Martens Elektronik GmbH
Kiebitzhörn 18 • D-22885 Barsbüttel / Germany • www.martens-elektronik.de
☎ +49-(0)40-670 73-0 • Fax +49-(0)40-670 73-288 • ✉ info@martens-elektronik.de

Capacitive Level Gauge UNICON®-CL

Continuous level measurement with immersion probe in range of 100 ... 3000 mm

Features

- Measuring ranges free programmable
- Measuring unit programmable m, cm, mm, in, ft, yd
- Tare-function (level 0)
- Outputs 4 ... 20mA, loop powered for level and temperature
- Probe for conductive liquids, acids or lyes
- LCD-Text Display
- 2 electronic alarm outputs, voltage free
- Simulation mode for level and temperature (manual operation)
- Temperature compensation with RTD(Pt100) sensor
- Protection IP65

Mounting mode 01

Mounting mode 04

General information

The Level Gauge UNICON-CL measures the level in a tank via the capacity. The medium to be measured must have a minimal conductivity of 50 µS/cm and must not to be adherent.

Short information

Programming	The front panel keypad can be used to program all designated functions.
Digital filter programmable	When digital filter is activated, the average value of several measurements is calculated and displayed.
Tare function	Manual zeropoint correction of displayed level.
Level correction	Manual correction on the current fill level (FS).
Calibration function	The UNICON-CL can be adapted to the geometric of the tank with a 2-point calibration. Probe constant and tare are calculated automatically.
Temperature compensation	Model 2 compensates the temperature drift of the probe material.
Alarm outputs	Switching performance of the alarm outputs is programmable as minimum or maximum function. The state of the alarm outputs is shown in the LCD-Display

Technical data

Power supply

Supply voltage	: 14 ... 30 V DC, loop powered
Operating temperature	: -10 ... 50 °C
Medium temperature	: 0 ... 60 °C or -10 ... 120 °C (depends on device type)
Process pressure	: max. 16 bar
Isolation	: Level output/temperature output/alarm output 1/alarm output 2
Test voltage	: 500 V DC
CE- conformity	: EN50022, IEC61000-4-3/4/5

Level measurement

Measuring range	: 0... 100 mm up to max. 0 ... 3000 mm
Measuring unit	: programmable m, cm, mm, in, ft, yd
Measuring frequency	: max. 400 kHz
Refresh time	: 1 s
Decimals	: 0 ... 3 (dependent to selected measuring unit)
Conductivity of the medium	: > 50 µS/cm
Viscosity of the medium	: < 2000 mm²/s (cSt)
Accuracy	: 0.5 % of the measuring value, ±2mm
Temperature coefficient	: 0.06 %/K Model = 1 (see order code) 0.01 %/K Model = 2 (see order code)

Temperature measurement

Temperature sensor	: RTD (Pt100), class B acc. to DIN EN 60751
Unit	: programmable °C; °F
Measuring range	: programmable -40.0 ... +160.0 °C (-40.0 ... +320.0 °F)
Decimals	: 1
Accuracy	: ±0.2 °C
Temperature coefficient	: 0.01 °C/K

Analog output

Output signal	: 4 ... 20 mA
Burden	: RA [Ω] ≤ $\frac{\text{Supply voltage-14 V}}{0.02\text{A}}$
Adjusting range	: initial value 3.800 ... 5.000 mA, end value 19.000 ... 21.000 mA
Accuracy	: 0.1 %
Temperature coefficient	: 0.007 %/K

