

## NCVRC TB PVC

### CONDUCTIVE ELECTRODES WITH BUILT-IN AMPLIFIER



Application		Level control of general purpose for conductive liquids. The housing contains the built-in amplifier reducing costs, installation time and easing the start-up. The operating mode depends on the number of electrodes: · With 2 electrodes: one level detection (amplifier KNPA). See page 2. · With 3 electrodes: maximum/minimum detection (amplifier KNCA). See page 3.																																	
Operating principle		The sensor uses the electrodes to detect the liquid contained into the tank from which the level is to be controlled. The detection of such level or lack of it provokes the reaction of a relay. A timing can be added to delay the detection in tanks with shaker mechanisms or with turbulences. In order to facilitate the adaptation to the characteristics of the installation, the state of the relay contacts can be selected.																																	
Sensor	Process connection	Top screw 1"1/2 G. PVC.																																	
	Electrode	Stainless Steel AISI303.																																	
	Type of cable	Plaited, in Stainless Steel AISI316, Ø3 mm. Depending on the application, you can be choose with PVC or PTFE isolation.																																	
	Cable length	300..20000 mm.																																	
	Volt./Cur. in electrodes	5 V <sub>pp</sub> / 4 mA (in shortcircuit)																																	
	Process temperature	-20..+70 °C																																	
	Process pressure	5 Kg/cm <sup>2</sup>																																	
	Sensitivity	Adjustable between 1..100 KΩ (1000 μs..10 μs) (See table)																																	
Housing	Material and dimensions	PBT. 64 x 95 x 110 mm																																	
	Protection	IP67																																	
	Temperature	-20..+50 °C																																	
	Cable gland	M20 x 1,5 (IP68)																																	
Output	Type	SPDT relay 6A/250VAC																																	
	Response time	· At power on: 800 ms · At liquid detection: 500 ms																																	
	Timing	Adjustable between 0..9 s. Can be set at detection, at undetection or at both situations.																																	
		<table border="1"> <thead> <tr> <th>Sensitivity</th> <th>Detected (≤ kohm)</th> <th>Undetected (≥ kohm)</th> </tr> </thead> <tbody> <tr><td>0</td><td>1</td><td>2</td></tr> <tr><td>1</td><td>6</td><td>12</td></tr> <tr><td>2</td><td>12</td><td>24</td></tr> <tr><td>3</td><td>17</td><td>34</td></tr> <tr><td>4</td><td>23</td><td>46</td></tr> <tr><td>5</td><td>28</td><td>56</td></tr> <tr><td>6</td><td>34</td><td>68</td></tr> <tr><td>7</td><td>39</td><td>78</td></tr> <tr><td>8</td><td>45</td><td>90</td></tr> <tr><td>9</td><td>50</td><td>100</td></tr> </tbody> </table>	Sensitivity	Detected (≤ kohm)	Undetected (≥ 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
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7	39	78																																	
8	45	90																																	
9	50	100																																	

REFERENCE		PROCESS CONNECTION			SUPPLY VOLTAGE		ELECTRODE		
NCVRC	Level sensor	TB	Top screw	P	PVC	P08	1"1/2 G	024	24 VAC
								048	48 VAC
								110	110..125 VAC
								230	220..240 VAC
								901	15..70 VAC/DC
902	60..240 VAC/DC								
				2 E	2 Electrodes		CVnnn (PVC isolation)	nnn = meters of cable. The total length of cable is the addition of the different lengths for each electrode.	
				3 E	3 Electrodes				
						CFnnn (PTFE isolation)			

To compose a reference, select one option of each column. Example: NCVRC TBP P08 024 2E CVnnn

**NCVR TB PVC**

2 Electrodes

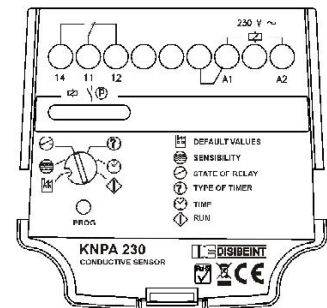
Control 1 level

**Start-up and adjustment**

Prior to start working with the sensor NCVRC, 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.

<b>Default values</b>		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).
<b>Sensitivity adjustment</b>	 	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.
<b>State of the relay contacts</b>	 	(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. <b>WARNING:</b> 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.
<b>Timing type</b>	 	(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.
<b>Time</b>	 	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.
<b>Run</b>		Normal operation mode. The state of the led @ matches with the state of the relay contact (led ON = relay ON).

