

Detecting Liquid Levels with Conductive Level Rod-Probes

Liquid levels in process and storage tanks need to be measured and monitored, since unwanted variations in these levels (due to evaporation or removal of the process liquids) must be corrected. In this respect, a distinction must be made between two general tasks:

- control of the level in order to permit automatic execution of process operations (such as dosing of liquids)
- monitoring of the level in order to prevent possible damage (dry-running, heating without sufficient liquid) to the devices (pumps, heaters) installed in the tanks or to prevent an overflow of the process liquid from the tanks.

You can implement safe control and monitoring of the liquid level in tanks with level rod-probes. Since these are purely passive devices, suitable electronic controllers are needed.

Level rod-probes operate on a conductive principle, which means that they can be used only in electrically conductive liquids (conductivity $>10 \mu\text{S}$). Encrustation and contamination in the tank normally have no effect on the function of the probes.

Possible deposits of encrustation between the tips of the probe can be avoided by ensuring that the difference between the probe-rod lengths is at least 60 mm.

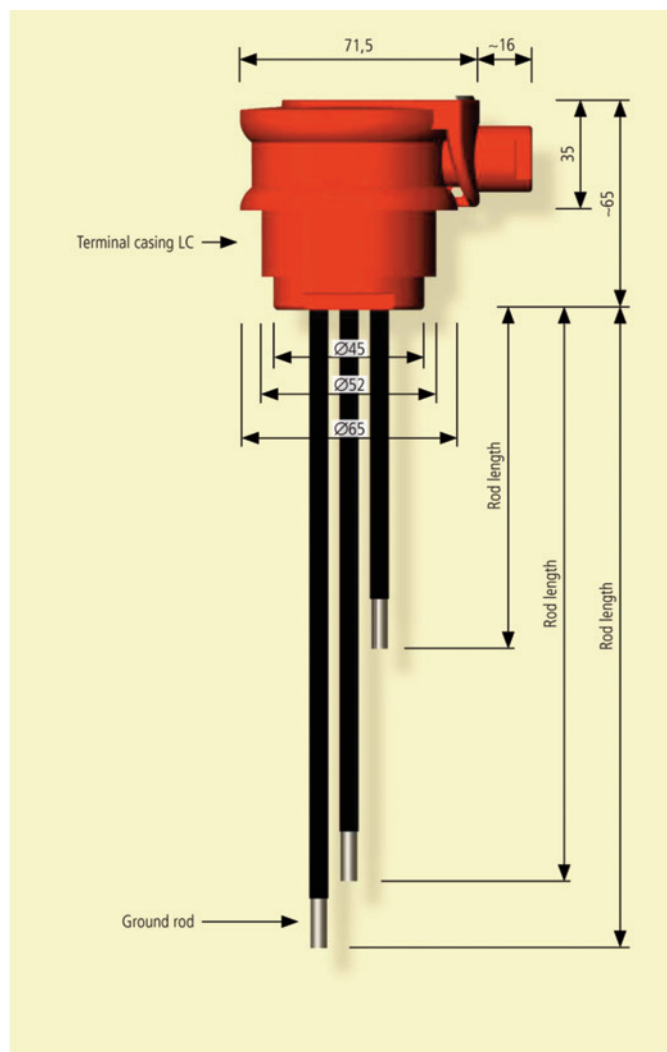
The levels of non-conductive or poorly conducting liquids, in which level rod-probes cannot be used, can be controlled and monitored with the aid of our float switches.

The level rod-probes are available in many different versions:

- with two to five rods for detection of one to four different levels and
- with or without an integrated temperature sensor.

A suitable electronic controller applies a low alternating voltage to the probe rods. A current then flows from the electrically conductive tips of the rods and through the conductive liquid to the reference electrode, called the ground rod. If the liquid level drops below the tip of a probe rod, the related electrical circuit is opened. The electronic controller detects the two states "current" and "no current".

The ground rod must be at least as long as the longest rod. If the distance between the tips of the minimum and maximum probe rods is more than 1000 mm, an additional ground rod must be provided.



Level rod-probes NS with terminal casing LC

In metallic, electrically conductive tanks, no ground rod is needed if the ground terminal is connected directly to the tank.

In order to prevent the rods from touching each other, PTFE spacers are fitted on probes with rod lengths of 300 mm or more.

The level rod-probes are available with the small terminal casing LC (material PP) or LC/L (material PVDF) and the large terminal casing BC (material PP) or BC/L (material PVDF).

Level rod-probes with terminal casing BC can be mounted on the edge of the tank with the supports HB (PP) or HB/L (PVDF) or on a cross-beam with the aid of the mounting sleeve EM or the holding sleeve HM.

