Liquid Level Sensor

Reliable Precision in Liquid Level Measurement

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PATENT PENDING

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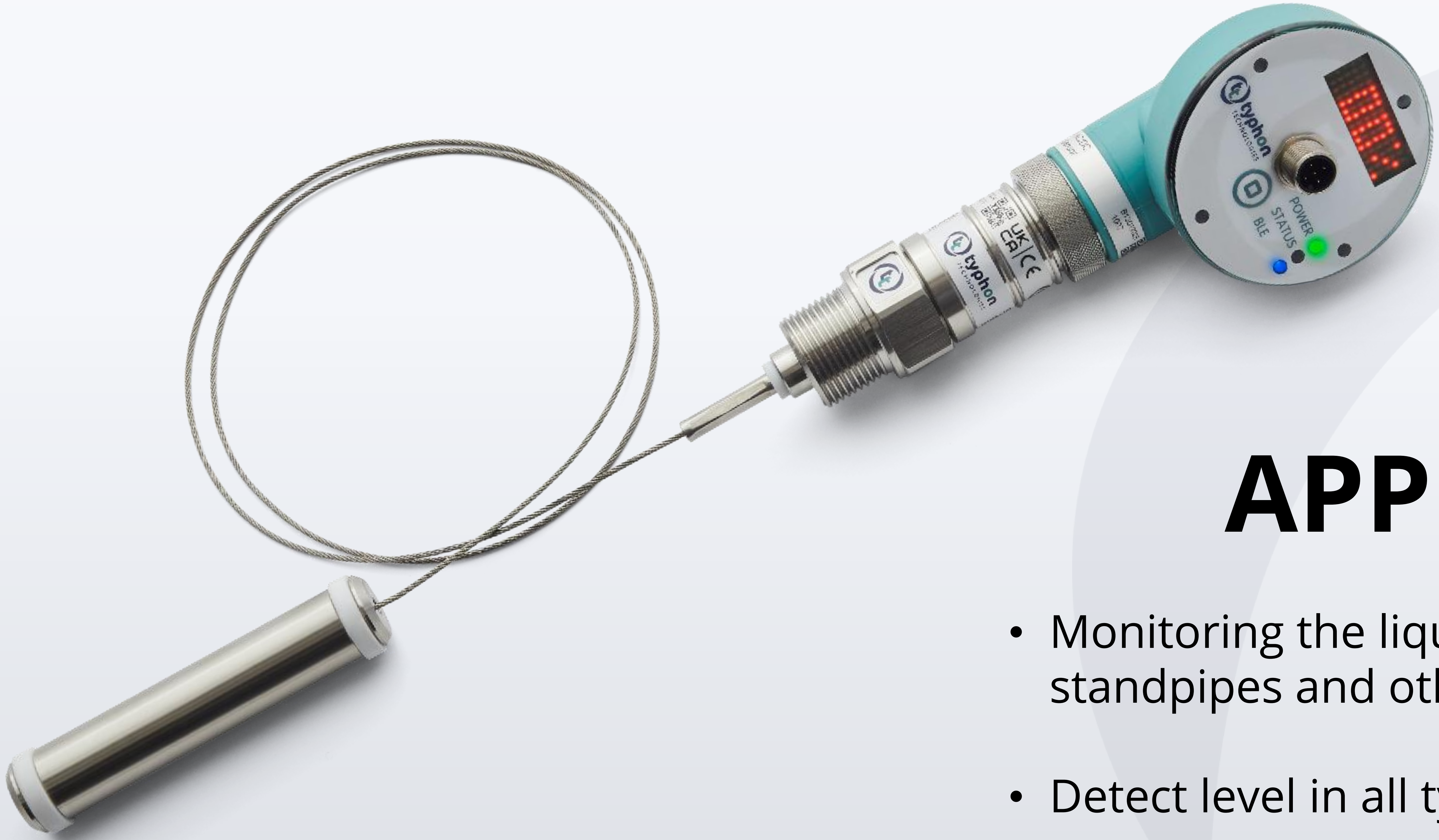
Liquid Level Sensor



APPLICATION

- Monitoring the liquid level in vessels, tanks, standpipes and other applications.
- Detect level in all types of refrigerant media and oil
- Applicable for all types of cooling and heating systems (including heat pumps application)

PATENT PENDING

CO_2, NH_3, OIL, HFC, HFO, CFC, ALCOHOL, WATER, BRINE

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Key Features

- **Flexible Output:** Analog (mA or Voltage) for 0-100 % indication
- **Universal Media Combability:** CO_2, NH_3, OIL, HFC/HFO/CFC, ALCOHOL, WATER/BRINE
- **Robust design:** Measuring capacitance & conductance – unaffected by metal or conductive parts
- **High Reliability:** 1000 VAC Galvanic Isolation for improved reliability and sensitivity
- **One Sensor, All media:** simplifies ordering and stocking
- **Easy setup:** Configure, diagnose and view live data via Bluetooth + TT SmartConfig App
- **Future proof:** Reduced PFAS content - Higher signal accuracy and environmental compliance
- **Industrial longevity:** No moving or mechanical part to wear out
- **Service-Friendly:** Replacement of electronic part without removing mechanical part
- **Industrial durability:** High pressure up to 150 bar / IP66 protection degree
- **Patent Pending:** Innovative technology for maximum reliability