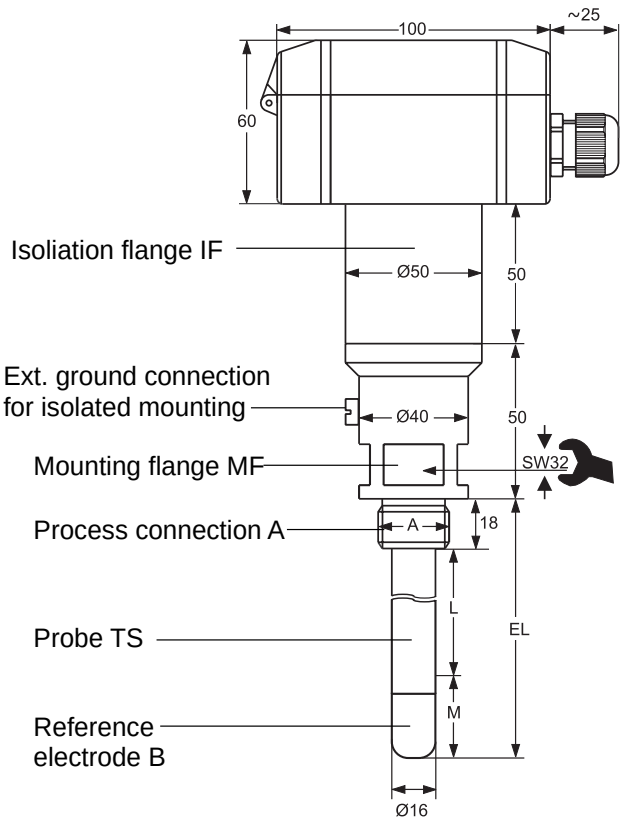
Alarm output

Transistor	: 14 ... 30 V DC, load max. 60 mA, short circuit protected
Voltage drop	: < 2 V (at max. load)

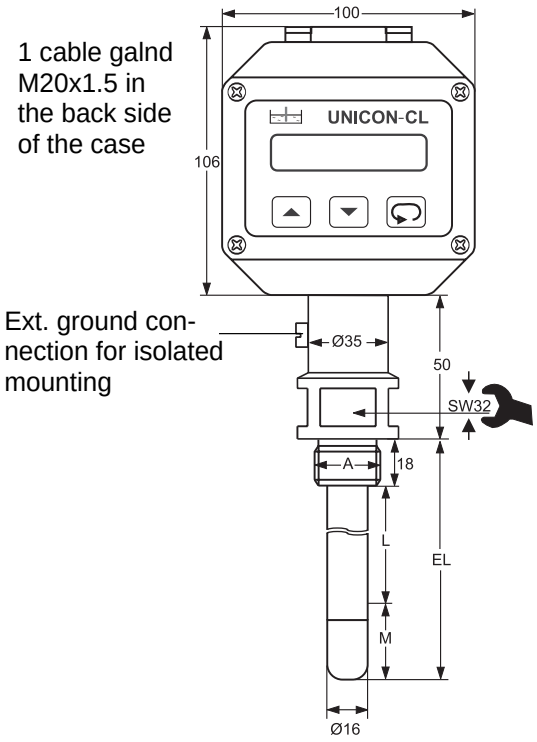
Display	: LCD-dot matrix, 4.9 mm character height 2 lines, 16 characters each
Case	: Field mounting
Material	: Case polyamide with fibre-glass PA6-GF/GK 15/15, front foil polyester
Dimensions	: 100 x 100 x 60 mm (WxHxD)
Weight	: max. 360 g
Terminals	: Screw terminals with pressure plate, 2,5 mm² flexible wire, 4 mm² single wire 1 cable gland M20x1.5
Protection	: IP65, terminals IP20 acc. to BGV A3
Immersion probe	: Material PTFE (Teflon) with 16 mm aluminium core
Mounting flange	: Stainless steel 1.4404 AISI 316L
Isolation flange	: PVDF with Medium temperature = 2 (-10 ... 120 °C, see order code)
Seals	: EPDM with FDA-certification

Dimensions

Headcase horizontal
(Mounting 01)



Headcase vertical
(Mounting 04)



Legend

IF: Isolation flange, PVDF
Only with advanced medium temperature
-10...+120 °C (steam sterilisation 140 °C).

MF: Mounting flange.
Stainless steel 1.4404 (AISI 316L).
Special devices for level measurement in concentrated acids/lyes.