Level rod-probes with terminal casing LC are mounted on the edge of the tank with the supports HL (PP) or HL/L (PVDF), or on crossbeams with the holding sleeve ML.

In order to ensure optimal chemical and thermal resistance, the level rod-probes are made from a variety of materials.

Specifications of the Standard Materials

Code letter	Probe rod material	Coating	Temp. Sensor material (in case of NT)	Max. liquid temperature
K	PTFE-Compound	PTFE, pure-white	PFA	100°C
B	Stainless steel (Mat.No. 316TI)	Polyolefin (PO)	PP	90°C
HC	Hastelloy (Alloy C4)	PTFE, pure-white	PP	90°C
T	Titanium (Mat.No. 3.7035)	PTFE, pure-white	PP	90°C

Overview of Available Level Rod-Probes

The switching points are determined by the various lengths of the probe rods and can be changed by the customer by cutting the rods to the desired length (not possible in the case of PTFE probe rods).

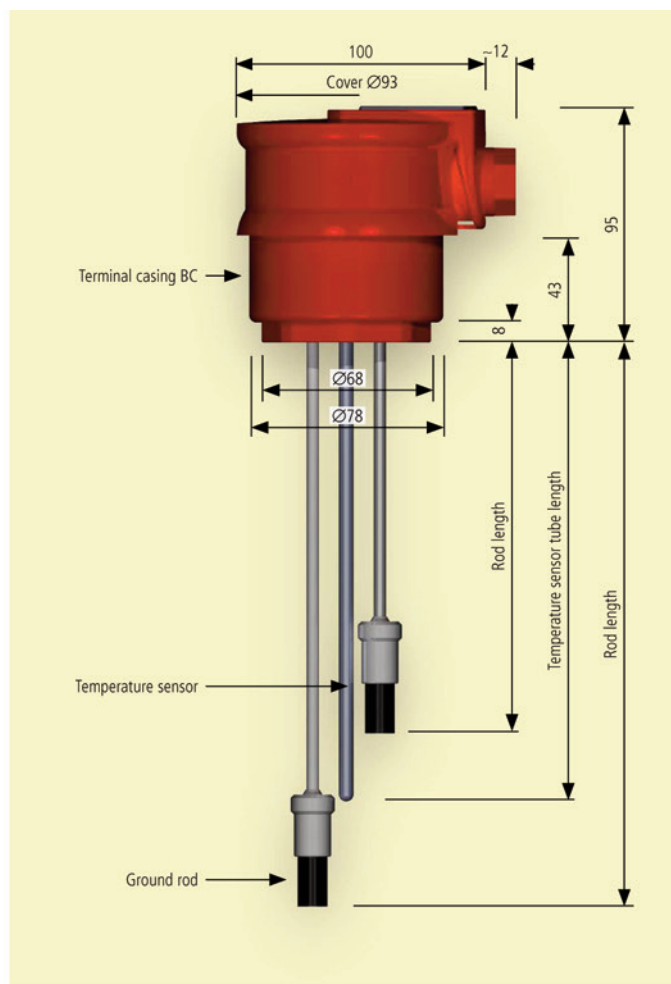
Number of levels to be detected	1	2	3	4
Number of probe rods	2	3	4	5
Level rod-probes type	NS2	NS3	NS4	NS5
Level rod-probes with integrated temperature sensor Pt100	NT2	NT3	NT4	NT5

BC Version

The terminal casing BC made of PP, permits connection of the cable and has the degree of protection IP65 (jet waterproof) in accordance with EN 60529. In cases of high temperatures (liquid temperature >80°C) or strongly oxidizing chemicals (such as chrome electrolyte or HNO₃ solutions), the PVDF terminal casing BC/L, made of PVDF, should be used. The cover can be unscrewed with the mounting wrench SB for access to cable terminals.

LC Version

The small terminal casing LC, made of PP or LC/L, made of PVDF, permits cable connection and has the degree of protection IP 65 (jet waterproof) in accordance with EN 60529. The cover can be unscrewed with the mounting wrench SL.



Level rod-probes NT with terminal casing BC

Level rod-probes used together with suitable electronic controllers ensure safe control and monitoring of important process parameters.

Selection Table for Control and Monitoring Electronics

	Level rod-probe types							
	NS2	NS3	NS4	NS5	NT2	NT3	NT4	NT5
Monitoring devices								
Level monitor	ETS100	ETS200	-	ETS410	ETS100	ETS200	-	ETS410
Temperature limiter	-	-	-	-	ETB100	ETB100	ETB100	ETB100
Control devices								
Level controller	-	ENR200	ENR300	-	-	ENR200	ENR300	-
Temperature controller	-	-	-	-	MTR	MTR	MTR	MTR