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Measuring principle

• Capacitance Measuring Principle

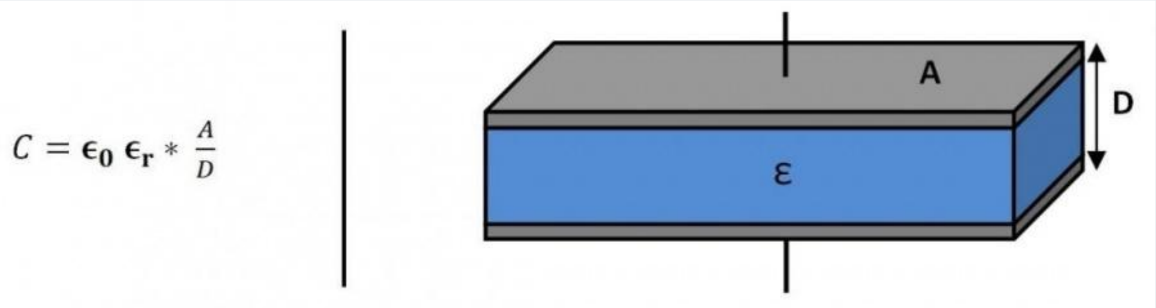
The capacitive measuring principle is based on the working principle of a capacitor. A capacitor creates an electric field between two conductive plates when the voltage is applied. The capacitance is calculated from the electric field and is than transform into a level.

The electric field is depending on 3 things:

dfgfgfgfdfg

- **Plate size** – Bigger plates can "hold" more charge.
- **Distance between plates** – Closer plates can "hold" more charge.
- **Material between the plates** – Different media have different dielectric constant (εr).

The distance of the conducting sheets (d) and the size (A) of the plates themselves are always kept constant to a capacitive sensor. Which means the only thing changing is the dielectric constants(εr) of the media.



Combined with

Medium	Dielectric Constant (εr, ~20–25 °C)
Ammonia (R717)	17
CO_2 (R744)	1.6
Propane (R290)	1.6 - 1.8
Propylene (R1270)	1.9
R134a (HFC)	13.6
R404A / R507A (HFC blends)	9 - 12
R1234yf (HFO)	9.5
Ethylene Glycol (30–50% aq.)	37 - 42
Propylene Glycol (30–50% aq.)	30 - 35
Brine (20–30% aq.)	70 - 80
Water	78.5
Ice (solid H_2O)	3.2
PAG Oil	5 - 7
POE Oil	4 - 6
PAO Oil	2.1 - 2.3
Air (gas)	1.0

• Conductance Measuring Principle

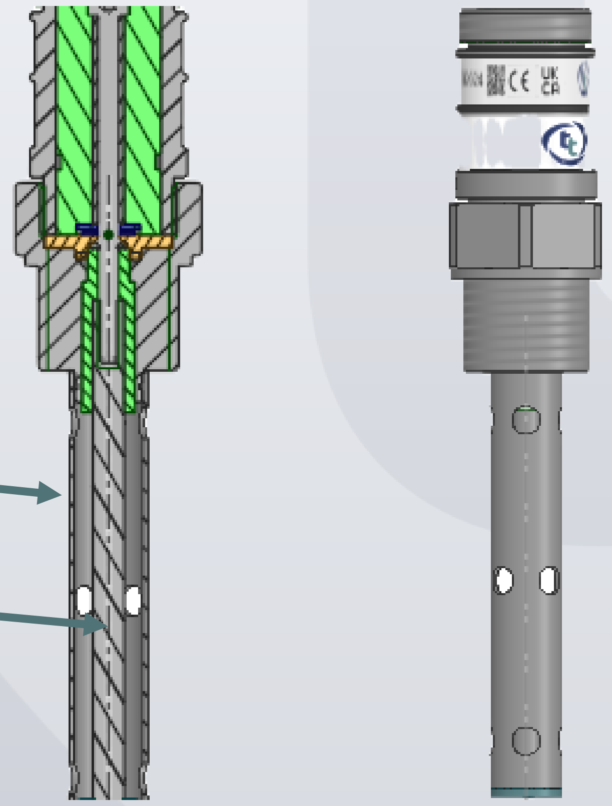
The conductance measuring consist of two electrodes and measure how well a material (media) can let electricity flow between the two electrodes.