A: Process connection G3/4A

TS: Immersion probe.
Single-probe with PTFE (Teflon) skin and metal core 16 mmØ

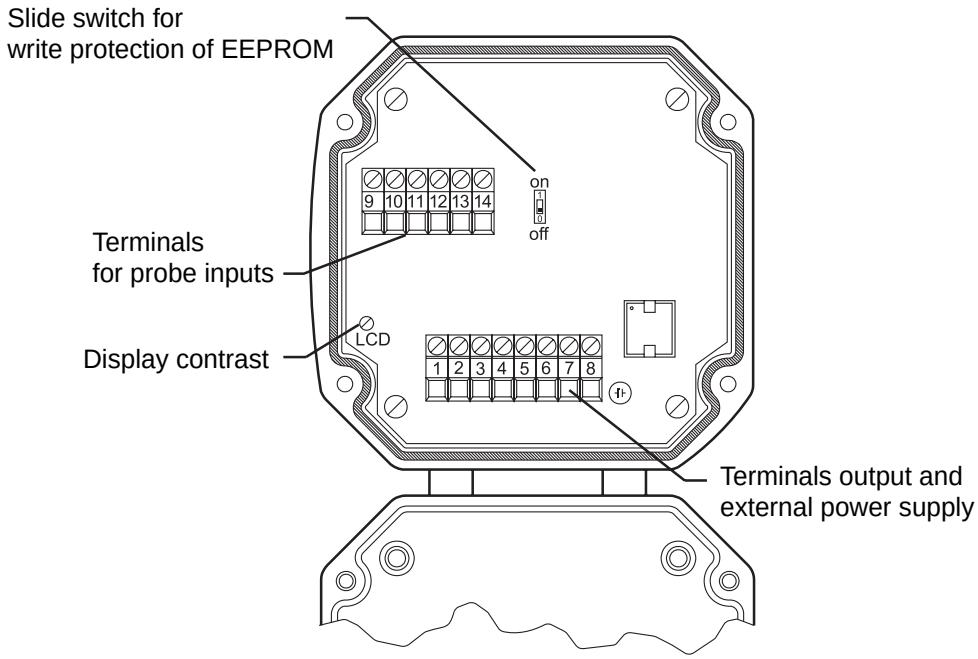
B: Reference electrode.
Probe tip metal (only for plastic tanks).
Stainless steel 1.4404 (AISI 316L) or special design Hastelloy (C22) for use in concentrated acids or lyes.

EL: Probe length (see order code).

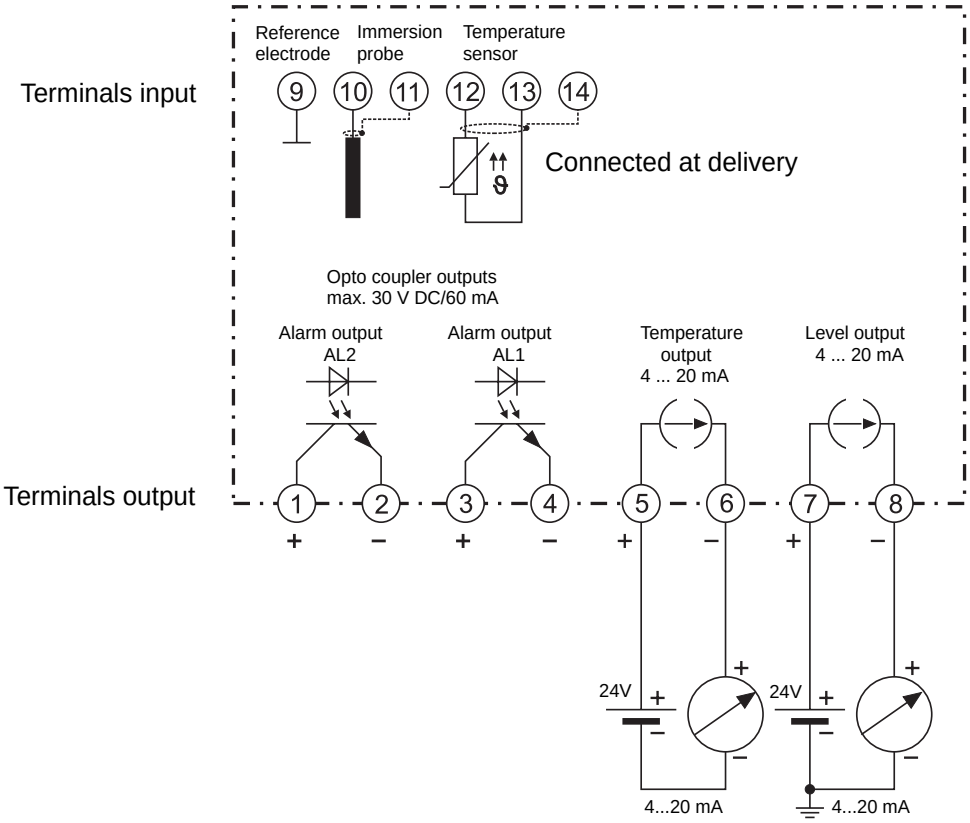
L: Linear measuring range.
20 (60)... 2962 (2922) mm.

