

# Thru-wall level switch

## CPK-HF-25

### INSTRUCTION MANUAL



Read the user's manual carefully before starting to use the unit or software.  
Producer reserves the right to implement changes without prior notice.



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## Used symbols

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To ensure maximum safety of control processes, we have defined the following safety instructions and information. Each instruction is labelled with the appropriate pictogram.



### Alert, warning, danger

This symbol informs you about particularly important instructions for installation and operation of equipment or dangerous situations that may occur during the installation and operation. Not observing these instructions may cause disturbance, damage or destruction of equipment or may cause injury.



### Information

This symbol indicates particularly important characteristics of the device.



### Note

This symbol indicates helpful additional information.

## Safety

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All operations described in this instruction manual have to be carried out by trained personnel or by an accredited person only. Warranty and post warranty service must be exclusively carried out by the manufacturer.

Improper use, installation or set-up of the sensor can lead to crashes in the application.

The manufacturer is not responsible for improper use, loss of work caused by either direct or indirect damage, and for expenses incurred at the time of installation or during the period of use of the level sensors.

## 1. Basic description

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Through wall level switches **CPK-HF-25** are intended for liquid (conductive and non-conductive) level detection on glass or plastic gauge-pipes, tubes and tanks. The sensor is equipped with high frequency technology, which allows reliable operation even for sensing of the adherent electrically conductive medium. The sensitivity and modes (O - normally open or C - normally closed) of the switches can be easily set by placing magnetic pen on sensitive spot. Output performance - transistor output with open collector (PNP) or two wire electronic switch (S). This connection is done by means of two wires directly into a circuit with relay or to binary input of control system.

## 2. Range of application

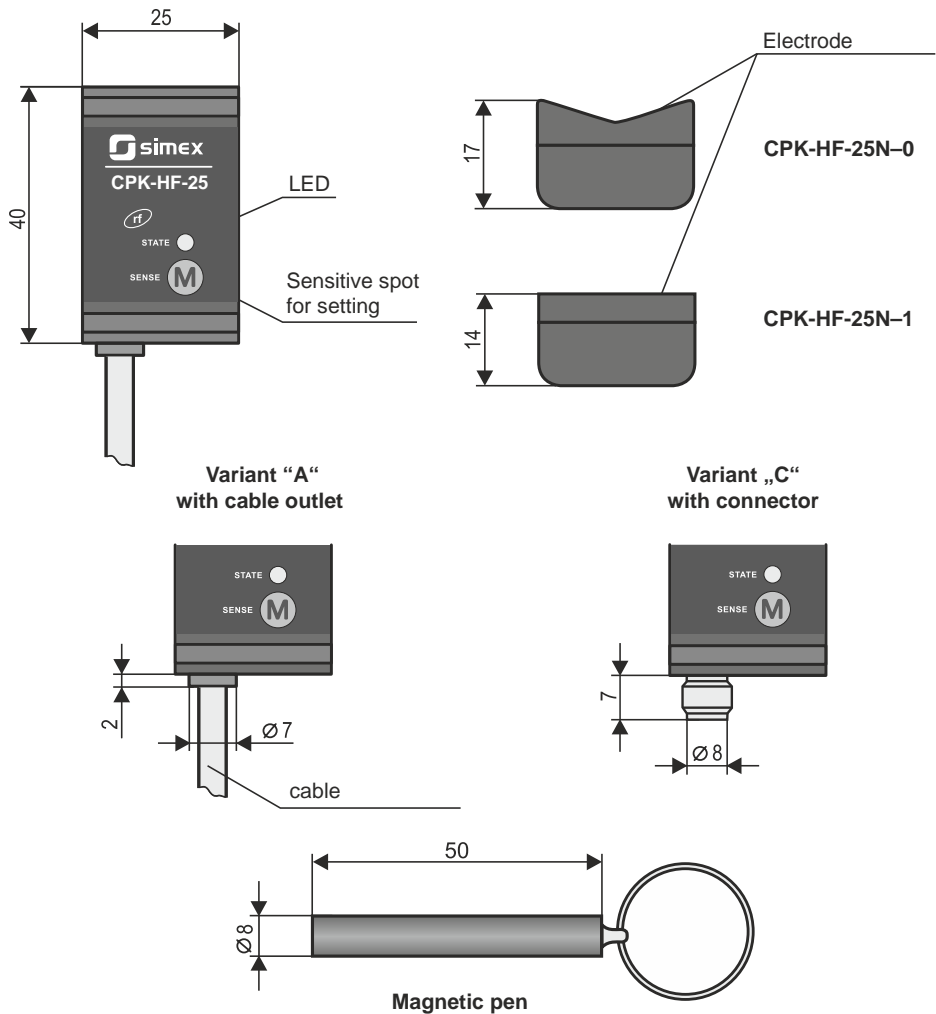
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Detection of various types of liquids - water, diesel, oil, cooling liquids, water solutions, some types of solvents. It is suitable for glass or plastic gauge-pipes, vessels, plastic container tanks, plastic tubs, pools, canisters, etc.

