

## NCVR DB PVC / NCVRI DB PVC

### CONDUCTIVE ELECTRODES WITH BUILT-IN AMPLIFIER



Application		<p>Level control of general purpose for conductive liquids.</p> <p>The housing contains the built-in amplifier reducing costs, installation time and easing the start-up.</p> <p>The operating mode depends on the number of electrodes:</p> <ul style="list-style-type: none"> <li>• With 2 electrodes: one level detection (amplifier KNPA). See page 2.</li> <li>• Con 3 electrodes: maximum/minimum detection (amplifier KNCA). See page 3.</li> </ul>	
Operating principle		<p>The sensor uses the rods to detect the liquid contained into the tank from which the level is to be controlled. The detection of such level or the lack of it provokes the reaction of a relay.</p> <p>A timing can be added to delay the detection in tanks with shaking mechanisms or with turbulences.</p> <p>In order to facilitate the adaptation to the characteristics of the installation, the state of the relay constacts can be selected.</p>	
Sensor	Process connection	DIN flange. DN25. PVC.	
	Electrode	SS AISI316 (1.4401). ø5 mm.	
	Electrode length	1000 mm.	
	Volt./Cur. in electrodes	5 V <sub>pp</sub> / 4 mA (in shortcircuit)	
	Process temperature	-20..+70 °C. Other temperatures, please consult.	
	Process pressure	5 Kg/cm <sup>2</sup>	
	Sensitivity	Adjustable between 1..100 KΩ (1000 μs..10 μs) (See table).	
	Electrode insulation (only NCVRI model)	Polyolefin shrink tube. The protective covering ensures detection set points. The Polyolefin is resistant to abrasion, to acids and alkalis.	
Housing	Material and dimensions	PBT. 64 x 95 x 110 mm	
	Protection	IP67	
	Temperature	-20..+70 °C	
	Cable gland	M20 x 1,5 (IP68)	
Output	Type	SPDT relay 6A/250VAC	
	Response time	<ul style="list-style-type: none"> <li>• At power on: 800 ms</li> <li>• At liquid detection: 500 ms</li> </ul>	
	Timing	Adjustable between 0..9 s. Can be set at detection, at undetection or at both situations.	

Sensitivity ranges

Sensitivity	Detecting (≤ kohm)	Undetecting (≥ kohm)
0	1	2
1	6	12
2	12	24
3	17	34
4	23	46
5	28	56
6	34	68
7	39	78
8	45	90
9	50	100

REFERENCE		PROCESS CONNECTION					SUPPLY VOLTAGE		ELECTRODE								
NCVR	Level sensor	DB	DIN flange	P	PVC	P34	DN25	024	24 VCA	2 E	2 Electrodes	1000	1000 mm				
								048	48 VCA								
								110	110..125 VAC								
NCVRI	Level sensor (electrode isolated)							230	220..240 VAC					3 E	3 Electrodes		
								901	15..70 VAC/DC							L	PE
								902	60..240 VAC/DC								

To compose a reference, select one option of each column. Example: NCVR TBP P34 024 2E L1000

## NCVR DB PVC



2 Electrodes

1 level control

### Default values



### Sensitivity adjustment



5

### State of the relay contacts



### Timing type



### Time



1s


### Run



## Start-up and adjustment



Prior to start working with the sensor NCPR, it must be adjusted for getting a right operation. Adjustments can be modified whenever required. It must be taken into account that the behaviour of the device can be different whether the adjustments are done while the electrodes are in touch or not with the liquid.

Be sure that the options selector is right positioned. Each time that it is moved to a new option, the led @ flashes twice indicating that the option has been correctly reached.




The sensor is adjusted by default with values that can be used in a large number of applications. When pressing the push-button PROG the led @ turns on. Keep the push-button pressed until the led @ turns off (3 seconds), indicating that the default values have been reset (they are framed with  at the left column).

When accessing to this option, the led @ emits as many flashes as the adjusted sensitivity value, between 0 and 9. Each time the push-button PROG is pressed, the sensitivity value increases in 1, except when the value is 9 that moves to 0. If it is pressed longer than 3 seconds, the sensitivity value moves to 0.