M: Measuring initial value.
Minimal immersion depth.
20mm in metal tanks,
60mm in plastic tanks.

Legend (snap-lid)

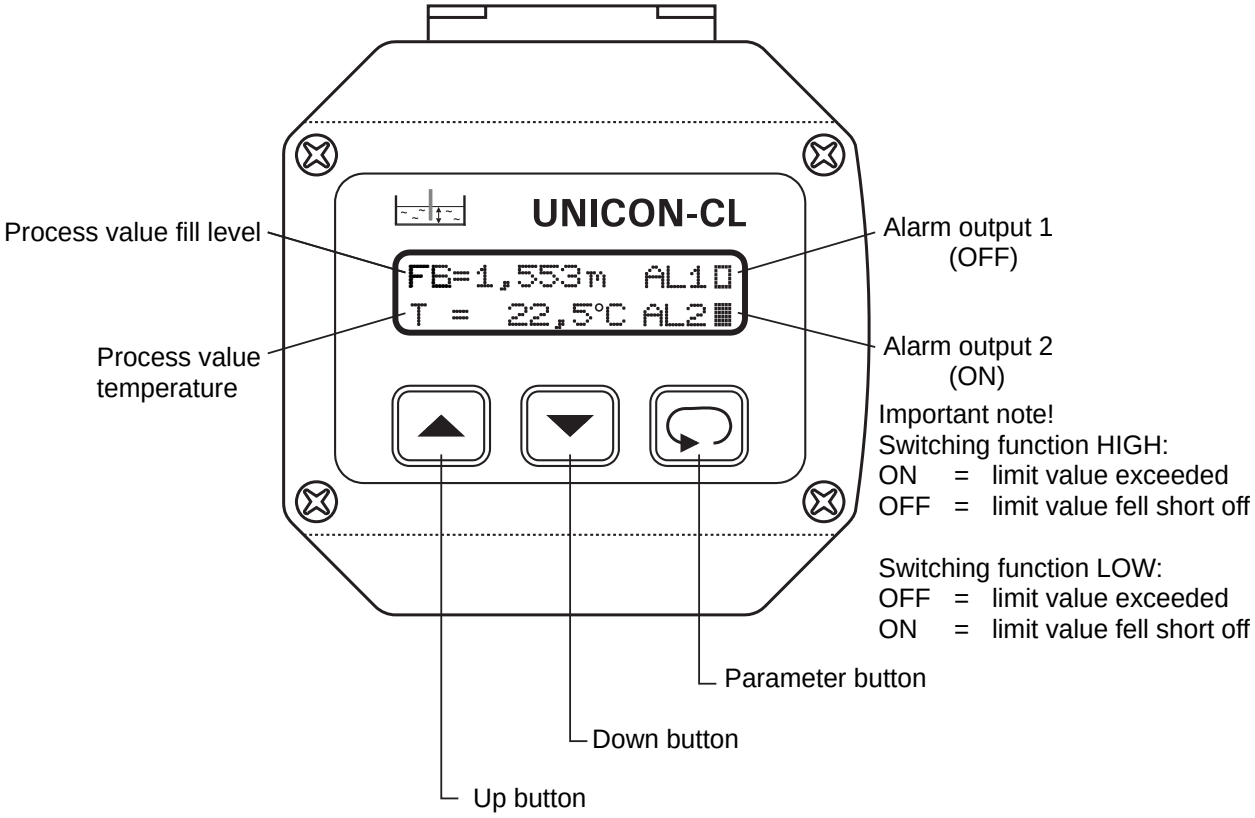


Connection diagram



For supplying the UNICON-CL, use terminals 7 and 8 as shown. If the UNICON is used for monitoring only, terminals 7 and 8 must be connected direct to the supply.

Panel controls and indicators



Instructions

The desired parameter can be called by button . For selection within a parameter use buttons and . Parameters are stored in an EEPROM, zero voltage safe.

Button combinations (press buttons at the same time):

+ 1 Parameter back

+ Parameter to “0" or minimum value

When the power supply is switched on, the UNICON initializes itself. The display shows device type UNICON-CL and software version. After initializing the current measurement values are displayed.

