

Capacitive level switch for industrial applications

Model CLS-1000

WIKA data sheet LM 50.14



For approvals, see
page 5

Applications

- Suitable as a limit level sensor for overflow or dry running protection
- Suitable for adhering or contaminated media
- Functions with liquids

Special features

- One or two switch points (configurable)
- Integrated temperature sensor available on request
- Integrated LED status display
- Minimised susceptibility to wear due to non-moving parts

Description

The CLS-1000 capacitive level switch uses a smart measuring principle to reliably detect levels. Inside the sensor there is an electrode which, together with the container or an additional opposing electrode, generates an electrical field. Normally, the capacitance of this electrical field is relatively low – so long as only air or another non-conductive medium is present.

However, as soon as a medium such as a liquid comes close to the sensor or touches it, the dielectric constant between the electrodes changes. This change leads to an increase in capacitance, which the CLS-1000 detects and evaluates. In this way, the sensor can precisely determine whether a certain level has been reached.



Model CLS-1000

Thanks to the non-contact measuring principle, the CLS-1000 is particularly wear-resistant, with no mechanical parts needing to be moved. This makes it ideal for applications where a long service life and minimal maintenance are required. If required, the CLS-1000 can also be equipped with two switch points to detect different filling levels.

Another highlight of the sensor is that, on request, a temperature sensor can also be integrated. With this, in addition to the level, the temperature of the medium can also be monitored, which, in many industrial applications, enables additional process control.

This robust yet cost-effective design makes the CLS-1000 an ideal solution for level monitoring in a wide range of applications.

Specifications

Basic information	
Media	■ Water-based ■ Oil-based

Accuracy specifications		
Non-repeatability per IEC 62828-4	≤ 2 mm [0.079 in]	
Long-term stability per IEC 62828-4	≤ ±5 mm/year	
Hysteresis	■ 3 mm [0.0118 in] ■ 2 ... 10 mm [0.079 ... 0.394 in]	
	→ Other hysteresis settings on request	
Resolution	1 mm [0.039 in]	
Temperature error	5 ... 35 °C [41 ... 95 °F]	≤ ±2 mm [0.079 in]
	-30 ... +5 °C [-22 ... +41 °F]	≤ ±5 mm [0.197 in]
	35 ... 80 °C [95 ... 176 °F]	≤ ±5 mm [0.197 in]
Reference conditions	Per IEC 62828-4	

Measuring range	
Protection tube diameter	16 mm [0.63 in]
Probe length / Insertion length [L]	
Stainless steel	30 ... 500 mm [1.18 ... 19.69 in]
	→ Other probe lengths on request
Dead band	
Upper dead band (T ₁)	Dependent on the selected process connection
Lower dead band (T ₂)	5 mm [0.2 in]
Active measuring range (M)	Probe length [L] - (upper dead band [T ₁] + lower dead band [T ₂])

Process connection (with installation from outside)		
Standard	Thread size	Seal
DIN EN ISO 1179-2	■ G ½ A ■ G ¾ A ■ G 1 A	■ Without ■ NBR ■ FKM
ANSI B 1.20.1	■ ½ NPT ■ ¾ NPT ■ 1 NPT	-
→ Other process connections on request		

Output signal	
Signal type of level	
Switching output	■ PNP ■ NPN
Number of switching outputs	Max. 2
Switching function	■ Normally closed (NC) ■ Normally open (NO)
Switching delay	■ Without ■ 1 s¹⁾ ■ 2 s¹⁾ ■ 3 s¹⁾ ■ 5 s¹⁾ ■ 10 s¹⁾

Output signal	
Signal type of temperature ²⁾	
Max. total error	≤ ±2 K
Resistance (2-wire)	■ Pt100 ■ Pt1000 (class B)
Current (3-wire)	4 ... 20 mA
Voltage (3-wire)	DC 0 ... 5 V
Load in Ω	
Current (3-wire)	600
Voltage (3-wire)	> max. output voltage / 1 mA
Signal output	
Current (3-wire)	4 ... 20 mA
Voltage (3-wire)	DC 0 ... 5 V
Voltage supply	
Current (3-wire)	4 ... 20 mA
Voltage (3-wire)	DC 0 ... 5 V
Auxiliary power	
Current (3-wire)	4 ... 20 mA
Voltage (3-wire)	10 ... 35 V
Current supply	Max. 350 mA including switching current
Current consumption	■ < 12 mA (idling) ■ Max. 30 mA (without LED) ■ Max. 70 mA (with LED)
Overvoltage resistance	Max. DC 40 V
Electrical safety	Protection class III
Dynamic behaviour	
Switch-on time	≤ 2 s

1) Adjustable only ex-works.