See the table at bottom to relate each digit with its ohmic value.

(Relay NO (  ): led @ OFF; Relay NC (  ): led @ ON). When accessing to this option, the led @ shows the actual state of the adjustment. Each time the push-button PROG is pressed, it is reversed the state of the relay contacts.

WARNING: This option modifies the state of the relay and this could provoke undesired effects in the case that any device be connected to the contacts of the relay.

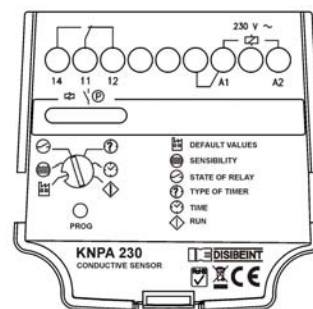
(Detecting (  ): led @ OFF; Undetecting (  ): led @ OFF; Detecting and undetecting (  ): led @ flashing). When accessing to this option, the led @ shows the actual state of the adjustment. Each time the push-button PROG is pressed, it is moved to the next timing type in a cyclic way.

When accessing to this option, the led @ emits as many flashes as the number of seconds adjusted in the timer, between 0 and 9 seconds. Each time the push-button PROG is pressed, the time value increases in 1 second, except when the value is 9 that moves to 0.

If it is pressed longer than 3 seconds, the time value moves to 0.

Normal operation mode.

The state of the led @ matches with the state of the relay contact (led ON = relay ON).



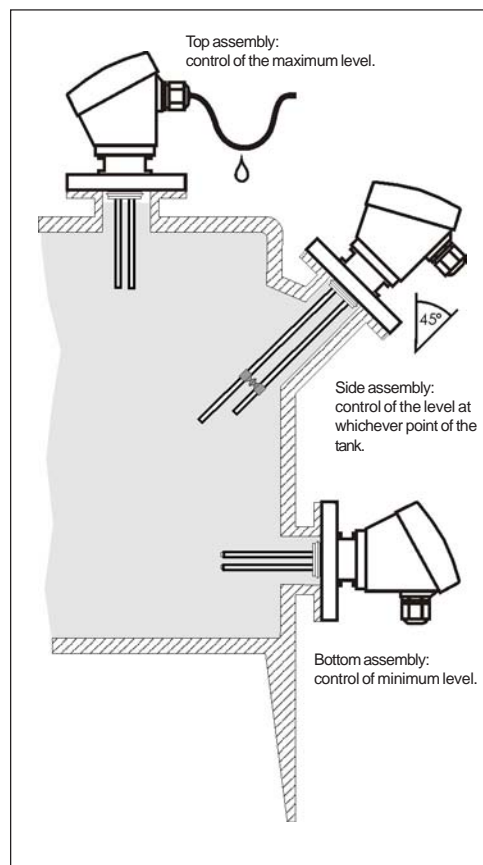
## Assembly conditions

**Electrodes:** The electrodes can be cut to reach the required detection height. Because the detection point is unique, it is recommended to cut them at the same length. During the cutting process, be careful in preserving the housing of mechanical stress that may damage the binding of the electrode with the electronic circuitry.

**Mounting position:** The sensor can be mounted in any position. In the case of mounting at the tank side, it is suggested to use the model NCVRI with isolated electrodes, that will prevent an undesired communication through the deposition of liquid on the electrodes. In the same way, if the rods are very large (more than 1 meter, usually), it is recommended to use the separator NR.SEP/P to keep the electrodes isolated while the liquid is not in contact with them.

**Handling:** Do not use the housing to screw the sensor into the fitting. Use a tool 40 mm wide at the steel part on the thread. Once tightened, you can turn the housing 350° with your hand until it be placed in the right position.

**Electrical connection:** Use a cable according with the load the relay will manage. It is convenient that the cable gland completely tight the cable of the electrical connection, and it becomes essential in the event of humidity or when installed outdoor. In these cases, make a loop in the cable to facilitate the removal of accumulated drops (see figure).