The **configuration level** is called-up by pressing the button . Now all the parameters defining the function of the UNICON can be programmed.

When the configuration is finished, or when no button is pressed for more than 120 seconds, the measurement values are displayed again. Leaving the **configuration level** is possible at any time when pushing the button for 2 seconds.

After installation, the device must be configurated for the intended use.

Programming

Notes to representation

Parameter is only displayed if configured

Parameter is only displayed if included (see order code)

Note! During the configuration only those parameters will be displayed, which are not excluded by other parameter settings. If the parameter length exceeds 16 characters, the remainder is available by pushing buttons UP and DOWN.
In case of a parameter modification all following affected parameters will be converted automatically.

Configuration

Display | **Description** (the display graphic contents factory settings)

```
FL=1.570m
T =25.0°C
```

Process values for level and temperature.

1

```
■deutsch
□ english
```

Language of the operating instructions
Selection with buttons ▲ and ▼.

2

```
Measurem.0-point
■bottom    □top
```

Measurement start value 0-point
0-punkt bottom measurement increasing (filling)
0-Punkt top measurement decreasing (emptying)
Selection with buttons ▲ and ▼.

3

```
Level unit
  metre (m)    ▾
```

Unit level measurement
metre (m), centimetre (cm), millimetre (mm), inch (in), foot (ft), yard (yd)
Selection with buttons ▲ and ▼.
⚠ In case of unit modification the number of decimal places is set to maximum.

4

```
Decimal pl. level
n=0...3      n=3
```

Decimals places for level measurement.
Depends on to the selected unit.
Selection with buttons ▲ and ▼.

5

```
FL MR init. val.
  0.000m
```

Fill level measuring range initial value (value for 4mA).
Setting possible from −9999 ... 9999 digit
with buttons ▲ and ▼.

continue page 7

Display **Description** (the display graphic contents factory settings)

6

Fill level measuring range end value (value for 20mA).
Setting possible from −9999 ... 9999 digit
with buttons ▲ and ▼.

7

Digital filter.
OFF, Step 1, 2, 3, 4
Calculated average value of the last 4, 8, 12 or 16 measured values.
Selection with button ▲ and ▼.

8

Calibration (see page 11).
By data input of 2 calibration points, the probe constant and the offset value for tare are calculated automatically.
Selection with buttons ▲ and ▼.

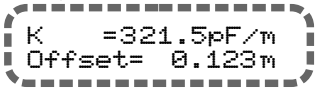
9

1. calibration point.
Input of the wanted level value with buttons ▲ and ▼.
By pressing the button ↻ the 1. point is stored.
This parameter is **not** left after 120s.

10

2. calibration point.
Input of the wanted level value with buttons ▲ and ▼.
By pressing the button ↻ the 2. point is stored.
This parameter is **not** left after 120s.

11



Result of the calibration
The calculated probe constant K and the offset value for tare are displayed.
⚠ If the difference is <100mm, <100pF/m or >1000pF/m, an error message appears, see page 10.

If the calibration procedure was selected, parameter 12, 13 and 14 are not displayed.

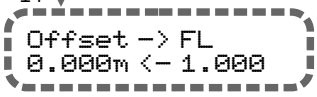
12

Probe constant (please see label).
Setting possible from 100.0 ... 999.9pF/m with buttons ▲ and ▼.
⚠ Configured at delivery.

13

Tare-function.
Pressing button ▲ for more than 3 s, the level display (FL) is set to " 0 ".

14



Correction of the fill level probe.
Setting possible with buttons ▲ and ▼.
The corrected offset value is shown on the left and the corrected level value (FL) is shown on the right of the display. Glossary see page 11.

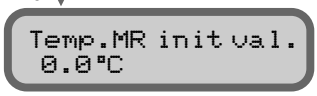
continue page 8

Display **Description** (the display graphic contents factory settings)

15

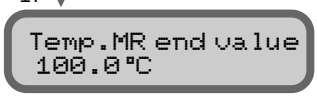
Temperature unit.
Selection with button ▲ and ▼.

16



Temperature measuring range initial value (value for 4mA).
Setting possible from −40.0 ... 160.0 °C
(−40.0 ... 320.0 °F) with buttons ▲ and ▼.

17



Temperature measuring range end value (value for 20mA).
Setting possible from −40.0 ... 160.0 °C
−40.0 ... 320.0 °F) with buttons ▲ and ▼.