2) On request

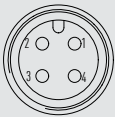
→ Other output signals on request

Electrical connection	
Connection type	■ Circular connector M12 x 1, 4-pin ■ Cable outlet, unshielded
Wire cross-section	0.25 mm [0.01 in]
Cable diameter	4 ... 10 mm [0.16 ... 0.39 in] (depending on the number of wires)
Cable material	■ PVC ■ PUR ■ Silicone
Cable length	■ 2 m ■ 5 m ■ Customised: 1 ... 50 m [3.3 ... 164 ft]
Pin assignment	→ See pin assignment page 4
Status LED	Indication of operating and switching states
Ingress protection (IP code) per IEC 60529 ¹⁾	IP67
Short-circuit resistance	Yes
Reverse polarity protection	Yes
Status LED	■ With ■ Without
Calibration option	■ Internal reed contact (without magnet) ■ Internal reed contact (with magnet) ■ Without subsequent calibration option

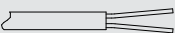
1) The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

Pin assignment

All connectors with moulded cable have the same colour assignment as the unshielded cable outlet.

Circular connector M12 x 1			
4-pin		Level	Level, analogue temperature output
	1	U+	U+
	2	-	S+
	3	U-	U-
	4	SP1	SP1

Circular connector M12 x 1		
5-pin		Level, Pt100/Pt1000 temperature output
	1	U+
	2	Pt100/Pt1000 - 1
	3	U-
	4	SP1
	5	Pt100/Pt1000 - 2

Cable outlet, unshielded				
		Level	Level, analogue temperature output	Level, Pt100/Pt1000 temperature output
	Brown	U+	U+	U+
	Yellow	-	S+	Pt100/Pt1000 - 1
	White	U-	U-	U-
	Green	SP1	SP1	SP1
	Pink	-	-	Pt100/Pt1000 - 2

Legend

U+ Positive power supply terminal
 U- Negative power supply terminal
 S+ Analogue signal output
 SP1 Switching output 1

→ Other pin assignments on request

Materials	
Materials (wetted)	
Sensor	Stainless steel, PEEK, FKM
Process connection	
Materials (in contact with the environment)	
Case	Stainless steel
Cable	Silicone PVC PUR
Electrical connection M12 x 1	PUR Stainless steel

Operating conditions		
Medium temperature limit	Stainless steel	-40 ... +120 °C [-40 ... +257 °F]
Ambient temperature limit	-30 ... +80 °C [-22 ... +273 °F]	
Storage temperature limit	-40 ... +70 °C [-40 ... 158 °F]	
Pressure limit of medium	Stainless steel	0 ... 50 bar [0 ... 725 psi]
Vibration resistance per IEC 60068-2-6	5g (25 ... 100 Hz)	
Shock resistance per IEC 60068-2-27	12g, 11 ms	
Mounting position	Stainless steel	Vertical, horizontal only suitable for 30 mm [1.18 in]
Influence of mounting position	Without	
Ingress protection (IP code) per IEC 60529	→ See electrical connection	

Packaging and instrument labelling	
Packaging	■ Individual packaging ■ Multiple packaging (up to 50 pieces possible)
Instrument labelling (product label)	■ WIKA product label, adhesive foil ■ Customer-specific product label on request