## NCVR DB PVC



3 Electrodes

Max / Min

Default values



Sensitivity adjustment



5

State of the relay contacts



Run



### Start-up and adjustment

Before to start-up the sensor NCVR it must be adjusted to get a right operation.

Adjustments can be modified whenever needed. Must be taken into account that the sensor behaviour can change whether the adjustments are done while the electrodes are in contact with the liquid or not.

Be sure that the options selector is right positioned. Each time it is moved to a new option, the led Ⓢ flashes twice indicating that this option has been correctly reached.

The sensor is adjusted by default with values that can be used in a large number of applications. When pressing the push-button PROG the led Ⓢ turns on. Keep the push-button pressed until the led Ⓢ turns off (3 seconds), indicating that the default values have been reset (they are framed with   at the left column).

When accessing to this option, the led Ⓢ emits as many flashes as the adjusted sensitivity value, between 0 and 9. Each time the push-button PROG is pressed, the sensitivity value increases in 1, except when the value is 9 that moves to 0. If it is pressed longer than 3 seconds, the sensitivity value moves to 0.

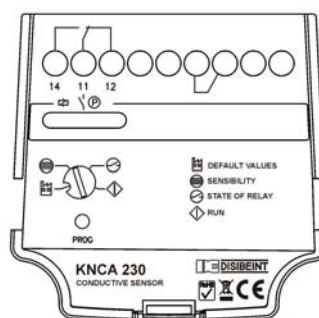
See the table at bottom to relate each digit with its ohmic value.

(Relay NO ( ): led Ⓢ OFF; Relay NC ( ): led Ⓢ ON). When accessing to this option, the led Ⓢ shows the actual state of the adjustment. Each time the push-button PROG is pressed, it is reversed the state of the relay contacts.

**WARNING:** This option modifies the state of the relay and this could provoke undesired effects in the case that any device be connected to the contacts of the relay.

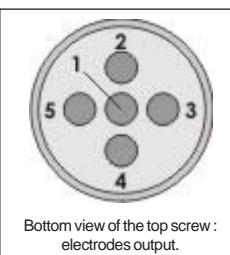
Normal operation mode.

The state of the led Ⓢ matches with the state of the relay contact (led ON = relay ON).



### Assembly conditions

**Electrodes:** The electrodes can be cut to reach the required detection height. The common electrode must be the largest one and it is identified with the number "2" at the bottom side of the top screw (see figure). The electrode for minimum level must be equal or shorter than the common one. During the cutting process, be careful in preserving the housing of mechanical stress that may damage the binding of the electrode with the electronic circuitry.

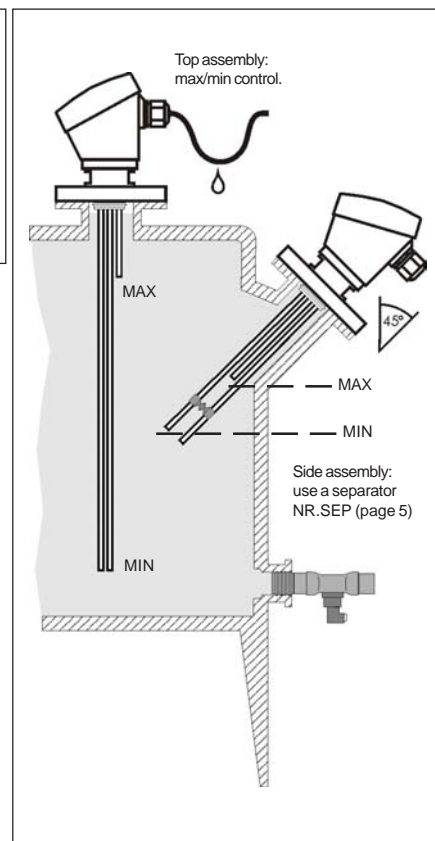


Bottom view of the top screw : electrodes output.