### 3. Variants of sensors

code	electrode	description
CPK-HF-25N-0	Prismatic (refracted) electrode	Shape-adapted to be attached to the gauging pipe or other tube. The fixing of the sensor onto a pipe is provided by plastic straps.
CPK-HF-25N-1	Plannar electrode	Suitable for installation on flat surfaces (e.g. plastic or glass tanks). The sensor can be fixed with plastic straps or by double sided adhesive layer.

### 4. Dimensional drawings



## 5. Installation and putting into operation

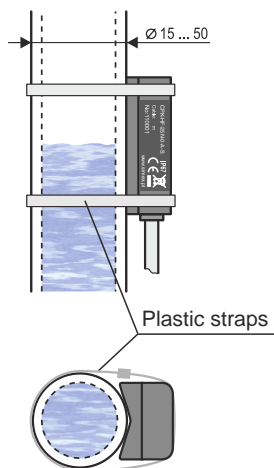
Please follow next 4 steps:

- **Mechanical mounting** - see chapter 5
- **Electrical connection** - see chapter 7
- **Settings** - see chapter 8

## 6. Mechanical mounting

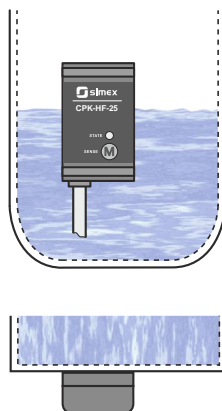
### THE SENSOR TYPE CPK-HF-25N-0

- is intended to point level detection on plastic or glass and gauge-tubes.
- The sensor is fixed to the gauge pipe or tube by means of two plastic straps (2.5 mm width). The cable should be vertically downwards oriented. The maximum wall thickness of the tube depends on the detected medium (see technical data), the maximum is 8 mm.



### THE SENSOR TYPE CPK-HF-25-1

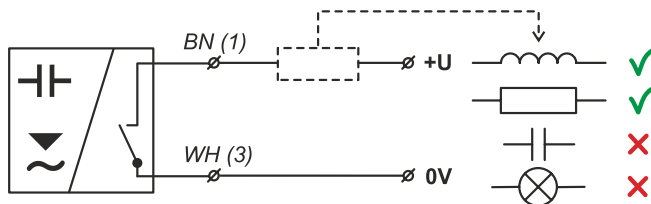
- is intended to thru-wall level sensing of liquids in plastic or glass vessels with flat walls.
- The sensor is installed on a clean and degreased surface of the vessel wall. The attachment is done by double-sided adhesive layer. Orientation of the sensor can be arbitrary. Maximum thickness of the vessel wall depends on the detected medium (see technical data), the maximum is 8 mm.



## 7. Electrical connection

### THE TYPE OF SENSOR CPK-HF-25N-\_-S

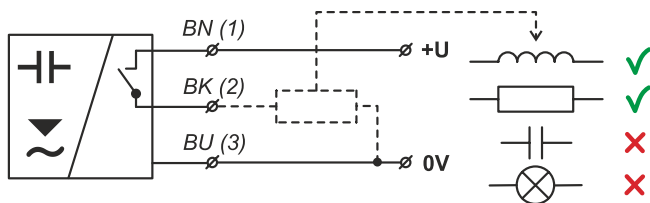
Positive pole (+U) of power supply is connected through a load (relay) to brown wire or pin connector No. 1, negative pole is connected to white wire or pin connector No.3.