How to use the conductance measuring principle:

- Detect level in tanks with conductive liquids
- Quality control (checking salt concentration in water).
- Leak detection (if a conductive liquid appears).

Electrode 1

Electrode 2



Designs & Forms

TTLLS-Cable VS TTLLS

- **Flexible length:** 200 – 6000mm Easy length adjustment on-site – same price
- **Universal Media Combability:** CO2, NH3, OIL, HFC/HFO/CFC, ALCOHOL, WATER/BRINE
- **Flexible design:** Easy to handle and ship, installation in low ceiling height
- **Installation:** 1” – 4” standpipe and not recommended for marine application
- **One Sensor, All media:** simplifies ordering and stocking
- *** Oil proof & temperature:** Temperature and oil Compensation
- **Reduced PFAS content** - Higher signal accuracy and reliability

- **Length:** 200 – 3000mm Ordering per length – price different
- **Universal Media Combability:** CO2, NH3, OIL, HFC/HFO/CFC, ALCOHOL, WATER/BRINE
- **Design:** Requirement of sensor length minimum free ceiling height
- **Installation:** directly in tanks, standpipes and recommended for marine application
- **One Sensor, All media:** simplifies ordering and stocking
- *** Oil proof & temperature:** Temperature and oil Compensation
- **Reduced PFAS content** - Higher signal accuracy and reliability

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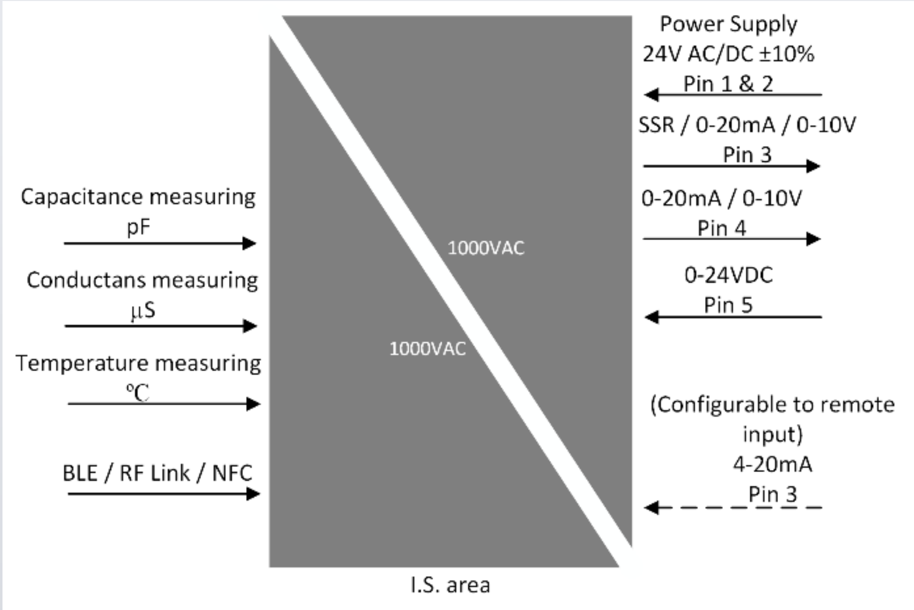
Electronic part

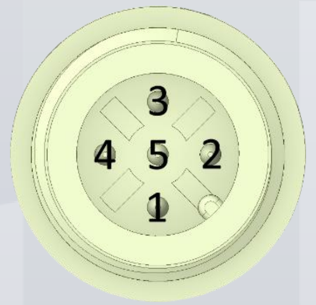
TTLLS-EL

- Measuring capacitance and conductance - not impacted by metal parts or any conductive parts
- Alarm output - SSR Relay 1A
- 1000 VAC Galvanic Isolation - Increase reliability and sensitivity.
- Configuration, diagnostic and Live data on site via Bluetooth
- The liquid level sensor has an analog output, which can be selected as either mA or Voltage for indication for 0-100% level.



- Matrix display - Visual indication of level and configuration parameters
- High resolution mA output 24 Bit = 0.001mA
- Universal Media Combability: CO2, NH3, OIL, HFC/HFO/CFC, ALCOHOL, WATER/BRINE
- *Oil proof & Temperature compensation
- Industrial durability - High pressure up to 150 bar / IP66 protection degree
- Patent pending technology
- M12 Connection