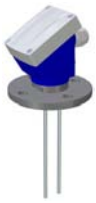
**Mounting position:** The sensor can be mounted in any position. In the case of mounting at the tank side, it is suggested to use the model NCVRI with isolated electrodes, that will prevent an undesired communication through the deposition of liquid on the electrodes. In the same way, if the rods are very large (more than 1 meter, usually), it is recommended to use the separator NR.SEP/P to keep the electrodes isolated while the liquid is not in contact with them.

**Handling:** Do not use the housing to screw the sensor into the fitting. Use a tool 40 mm wide at the steel part on the thread. Once tightened, you can turn the housing 350° with your hand until it be placed in the right position.

**Electrical connection:** Use a cable according with the load the relay will manage. It is convenient that the cable gland completely tight the cable of the electrical connection, and it becomes essential in the event of humidity or when installed outdoor. In these cases, make a loop in the cable to facilitate the removal of accumulated drops (see figure).



Model



**NCVR DB PVC 2E  
NCVRI DB PVC 2E**

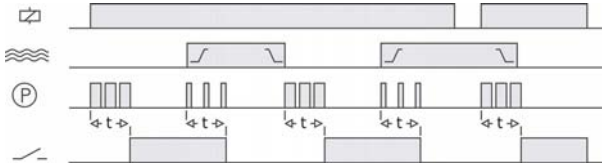
- 2 Electrodes
- Amplifier *KNPA*



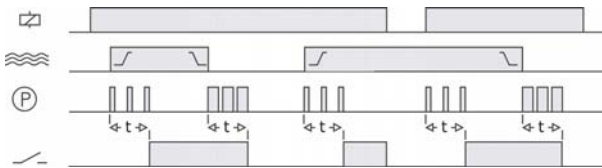
**NCVR DB PVC 3E  
NCVRI DB PVC 3E**

- 3 Electrodes
- Amplifier *KNCA*

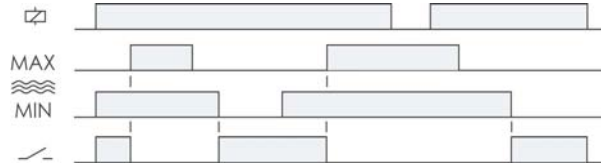
Operating diagrams



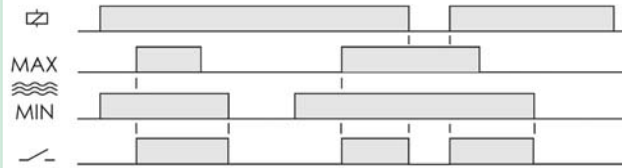
Simulation: Control of maximum level or filling  
Relay contacts: NC  
Timing type: Detecting and undetecting  
Time: Any value greater than 0



Simulation: Control of minimum level or emptying  
Relay contacts: NO  
Timing type: Detecting and undetecting  
Time: Any value greater than 0



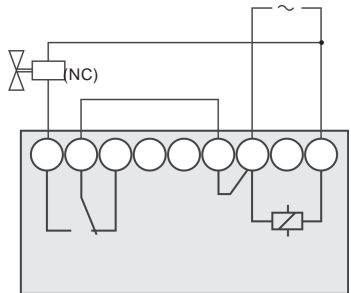
Simulation: Control for filling  
Relay contacts: NC



Simulation: Control for emptying  
Relay contacts: NO

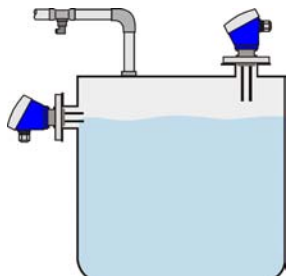
Example of wiring connection

Control of maximum level  
or filling control using a  
sensor with 2 electrodes  
and the amplifier KNPA.

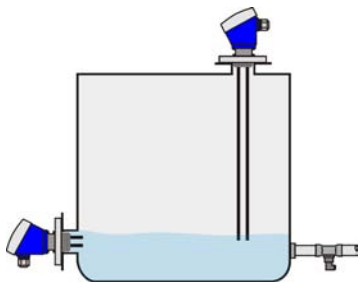


Filling control using a  
sensor with 3 electrodes  
and the amplifier KNCA.