Connection scheme of sensor  
with 2-wire electronic switch type output

### THE TYPE OF SENSOR CPK-HF-25N-\_-P

Positive pole (+U) of power supply is connected to brown wire or pin connector No.1, negative pole is connected to blue wire or pin connector No.3. Load (relay) is connected to black wire or pin connector No.2.



Connection scheme of sensor  
with PNP type output

Legend:

- (1) – Terminals number for variants with connector
- BN – Brown
- WH – White
- BU – Blue



The sensor CPK-HF-25 output is protected against short circuits. Capacity loads and loads with low sleep resistance (bulb) the sensor evaluation as a short circuit. In case of high ambient electromagnetic interference, parallel conductors with power lines, or lines at distances greater than 30 m, we recommend to use shielded cable.

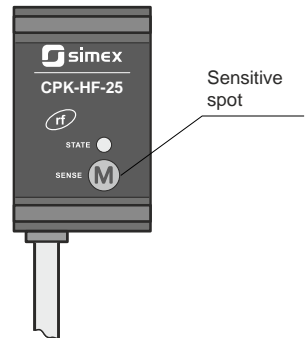


Electrical connection must be done in de-energized state!

For switching supply sources, it is necessary to check that the input is galvanically separated from the network side and that they are fitted with a filter suppressing the conforming interference (terminals + and – oscillate together towards the ground potential), or the interference is removed in another manner.

## 8. Setting

The setting is done by placing of magnetic pen to sensitive spot (M) located on the front of the sensor. Short time attaching (up to 2 sec.) of the magnetic pen to the sensitive spot (M) makes the sensor open. Long attach (at least 4 sec.) of the pen when the level is changed, defines closed state of the sensor. In this way the sensitivity for the measured medium and switching modes "O" (normally open) or "C" (normally closed) is set. When changing the fluid it is necessary to make the new setting.



### a) Mode O (normally open)

1. Put the level of the measured medium in the state below the lower edge of the sensor in the tank or in the gauge-pipe.
2. Attach the magnetic pen to the sensitive spot (M) for maximum 2 seconds. When the LED goes out, the sensor is in the state open.
3. After removal of the magnetic pen check the status of orange lights:
  - If the LED doesn't light or is flashing rapidly (0.2 s), go to step 4.
  - If the LED lights, you must repeat step 2 so as not to exceed the limit of 2 seconds attaching magnetic pen.
4. Put the level of the measured medium in the state above the upper edge of the sensor in the tank or in the gauge-pipe.
5. Attach the magnetic pen to the sensitive spot (M) for minimum 4 seconds. When the LED lights up, the sensor is in the state closed.
6. After removal of the magnetic pen check the status of orange lights:
  - If the LED lights, settings of the sensor is correct.
  - If the LED doesn't light, the sensor was set incorrectly and you must repeat the procedure from step 1.
  - If the LED is flashing, the sensor didn't recognize upper and lower limits. In this case, first verify that at the step 1 the level of the measured medium was below the lower edge of the sensor and at the step 3 the level of the measured medium was above the upper edge of the sensor. Then make sure that the thickness of the gauge-pipe wall or the tank wall does not exceed the limit specified in the Technical specifications (p. 2). If not, check there isn't a thick layer of sediment on the inner wall of the tank or the gauge-pipe.



For security reasons, we recommend to set the mode O (normally open, sensor closes when immersed) for minimum level detection. Any failure of the sensor or wiring is equally apparent as the emergency level state. Analogously – for the maximum level detection is recommended to set the mode C (normally closed, sensor opens when immersed).

**b) Mode C (normally closed)**

1. Put the level of the measured medium in the state **below the lower edge** of the sensor in the tank or in the gauge-pipe.
2. Attach the magnetic pen to the sensitive spot **Ⓜ for minimum 4 seconds**. When the LED lights up, the sensor is in the state closed.
3. After removal of the magnetic pen check the status of orange lights:
  - If the LED lights or is flashing rapidly (0.2 s), go to step 4.
  - If the LED doesn't light, you must repeat step 2 so as to observe the limit of 4 seconds attaching magnetic pen.
4. Put the level of the measured medium in the state **above the upper edge** of the sensor in the tank or in the gauge-pipe.
5. Attach the magnetic pen the sensitive spot **Ⓜ for maximum 2 seconds**. When the LED goes out, the sensor is in the state open.
6. After removal of the magnetic pen check the status of orange lights:
  - If the LED doesn't light, settings of the sensor is correct.
  - If the LED lights, the sensor was set incorrectly and you must repeat the procedure from step 1.
  - If the LED is flashing, the sensor didn't recognize upper and lower limits. In this case, first verify that at the step 1 the level of the measured medium was below the lower edge of the sensor and at the step 3 the level of the measured medium was above the upper edge of the sensor. Then make sure that the thickness of the gauge-pipe wall or the tank wall does not exceed the limit specified in the Technical specifications (p. 2). If not, check there isn't a thick layer of sediment on the inner wall of the tank or the gauge-pipe.