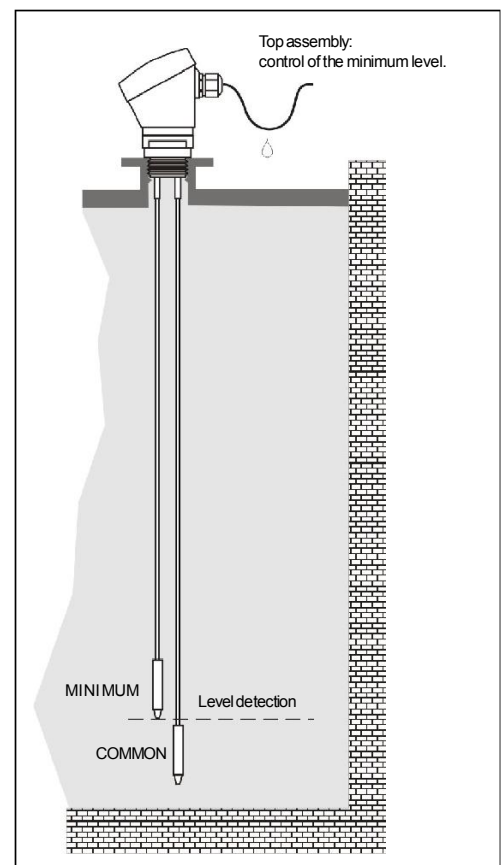
**Assembly conditions**

**Electrodes:** The electrodes can be cut to reach the required detection height. The minimum electrode must be shorter than the common electrode to prevent contact between them. The detection point for the bottom electrode minimum.

**Mounting position:** The sensor should be mounted in vertical position.

**Handling:** Do not use the housing to screw the sensor into the fitting. Use a tool 40 mm wide at the PVC 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 TB PVC**

3 Electrodes

Max / Min

**Start-up and adjustment**

Before to start-up the sensor NCVRC 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.

**Default values**

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).



**Sensitivity adjustment**

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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.

**State of the relay contacts**

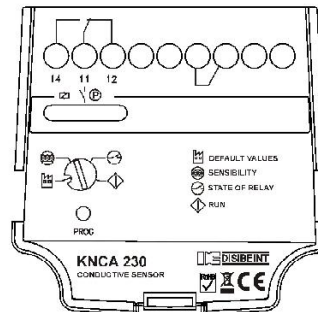
(Relay NO (  ): led Ⓢ OFF; Relay NC (  ): led Ⓢ ON). When accessing to this option, the led Ⓢ shows the actual state of the adjustment. Each time the push-button PROG is pressed, it is reversed the state of the relay contacts.

**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.

**Run**

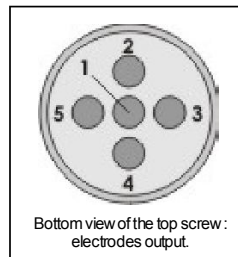
Normal operation mode.

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 minimum electrode must be shorter than the common electrode to prevent contact between them.

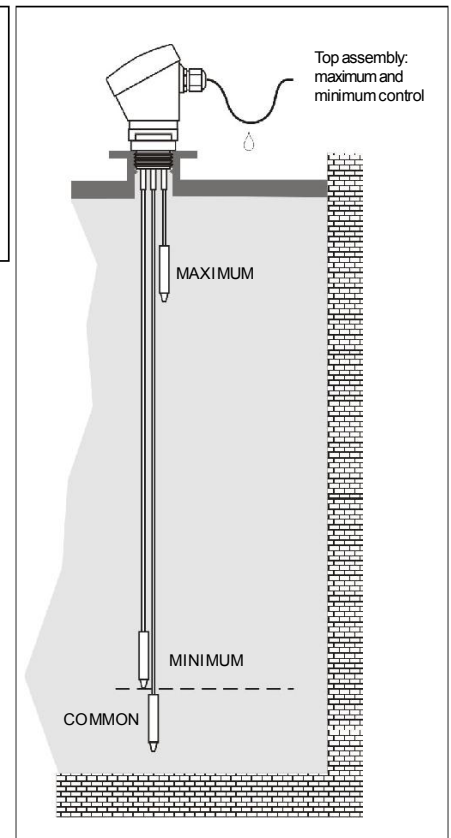


Bottom view of the top screw :  
electrodes output.

**Mounting position:** The sensor can be mounted in vertical position.

**Handling:** Do not use the housing to screw the sensor into the fitting. Use a tool 40 mm wide at the PVC 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 TB PVC 2E

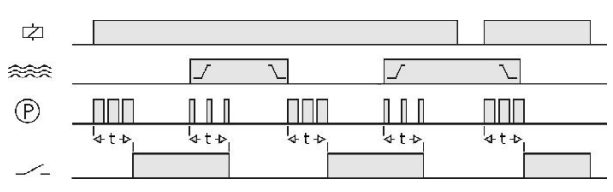
- 2 Electrodes
- Amplifier *KNPA*



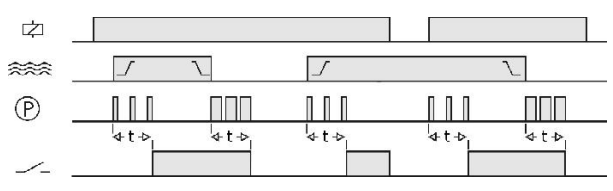
### NCVR TB PVC 3E

- 3 Electrodes
- Amplifier *KNCA*

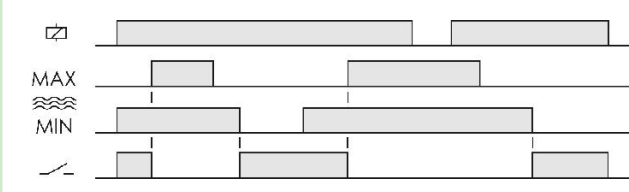
Operating diagrams



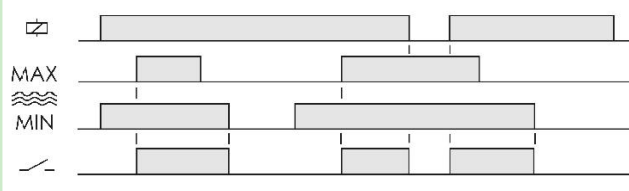
Simulation: Control of maximum level or filling  
 Relay contacts: NC  
 Timing type: Detecting and undetecting  
 Time: Any value greater than 0