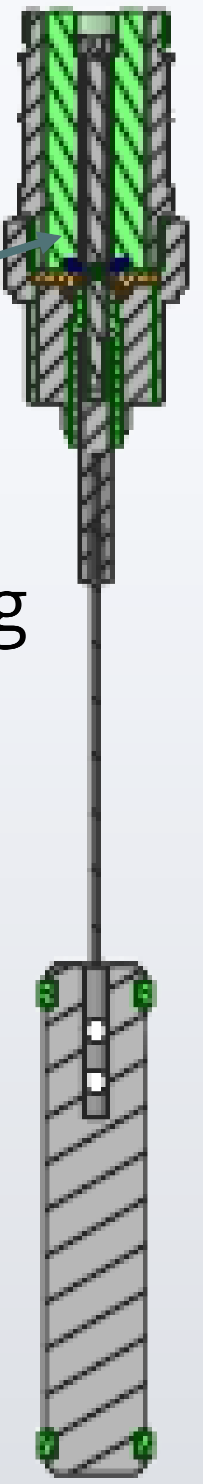
Pin 1: (Brown)	+24V AC/DC ±10%
Pin 2: (White)	-0V / Common
Pin 3: (Blue)	Input mA / control mA output / Alarm SSR
Pin 4: (Black)	Level Output mA / Level Output Voltage
Pin 5: (Grey)	Stop / Start Sensor



Mechanical part

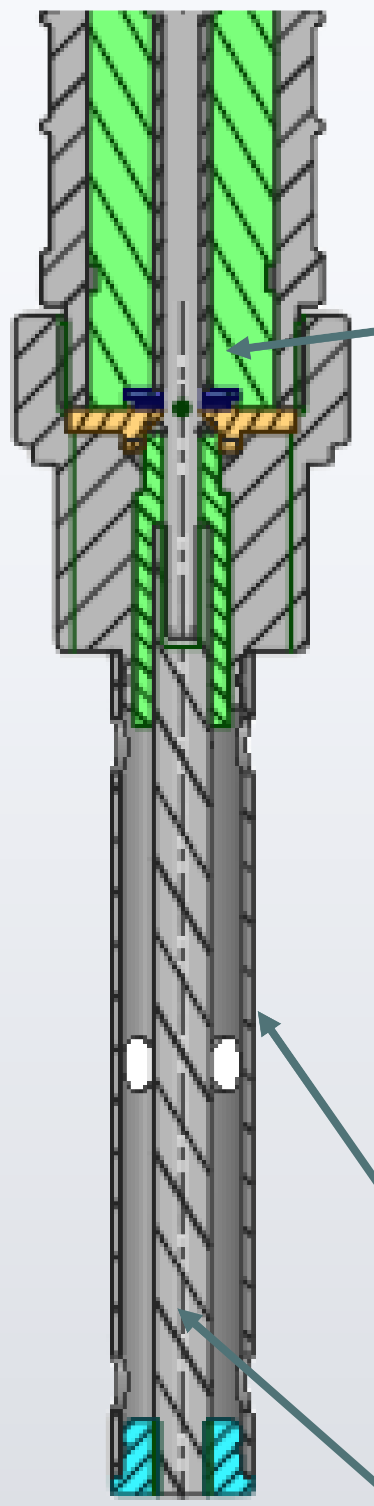
TTLLS-Cable-Mec

- Stainless Steel design



- PTFE Sealing, PEEK & O-ring
- Stainless Steel Wire
- Stainless Steel Counter Wight – part of the measurement
- PTFE Weight Isolator – Ensure that the weight not touching the standpipe