After this settings the sensor responds to the level immersion and emersion in the upper half of the sensing area and the hysteresis size 5 mm (1/8 of the distance between the bottom and the top of the sensor).

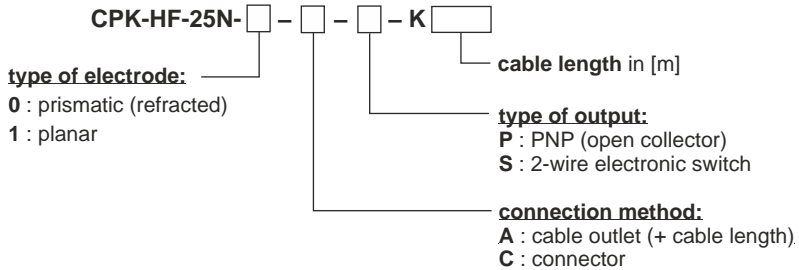
## 9. Status signalization

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Indicator	Function
<b>Orange LED</b>	<b>Continuous light</b> – Sensor is closed (switched ON)
	<b>Dark</b> – Sensor is open (switched OFF)
	<b>Rapid flashing (period 0,2 sec.)*</b>
	– Unrecognized upper and lower limits of setting mistake
	<b>Slow flashing (period 0,8 sec.)</b> – Short circuit at sensor output

\* Sensor with "S" type output, for each flash of the LED switches its output on for approx. 3 ms. This period is sufficiently short to avoid unwanted switching of relay contacts. For binary inputs, we recommend to set the filter so as not to respond to pulses shorter than 3 ms.

## 10. Order code



## 11. Correct specification examples

### CPK-HF-25N-1-A-P-K5

(1) planar electrode, (A) cable outlet with 5 m length fixed cable; (P) output type PNP

### CPK-HF-25N-0-C-S

(0) prismatic electrode, (C) electric connection with connector; (S) output type S (electronic switch)

## 12. Accessories

### Standard - included in the level sensors price

- 2 pcs of Plastic straps 2,5 x 200 mm
- 1 pc of Double-side self adhesive tape (for CPK-HF-25N-1)
- 1 pc of Magnetic pen

### Optional - for extra charge

- Connector ELKA KV 3308

## 13. Safety, protection and compatibility

The level sensor is equipped with a protection against electric shock on electrode, polarity, over-voltage and short-term current overload on the output.

Protection against dangerous contact is ensured by supplying safe voltage according to SN 33 2000-4-41 (SELV).

Electromagnetic compatibility is provided by conformity with standards EN 55011(B), EN 61326-1, EN 61000-4-2 (A, 8 kV), EN 61000-4-3 (A, 10 V), EN 61000-4-4 (A, 2 kV), EN 61000-4-5 (B, 1 kV), EN 61000-4-6 (A, 3 V) and EN 61000-4-8 (A, 30 A).

This equipment has been issued a declaration of conformity in accordance with Act 90/2016 Coll. and subsequent amendments. The delivered electrical equipment meets the requirements of the applicable government regulations on safety and electromagnetic compatibility.

## 14. Use, operation and maintenance

The sensor requires no operator to operate. During operation, the operator of the technological unit is informed about the level of the measured substance in the status gauge by an LED signalling diode.

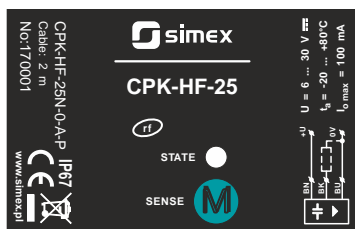
The maintenance of the device consists in regular checking of the cable integrity and removal of dirt from the back side of the sensor. It is forbidden to make any changes to the device without the manufacturer's consent. Any repairs must be carried out only by the manufacturer of the device or by a service organisation authorised by him.

