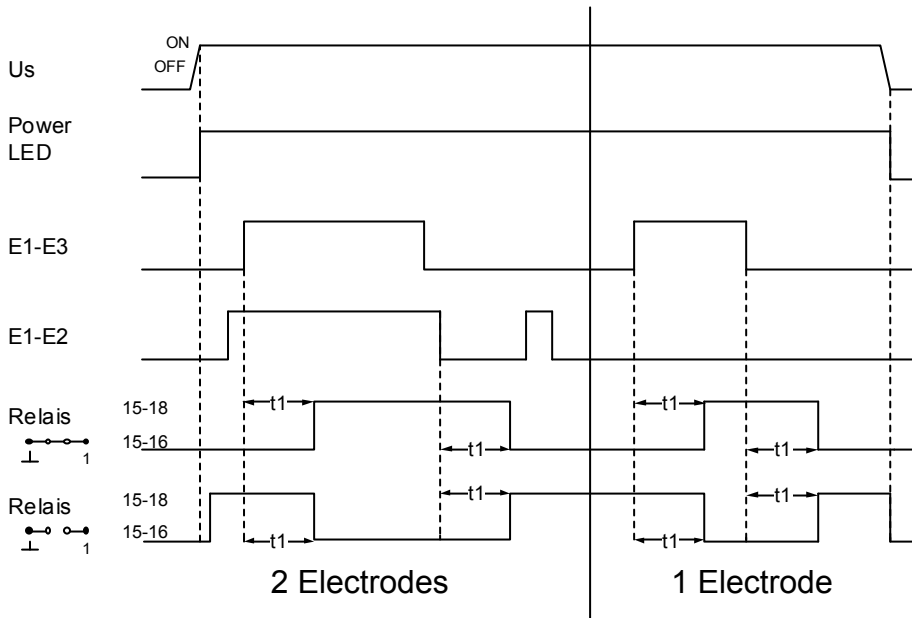


## Overview of functions example filling with 2 electrodes

The detection of the level is made with a **DC-free** measuring of resistance between all electrodes. The common electrode is E 1. A magnetic valve that is switched with relay-contacts 15-18 opens and lets liquid in until the upper electrode E3 is in contact with the liquid. Then the relay releases (15-18 open) and the valve closes. The relay remains released as long as electrode E 2 is in contact with the liquid. When the level falls below E2, the relay picks up (LED Relay on, 15-18 close) and the procedure starts new with opening the valve. Thus the level of the liquid is kept between E 1 and E 2.

For monitoring one level only or in applications to protect from running dry or overflow or leak detection, only electrodes E1 and E3 are connected.

## Action Chart



t1 = adjusted switching-delay  
LED Relay on = relay

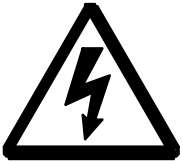
## Installation

- Installation in switchgear cabinet on 35 mm mounting rail or wall-mount with screws M4
- Connection according to connection plan or type plate

### **ATTENTION!**

**Before switching on the unit make sure that the connected voltage corresponds with the voltage on the lateral type-plate!**

**Observe the maximum temperature permissible when installing in switching cabinet. Make sure sufficient space to other equipment or heat sources. If the cooling becomes more difficult e.g. through close proximity of apparatus with elevated surface temperature or hindrance of the cooling air, the tolerable environmental temperature is diminishing.**



### **ATTENTION**

**Dangerous electrical voltage!**

**May lead to electrical shock and burn.**

**Before beginning of work switch unit and equipment free of voltage.**

## Putting into Operation

LED Power on = ready

LED Relay On on = relay picked up (15-16 open, 15-18 closed)

### **Adjusting the sensitivity:**

- Start with potentiometer set for highest sensitivity/resistance (250 k $\Omega$ )
- At malfunction because of too long cables (capacity of cable) or when conductive foam covers the electrodes reduce sensitivity (turn left).
- At liquids with a high conductivity (e.g. dirty water) a low sensitivity can be set from the beginning

## Error Search

- Relay doesn't switch
  - Check whether LED Power is on and if supply-voltage is connected properly to A1, A2 and if it corresponds with the voltage on the lateral type-plate.
  - Check whether the electrodes are connected properly.
- Relay switches though the electrodes are not in contact with the liquid:
  - Check whether the electrodes are bridged by a liquid film or by
  - Capacity of cable too highNormally both errors can be solved by setting the sensitivity to a lower resistance (turn potentiometer left)

In case of any other malfunctions send it in for repair together with a description of the occurred malfunction.