TTLLS-Mec



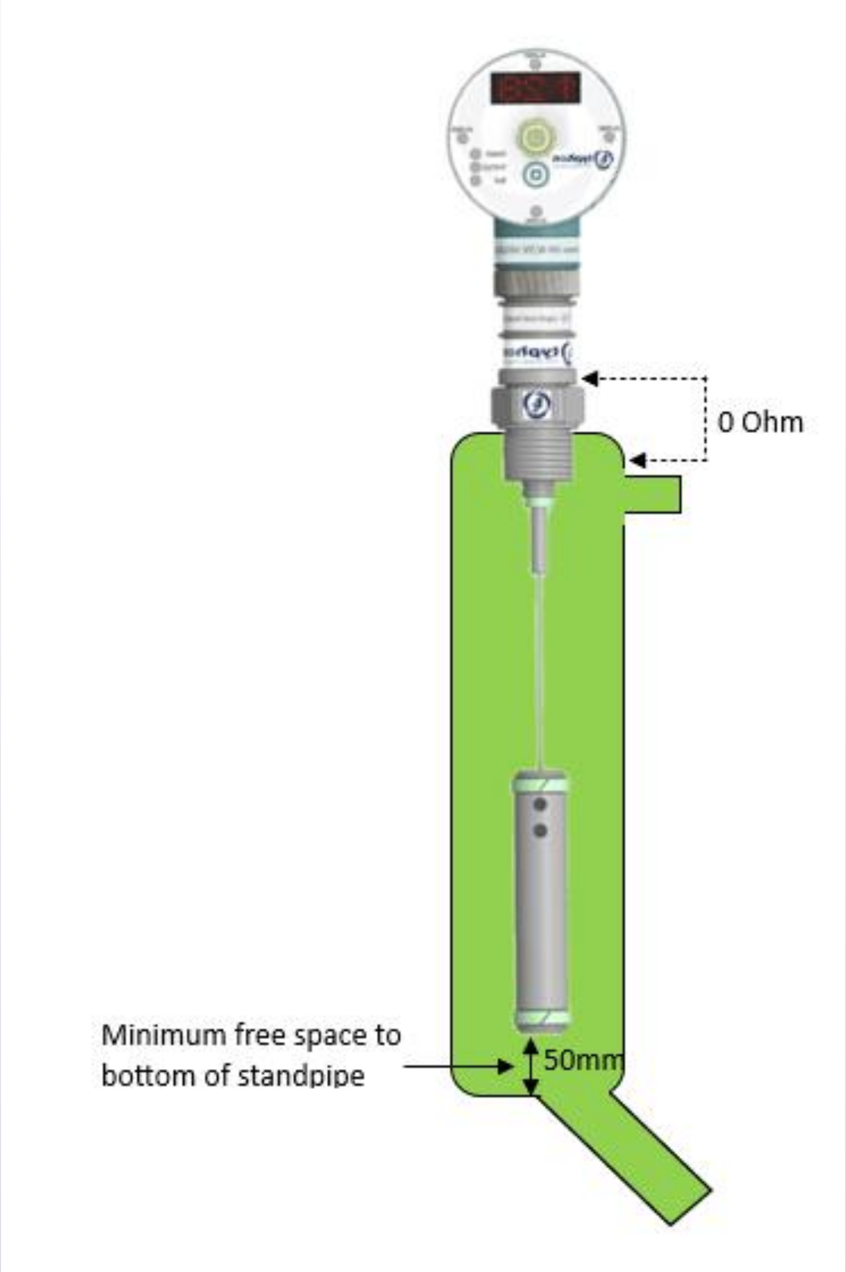
- Stainless Steel design
- PTFE Sealing, PEEK & O-ring

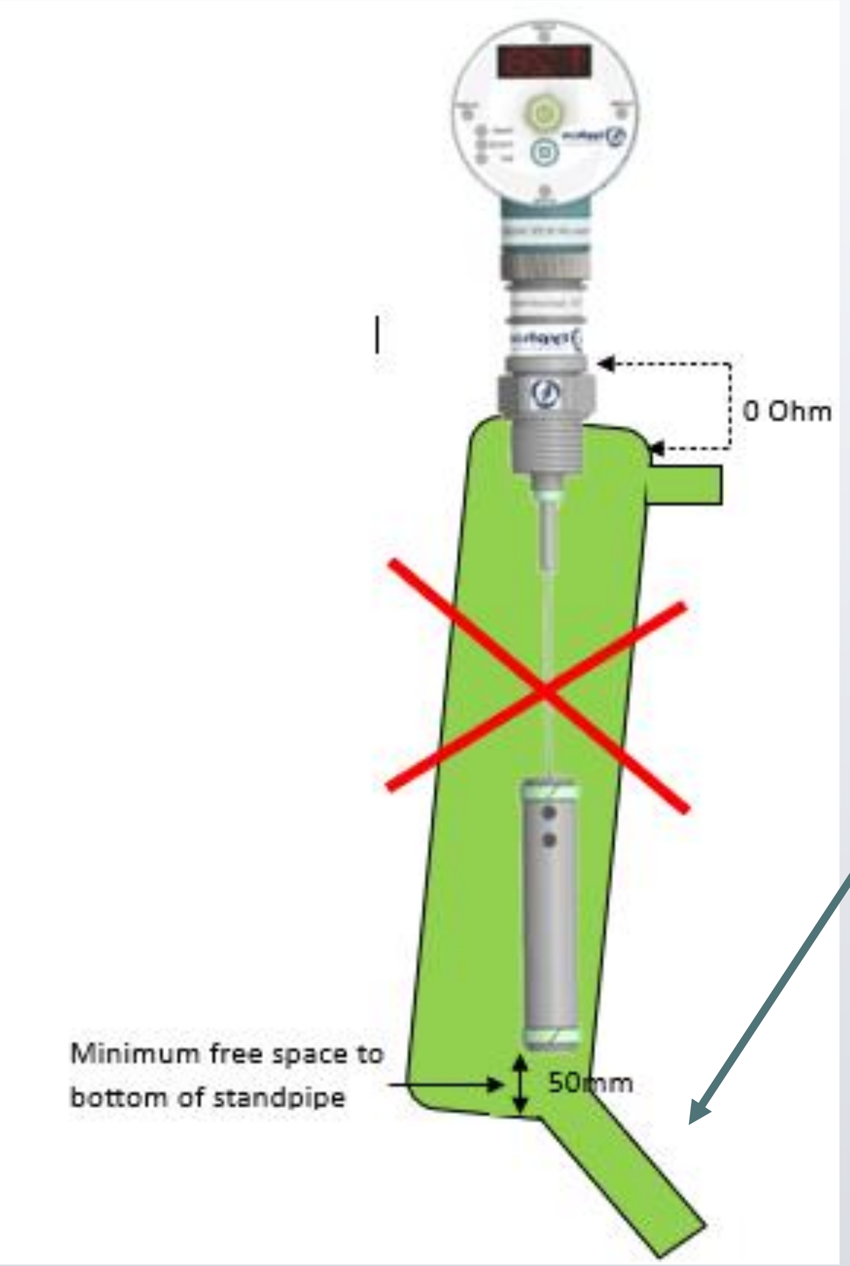
- PEEK End plug
- Stainless steel electrode 1
- Stainless steel electrode 2