18

Temperature correction.
Setting possible from −10.0 ... −10.0 °C
(−18.0 ... 18.0 °F) with buttons ▲ and ▼.
The corrected value is shown on the right of the display.

19

Alarm function AL1.
Deactivated (OFF), level (FL) or temperature (temp).
Selection with buttons ▲ and ▼.

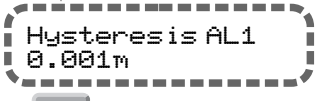
20

Switching performance AL1.
Selection with buttons ▲ and ▼.

21

Setpoint AL1.
Setting possible in the programmed measuring range
with buttons ▲ and ▼.

22



Hysteresis AL1.
Setting possible from 0.001 ... 9.999m
with buttons ▲ and ▼.

continue page 9

Display	Description (the display graphic contents factory settings)
23 Alarm AL2 ■OFF □FL □Temp	**Alarm function AL2.** Deactivated (OFF), level (FL) or temperature (temp). Selection with buttons ▲ and ▼.
24 Alarm AL2 □LOW ■HIGH	**Switching performance AL2.** Selection with buttons ▲ and ▼.
25 Setpoint AL2 0.000m	**Setpoint AL2.** Setting possible in the programmed measuring range with buttons ▲ and ▼.
26 Hysteresis AL2 0.001m	**Hysteresis AL2.** Setting possible from 0.001 ... 9.999m with buttons ▲ and ▼.
27 Simulation FL 1.196m	**Simulation of the fill level (manual operation).** Setting possible in the programmed measuring range with buttons ▲ and ▼. This parameter is **not** left after 120 seconds.
28 Simulation temp. 51.9°C	**Simulation of the temperature (manual operation).** Setting possible in the programmed measuring range with buttons ▲ and ▼. This parameter is **not** left after 120 seconds
29 Adjust 4-20mA □YES ■NO	**Adjustment of the process outputs.** Selection with buttons ▲ and ▼.
30 Adjust FL output Initial: 4.000mA	**Adjustment initial value analog output fill level.** Setting possible from 3.800 ... 5.000mA with buttons ▲ and ▼.
31 Adjust FL output End: 20.000mA	**Adjustment end value analog output fill level.** Setting possible from 19.000 ... 21.000mA with buttons ▲ and ▼.
32 Adjust temp. out Initial: 4.000mA	**Adjustment initial value analog output temperature.** Setting possible from 3.800 ... 5.000mA with buttons ▲ and ▼.

continue page 10

Display	Description (the display graphic contents factory settings)
33 Adjust temp.out End: 20.000mA	**Adjustment end value analog output temperature.** Setting possible 19.000 ... 21.000mA with buttons and .
35 Configuration unlock Block	**Configuration lock.** Selection by pressing buttons or for at least 2 seconds.
34 Factory setting Code= 0	**Parameter for factory setting**
FL=1.570m T =25.0°C	**Back to the current measurement values**

Error messages

Display	Description
Display flashes	Overrange of the measuring range.
Error levelsens. please check	Short circuit of the level probe. A factory check is necessary.
Error temp.sens. short circuit?	Short circuit of the temperature sensor or connection cables. A factory check is necessary.
Error temp.sens. disconnection?	Break of wire or defect of temperature sensor. A factory check is necessary.
Write protect!!	An entered parameter could not be stored because write protection is activated by internal slide switch to position ON. Set switch to position OFF and modify again.
XX Param. error please check	While examination of parameter memory XX, errors were detected. Incorrect parameters are reset to factory setting. Check parameters and program again if necessary.
XX Param. error calib. necessary	As before, but factory calibration is necessary.
Diff. FL1/FL2 to small!!	The distance of the calibration point 1 and point 2 is <100mm.
Probe constant invalid!!	At the calibration mode no probe constant could be calculated. Please assure the entered data for FL 1 and FL 2 must be correspond to the real fill level.