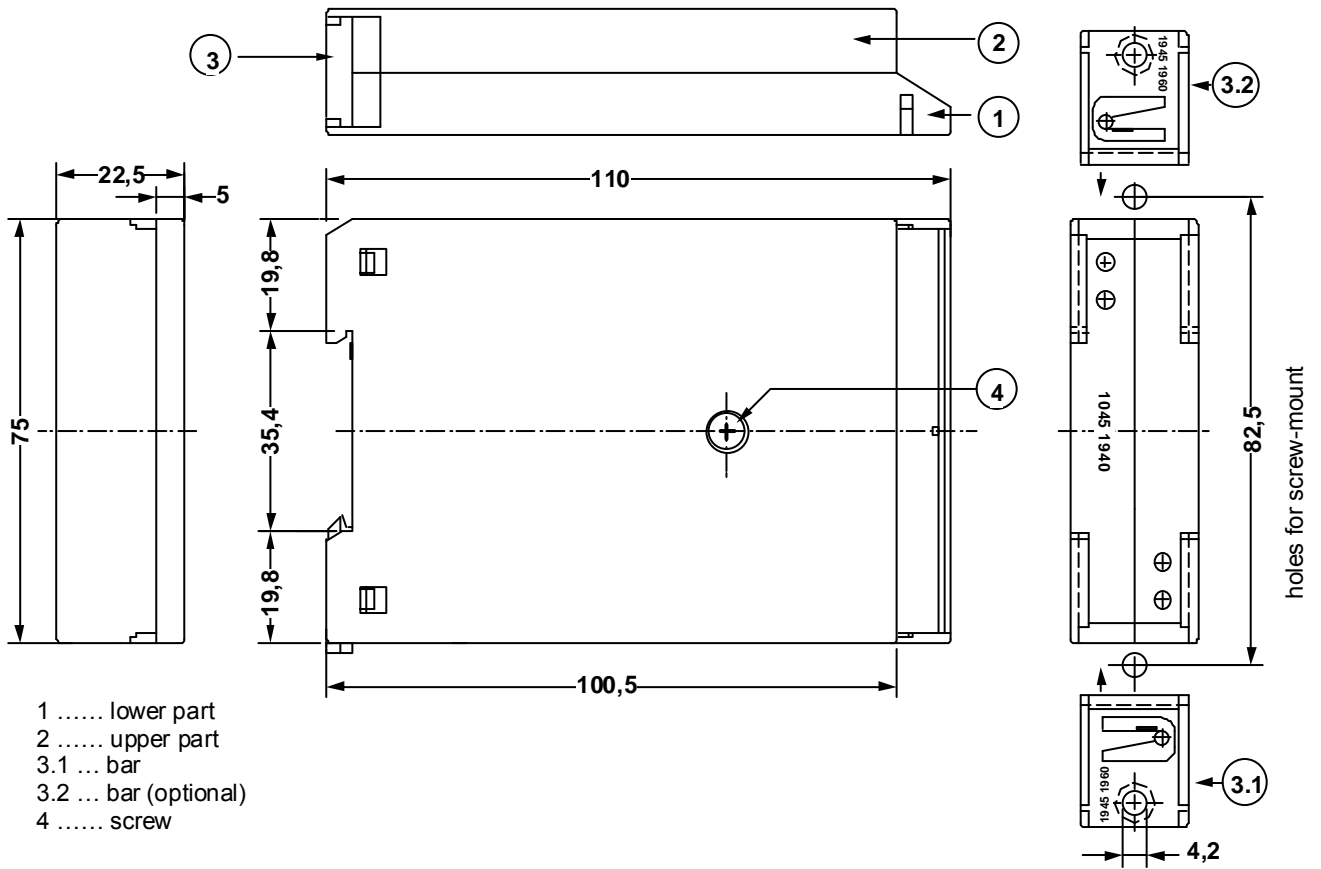
## Technical Data

<u>Supply voltage <math>U_s</math>:</u>	AC/DC 24 – 240 V, 50 / 60 Hz < 3 W < 5 VA
Tolerance	DC 20,4 - 297 V, AC 20 - 264 V
<u>Level-electrodes (E1 , E2 , E3)</u>	
max. voltage:	< 6 V <sub>eff</sub>
max. current:	<250 $\mu$ A
Switching point:	adjustable app. 5 k $\Omega$ ... 250 k $\Omega$
Switching point	max. cable-length      max. capacity of cable.
5 k $\Omega$	2500 m                      500 nF
250 k $\Omega$	50 m                        10 nF
Switch on-/off-delay	0,1...10sec adjustable
Tolerance	25%
<u>Data of relay</u>	
Type of contact	EN 60947-5
Switching voltage	1 change-over-contact (CO)
Switching current	max. AC 415 V
Switching power	max. 6 A
	max. 2000 VA (ohmic load)
	max. 120 W bei DC 24 V
Rated nominal current $I_e$ for CO	3 A AC15 250 V; 2 A DC13 24 V
Recommended fuse	3,15 A slow (gL)
Contact life mechanical	$3 \times 10^7$ operations
Contact life electrical	$1 \times 10^5$ operations at 240 V / 6 A
	$1 \times 10^6$ operations at 240 V / 2 A
Reduction factor at $\cos\phi = 0,3$	0,5
UL electrical ratings	250 V ac, 3 A, general use
	240 V ac, 1/4 hp, 2.9 FLA
	120 V ac, 1/10 hp, 3.0 FLA
	C 300

<u>Test conditions:</u>	EN 50178 / EN 60 947 safe insulation
Rated impulse withstand voltage	4000 V
Contamination level	3
Rated insulation voltage Ui	250 V
On-period	100 %