Installation

TTLLS-Cable

- TTLLS-Cable shall be installed in standpipes from 1” to 4” standpipes
- Standpipes shall be in vertical position, otherwise a re-calibration needs to be done.

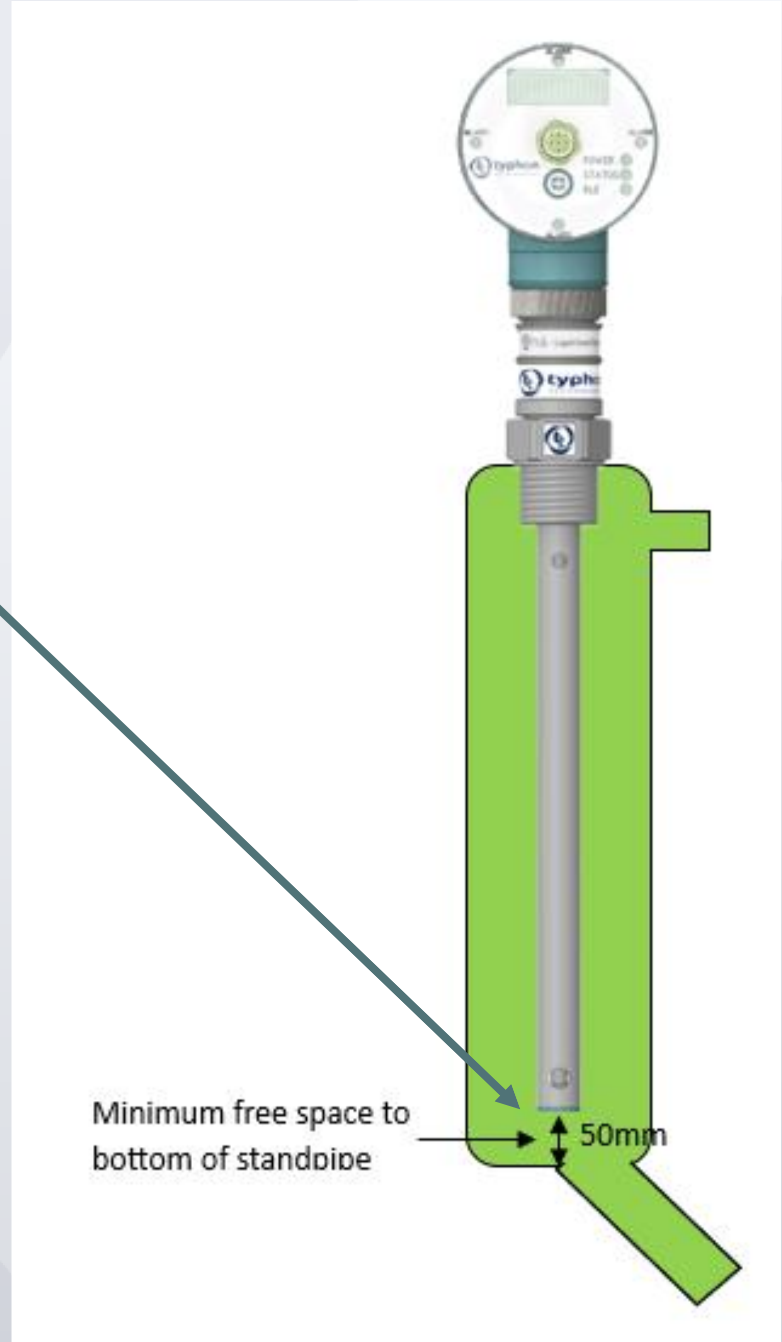




- Liquid Level Sensor must be installed in a vertical position.
- Minimum 50mm free space in bottom.
- The outlet pipe from standpipe shall be mounted at an angle of 5-10 degrees from horizontal. This drains the standpipe from oil.