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



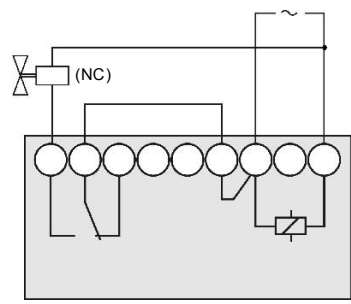
Simulation: Control for filling  
 Relay contacts: NC



Simulation: Control for emptying  
 Relay contacts: NO

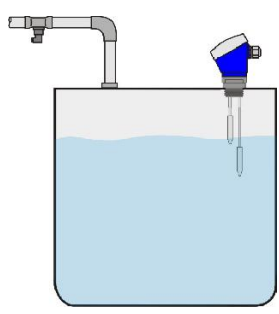
Example of wiring connection

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

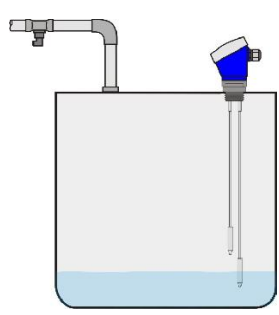


Filling control using a sensor with 3 electrodes and the amplifier KNCA.

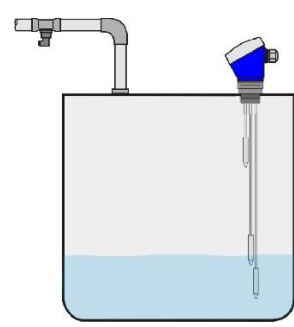
Installation examples



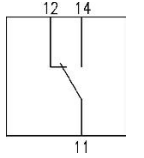
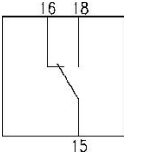
Detection of maximum level

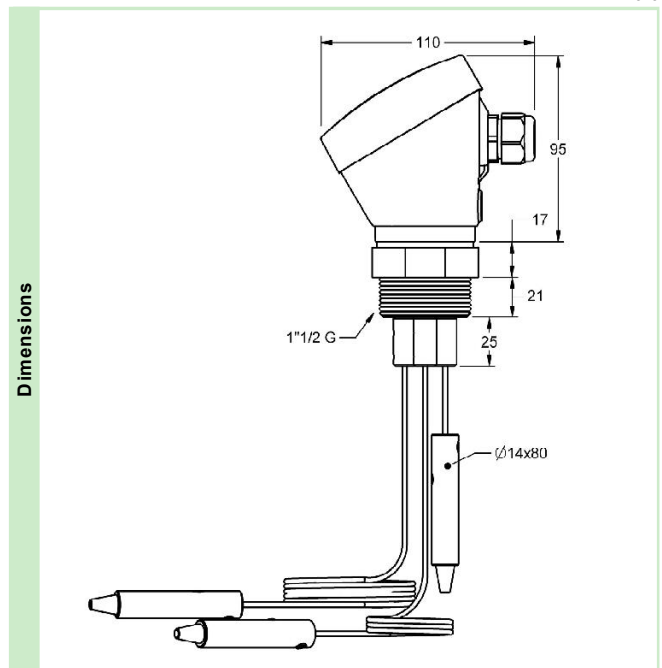


Detection of minimum level



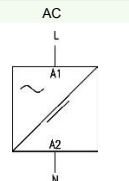
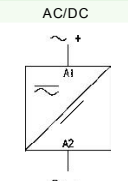
Detection of maximum and minimum level

		KNCA	KNPA
			
Output relay	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		> 30 x 10 <sup>6</sup> operations
	Max. mechanical operations		72.000 operations / hour
	Electrical life at full load		360 operations / hour
	Contact material		AgNi 0.15
	Maximum voltage		400 VAC
	Operating voltage		400 VAC
	Volt. between changeovers		1000 VAC
	Voltage between contacts		1000 VAC
Voltage coil/contact		4000 VAC	
Distance coil/contact		8 mm	
Isolation resistance		> 10 <sup>4</sup> MΩ	



		KNCA / KNPA
Constructive and environmental data	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	Cyclopol - 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

		PVC	PTFE
Insulation	Application	Electrodes protection against possible contacts among them.	
	Colour	Transparent	
	External diameter (approx.)	4 mm	
	Temperature	+70°C	+120°C
	Models	NCVRC TB...CV	NCVRC TB...CF

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