Installation, operation and maintenance of the equipment must be carried out in accordance with these technical conditions and the provisions of the applicable standards must be observed.

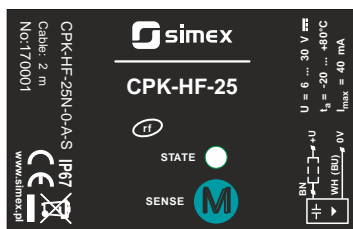
## 15. Marking of labels

Data on the plate of the unit of

**CPK-HF-25N-x-x-P**



**CPK-HF-25N-x-x-S**



Symbol of producer: 

Internet address: [www.simex.pl](http://www.simex.pl)

Type of level meter: CPK-HF-25N-\_-\_-

Cable length: (only for CPK-HF-25N-\_-A-\_-)

Product serial number: Ser. No.: xxxxx – (from left: year of manufacture, serial production No.)


Supply voltage range:  $U=6...30$  VDC

Output current range:  $I_{MAX}$ , nebo  $I_{OMAX}$

Ambient temperature range:  $t_a = -20 ... +80^{\circ}\text{C}$

Protection: IP67

Mark of conformity: 

Mark for take-back of electrical waste: 

## 16. General warranty conditions

The manufacturer warrants from the date of delivery that this product will have the specified characteristics as stated in the technical specifications for a period of 3 years.

The manufacturer is liable for defects found during the warranty period and claimed in writing.

The warranty does not cover defects caused by improper handling or failure to comply with the technical specifications.

The warranty is void if the customer or a third party makes changes or modifications to the product, if the product is mechanically or chemically damaged, or if the serial number is illegible.

To make a claim, the warranty certificate must be presented.

In the event of a legitimate claim, we will repair or replace the defective product. In both cases, the warranty period will be extended by the repair period.

## 17. Technical specifications

Technical specifications		
Supply voltage		6 ... 30 V DC
Supply current	– Output type P	max. 0,6 / 7 mA
	– Output type S	max. 0,6 mA
Switched current (Min. / Max.)	– Output type P	100 mA
	– Output type S	3,3 / 40 mA
Remanent voltage – ON state	– Output type P	1,8 V
	– Output type S	6,0 V
Switching frequency		1 Hz
Ambient temperature range		–20 ... +80°C
Temperature range at the tube or vessel surface / with double-side self adhesive tape		–20 ... +90°C/+60°C
Max. thickness of the vessel wall	– Conductive liquids	8 mm
	– Non-conductive liquids with $\epsilon_r < 10^*$	3 mm
Protection class		IP 67
Housing material		plastic (PP)
Connection cable type (Variants "A")	– Output type P	PVC 3x0,34 mm <sup>2</sup>
	– Output type S	PVC 2x0,34 mm <sup>2</sup>
Weight (including 2 m cable)		Approx 60g

\*)  $\epsilon_r$  see "Table of dielectric constants"

## 18. Packing, shipping and storage

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The CPK-HF-25 is packed in a polythene bag and the entire shipment is placed in a cardboard box. Suitable padding is used in the cardboard box to prevent mechanical damage in transit.

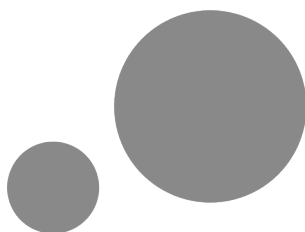
Remove the equipment from the packaging before using it to prevent possible damage.

Transportation to the customer is carried out by a freight forwarding company. By prior arrangement, personal collection of the ordered goods at the company's headquarters is also possible. Upon receipt, please check whether the shipment is complete and corresponds to the scope of the order, or whether the packaging and equipment have been damaged during transport. Do not use equipment obviously damaged in transit, but contact the manufacturer to resolve the situation.

If the equipment is to be transported, it must be packed in its original packaging and protected against shocks and weathering.

Store the equipment in its original packaging in a dry area, sheltered from the weather, with humidity up to 85% without the effects of chemically active substances. The storage temperature range is -10 °C to +50 °C.





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