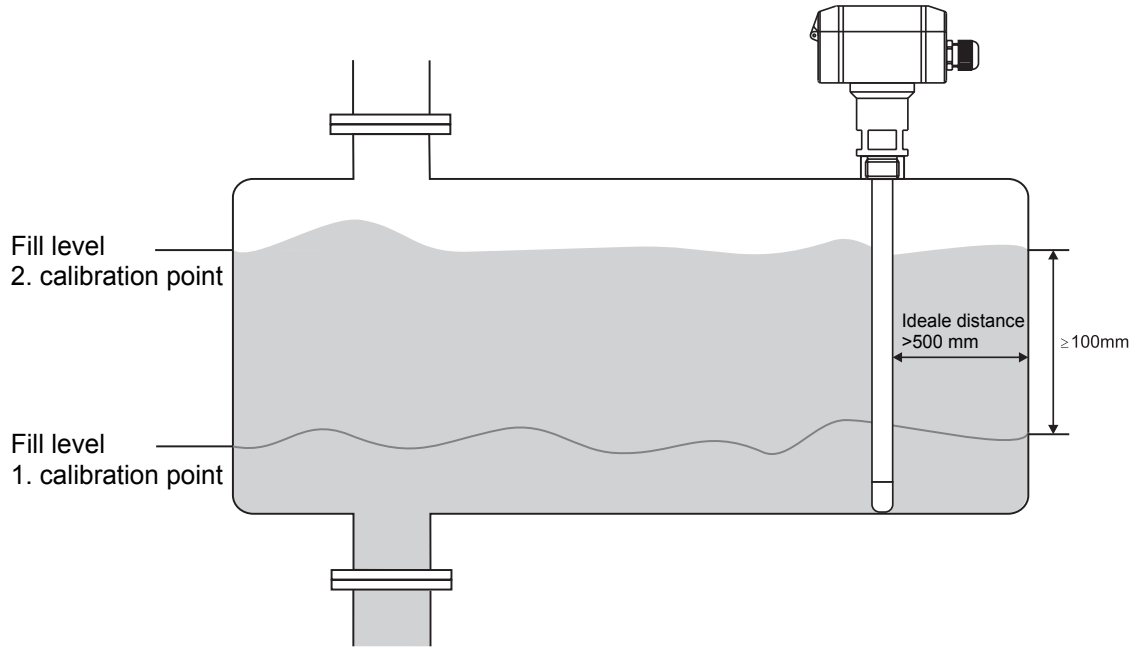
Correction of the fill level (Parameter 14)

If the current fill level differs from the displayed level (e.g. if the fill level is measured with a dipstick), the displayed level can be corrected with the offset parameter.

Calibration

Using the 2-point-calibration the UNICON-CL can be aligned automatically. With these calibration points the probe constant K and the offset-value for tare are computed.

1. Select "YES" at menu item Calibration (parameter 8, page 7)
2. Press button to select 1.calibration point FL1
3. Enter fill level for 1.calibration point with buttons and .
4. Press button to select 2. calibration point FL2
5. To obtain level for 2. calibration point full or empty tank
6. Enter fill level for 2. calibration point with buttons and .
7. Finishing calibration by pressing button .
   The display shows the computed values for probe constant K and offset-correction for tare.



Mounting notes

⚠ Only for vertical mounting

- For a distance from probe to tank wall < 500 mm, a calibration is recommend. See parameter 8 "calibration"
- Minimal conductivity of 50 µS/cm, not adherent.

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Ordering code:

	1.		2.		3.		4.		5.		6.		7.
UNICON-CL -	☐	-	☐	-	☐	-	☐	-	☐	-	☐	-	☐

1. Model

1	Output 4 ... 20mA for level measurement, loop powered, 2 electronic alarm outputs, supply voltage 14 ... 30V DC	
2	like 1, but additional temperature measurement with RTD (Pt100) for temperature compensation of the immersion probe, additional output 4 ... 20mA for temperature, loop powered	

2. Mounting

01	case horizontal	(Display on top)
04	case vertical	(Display front side*)

* 1 cable gland M20x1.5 on the backside

3. Probe

		min. immersion depth M
1	single probe for metal tanks	20 mm
2	single probe for plastic tanks	60 mm
4	as 2, but for Reference electrode Hastelloy, for acids and lyes (Please state your medium in plain text).	60 mm

4. Medium temperature

1	0 ... 60 °C
2	-10 ... 120 °C (steam sterilisation 140 °C)

5. Process connection A

G3/4 A

6. Probe length EL (please state in mm)
standard length 500, 800, 1000, 1500, 2000, 2500

7. Options

00	without option
11	2. cable gland M20x1,5

Note: Following information are needed by order:
1. medium
2. medium temperature