Rated ambient temperature range	-20 °C ... +60 °C
	EN 60068-2-1 dry heat
Interference resistance	EN 61000-6-2
Interference transmission	EN 61000-6-3
Vibration resistance EN 60068-2-6	2...25 Hz ±1,6 mm
	25 ... 150 Hz 5 g
<u>Housing</u>	design K
Dimensions (B x H x T)	75 x 22,5 x 110 mm
Line connection 1 wire	each 1 x 0,75...2,5 mm <sup>2</sup>
Stranded wire with wire-end sleeves	each 1 x 0,14...1,5 mm <sup>2</sup>
Protection housing	IP 40
Protection terminals	IP 20
Attachment	Snap-mount on DIN-rail 35 mm according to EN 60 715 or screws M4
Weight	app. 100 g

**Subject to technical changes**

# Housing K Dimensions in mm

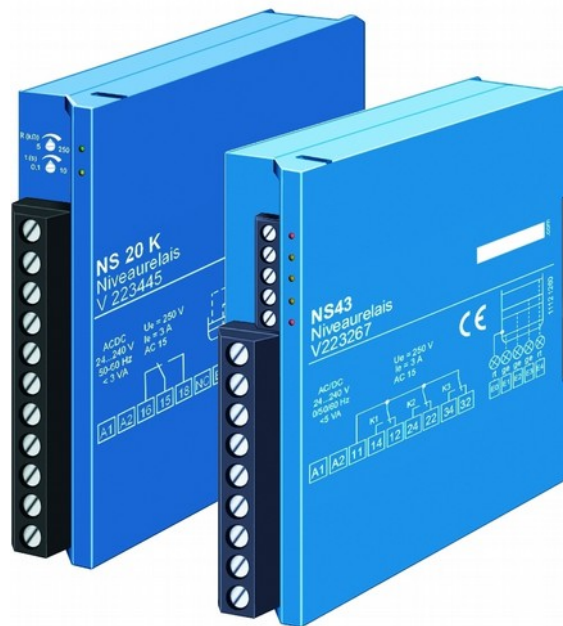




# FKE

## Electrode Relay for Conductive Level Switch

- limit value detection
- pump control
- overflow protection
- dry-run protection



### Description:

The electrode relays of the FKE series are used in conjunction with the conductive level switches of the FK01 to FK12 series to measure the level of conductive liquids.

An alternating voltage is applied to an electrode insulated from the vessel. If this electrode is wetted by the medium, a small current flows from the electrode through the medium to the vessel wall (for plastic vessels to a separate ground electrode). This current flow is detected by the electrode relay and output as a switching signal.