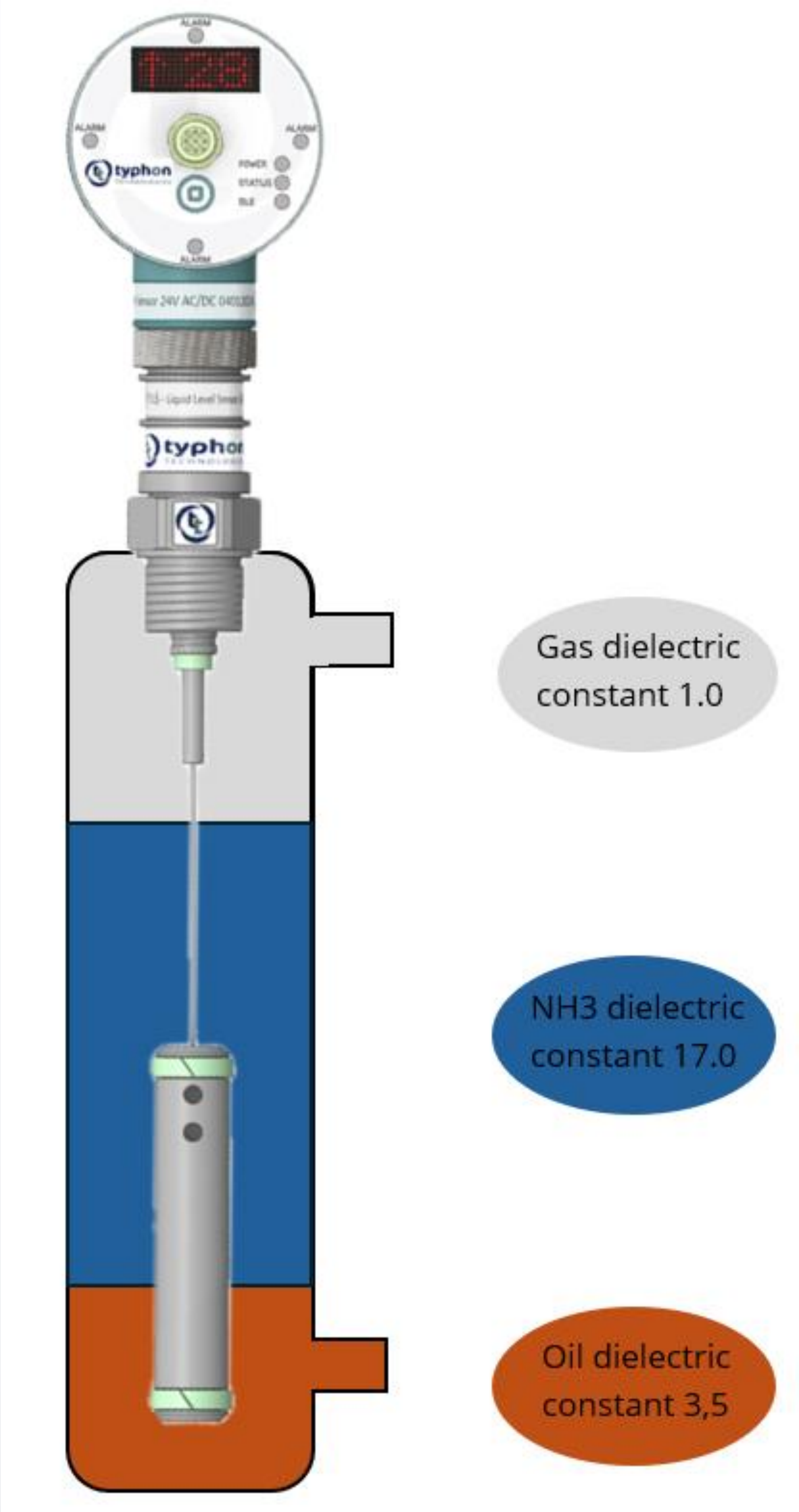
TTLLS

- TTLLS can be installed in standpipes, directly into a vessel or tank

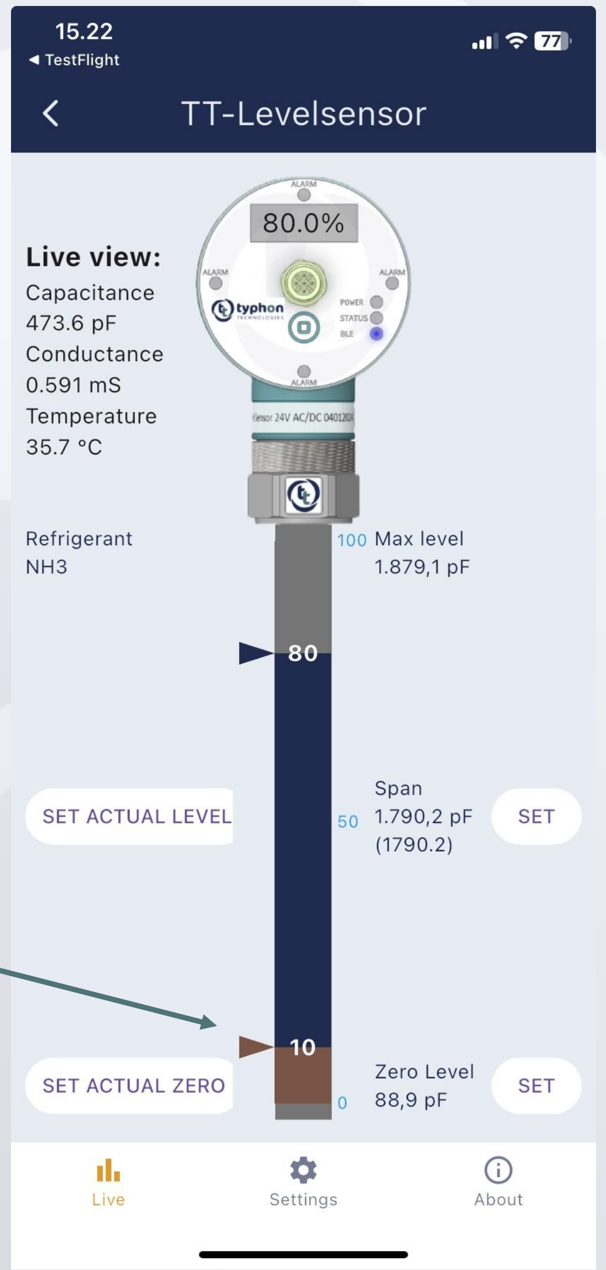


Oil proof – Compensation for oil

Patent pending technology – The Level sensor is cable of detecting e.g. oil layer below ammonia and make any needed compensation for correct level measuring.