Approvals

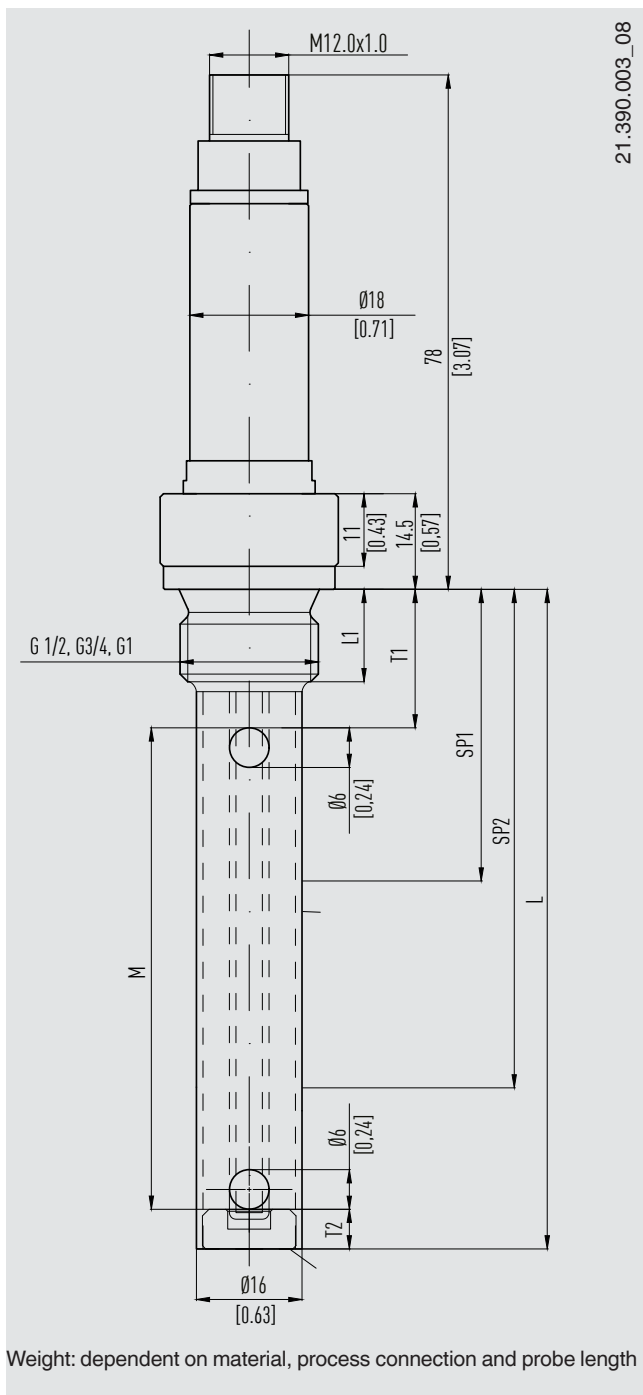
Logo	Description	Region
	EU declaration of conformity	European Union
	EMC Directive EN 61326 emission (group 1, class B) and immunity (industrial environments)	
	RoHS directive	
	DNV Ships, shipbuilding (e.g. offshore)	International

Certificates

Certificates	
Certificates	2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)

Legend

$L_{\min}$	Minimum insertion length	$SP1_{\min}$	Minimum switch point 1
$L_{\max}$	Maximum insertion length	$SP2_{\min}$	Minimum switch point 2
T_1	Upper dead band (dependent on process connection)	$SP1_{\max}$	Maximum switch point 1
T_2	Lower dead band	$SP2_{\max}$	Maximum switch point 2