### Typical applications:

- for level detection in vessels with conductive liquids
- full and empty signal
- level control between two filling levels
- overflow protection
- dry-run protection

## Models:

- FKE.NS20K:** Electrode relay for pump control or for limit value detection
- FKE.NS43:** Electrode relay for pump control with 2 additional switching points for overflow and dry-run protection

## Order Code:

Order number: **FKE. NS43. 2**

Electrode relay for conductive level switch

### Connection:

NS20K = pump control relay or 1 limit value  
NS43 = pump control relay, 2 additional limit values

### Power supply:

2 = 24-240 V AC/DC

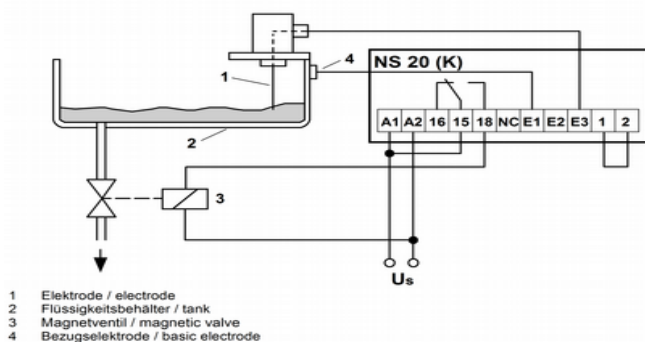
### FKE.NS20K: Electrode relay for pump control or limit value detection

#### Connection of max. 2 electrodes:

The device is used for limit value monitoring, e. g. as overflow or no-load protection.

Switching function: E1 and E3 wetted: relay ON

**Überwachung Flüssigkeitsstand mit 1 Elektrode** (E3 benetzt, Relais an 15-18 geschlossen)  
**monitoring of liquid with 1 electrode** (E3 dipped, relay on 15-18 closed)

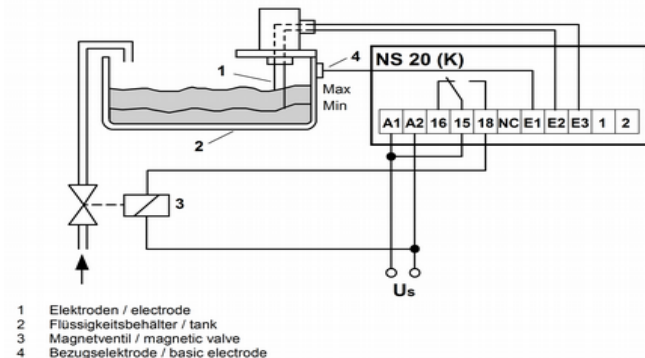


#### Connection of max. 3 electrodes:

The device is used to control a liquid level between a maximum value (E3) and minimum value (E2). The common ground (E1) is connected to the vessel wall (for metal vessels) or a third electrode.

As long as the electrode E3 is not wetted, the output relay switches into on-position. If the liquid reaches level E3, the output relay drops out. Only when the liquid level falls below level E2 again does the output relay energize again and the cycle starts again.

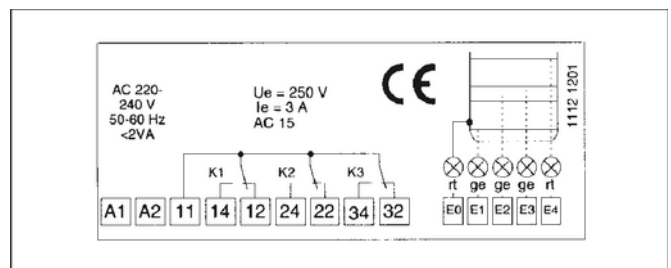
**Zulaufsteuerung mit 2 Elektroden** (E3 benetzt, Relais aus 15-16 geschlossen)  
**filling tank with 2 electrodes** (E3 dipped, relay off 15-16 closed)



### FKE.NS43: Electrode relay for pump control with 2 limit values

By using this electrode relay, an additional full and empty monitoring can be carried out in addition to the level control between two levels.

A maximum of 5 electrodes can be connected (2 x for level control, 1 x each for full or empty signal, 1 x common ground). Three output relays are used for pump and valve control as well as for the output of the full and empty signal.



## Technical Data:

### Electrode relay:

**design:** snap rail housing according to DIN50022

### Supply:

24-240 V AC/DC

### Output relay:

FKE.NS43: SPDT, max 440 VAC, max. 8 A, max. 2000 VA  
FKE.NS20K: SPDT, max . 415 VAC max. 6 A, max. 2000 VA

### Response

#### sensitivity:

adjustable, 25...250 kOhm

### Protection class:

FKE.NS43: IP30, clamps IP20  
FKE.NS20K: IP40, clamps IP 20

### Environment temp.:

-20...+55 °C