Installation examples



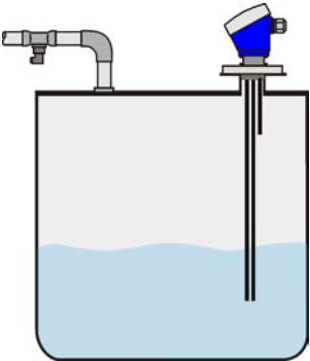
Detection of maximum level



Detection of minimum level



Detection of liquid  
inside the pipes

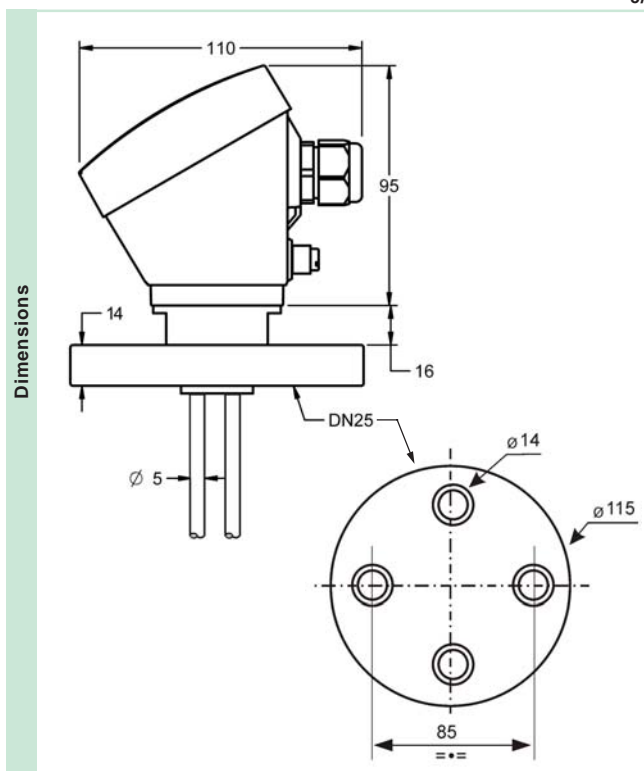


Detection of maximum and minimum level

Output relay	KNCA		KNPA	
	Resistive load	AC	6 A / 250 V	
		DC	0,2 A / 200 V	
	Inductive load	AC	6 A / 24 V	
		DC	3 A / 250 V	
	Mechanical life		3 A / 24 V	
	Max. mechanical operations		> 30 x 10 <sup>6</sup> operations	
	Electrical life at full load		72.000 operations / hour	
	Contact material		360 operations / hour	
	Maximum voltage		AgNi 0.15	
	Operating voltage		400 VAC	
	Volt. between changeovers		400 VAC	
	Voltage between contacts		1000 VAC	

Constructive and environmental data	KNCA / KNPA	
	Voltage phase-neutral	300 V
	Overvoltage category	III
	Shocking voltage	4 kV
	Pollution degree	2
	Protection class	IP 20
	Storing temperature	-50..+85°C
	Operating temperature	-20..+50°C
	Humidity	30..85% HR
	Housing	Cycloxy - Light Grey
	Socket	Lexan - Light Grey
	Leds window	Lexan - Transparent
	Buttons and terminal blocks	Technyl - Dark Blue
	Terminals	Nickled brass
	Norms	Designed and manufactured under EEC standards. Directive for electromagnetic compatibility 2004/108/EEC. Directive for low voltage 2006/95/EEC. Plastics: UL 91 V0

Supply voltage	KNCA / KNPA	
	Galvani isolation	Yes
	Frequency	50 / 60 Hz
	Operating margins	±10..-15%
	Positive	-
	Protected polarity	Terminal A1



Insulation	Poliolefine PE	
	Application	Electrodes protection against possible contacts among them.
	Colour	Grey
	External diameter (approx.)	7 mm
	Temperature	+70°C
	Models	NCVRI TB ... L

Accessories	NR.SEP/P	NR.SEP/T
	Application	Electrodes separator
	Material	PVC
	Electrode diameter	5 mm