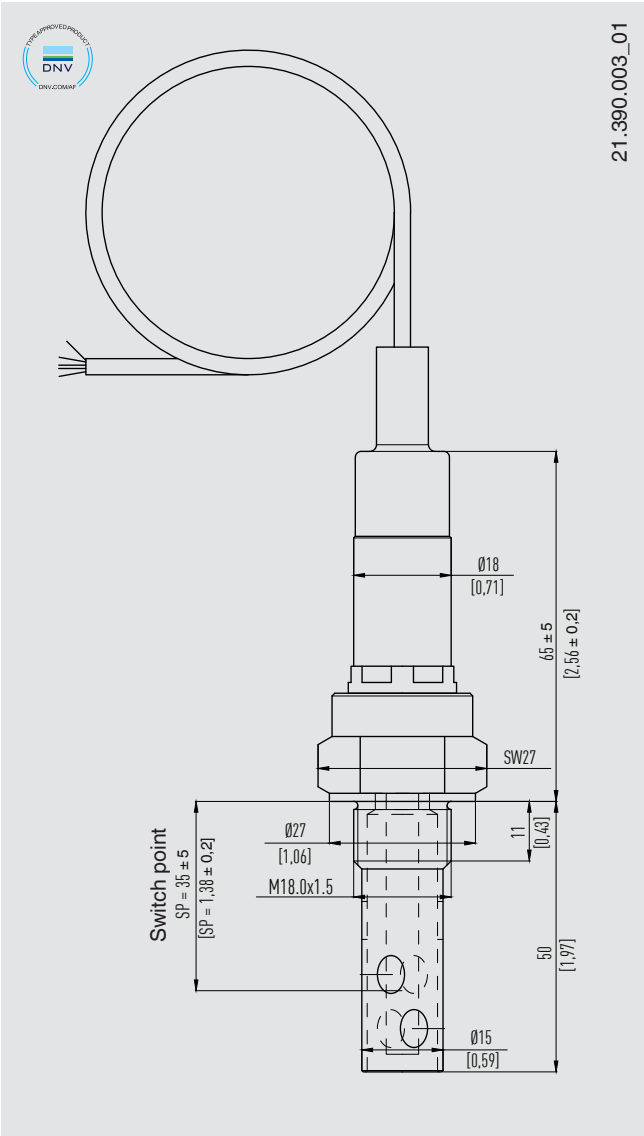
→ For information on tapped holes and welding sockets, see technical information IN 00.14 at www.wika.com.

Process connection	$L_{\min}$	$L_{\max}$	T_1	T_2	$SP1_{\min}/SP2_{\min}$	$SP1_{\max}/SP2_{\max}$
G $\frac{1}{2}$	30	500	21	5	≥ 23	≤ 493
G $\frac{3}{4}$	32	500	23	5	≥ 25	≤ 493
G 1	34	500	25	5	≥ 27	≤ 493
NPT $\frac{1}{2}$	31	500	22	5	≥ 24	≤ 493
NPT $\frac{3}{4}$	32	500	23	5	≥ 25	≤ 493
NPT 1	37	500	28	5	≥ 30	≤ 493

Formula:

$$SP_{\min} = T_1 + 2 \text{ mm}$$

$$SP_{\max} = L_{\max} - (T_2 + 2 \text{ mm})$$



Accessories and spare parts

Circular connector M12 x 1 with moulded cable					
Description		Temperature range	Cable diameter	Cable length	Order number
Circular connector M12 x 1 with moulded cable					
	Straight version, cut to length, 4-pin, PUR cable, UL Listed, IP67	-20 ... +80 °C [-4 ... +176 °F]	4.5 mm [0.18 in]	2 m [6.6 ft]	14086880
				5 m [16.4 ft]	14086883
				10 m [32.8 ft]	14086884
	Angled version, cut to length, 4-pin, PUR cable, UL Listed, IP67	-20 ... +80 °C [-4 ... +176 °F]	4.5 mm [0.18 in]	2 m [6.6 ft]	14086889
				5 m [16.4 ft]	14086891
				10 m [32.8 ft]	14086892
Connection cable M12 x 1 with integrated LED display					
	Connection cable, 4-pin, PUR cable, UL listed, IP67 1 x LED green, 2 x LED yellow	-20 ... +80 °C [-4 ... +176 °F]	4.5 mm [0.18 in]	2 m [6.6 ft]	14252834
	Connection cable, 4-pin, PUR cable, UL listed, IP67 1 x LED green, 2 x LED yellow	-20 ... +80 °C [-4 ... +176 °F]	4.5 mm [0.18 in]	5 m [16.4 ft]	14252835

Description	Order number
Calibration magnet	14760395

Ordering information

Model / Medium / Probe length / Switching output / Switching function / Electrical output / Process connection

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