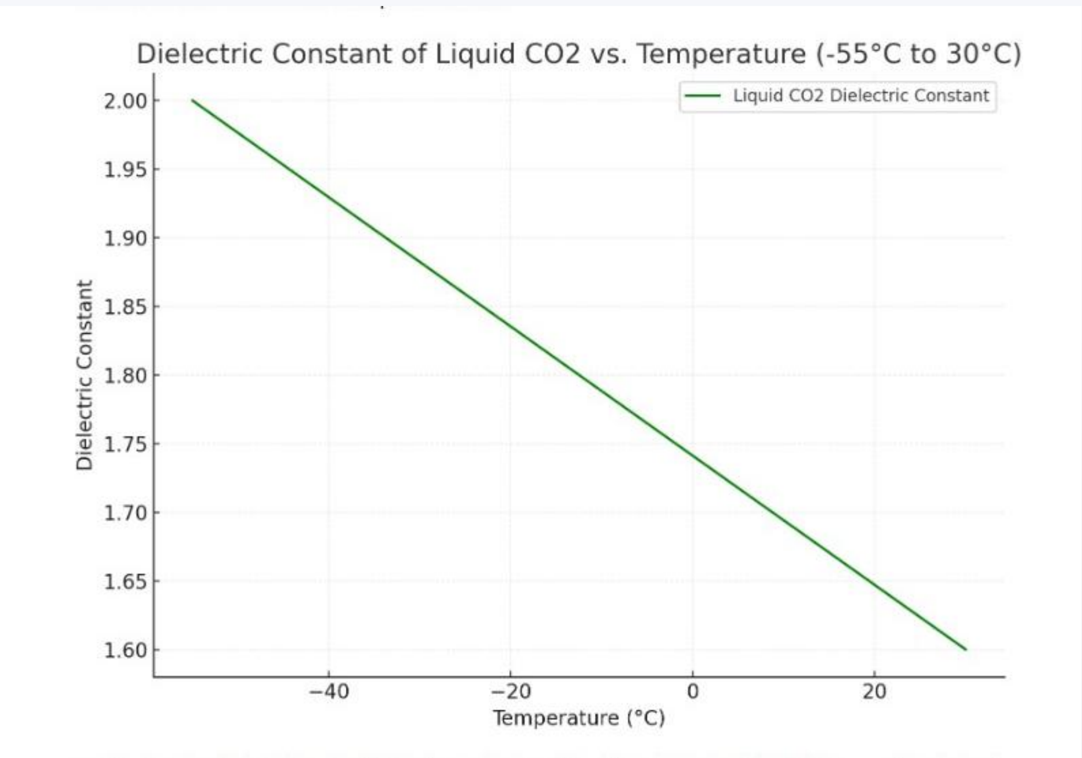
- Patent pending measuring technology
- Measuring level is not impacted by oil layer at the bottom in the standpipe, level is compensated for the oil
- See Oil percent in TT SmartConfig App
  Get the oil level indication from the second analog mA output 0 – 100% level

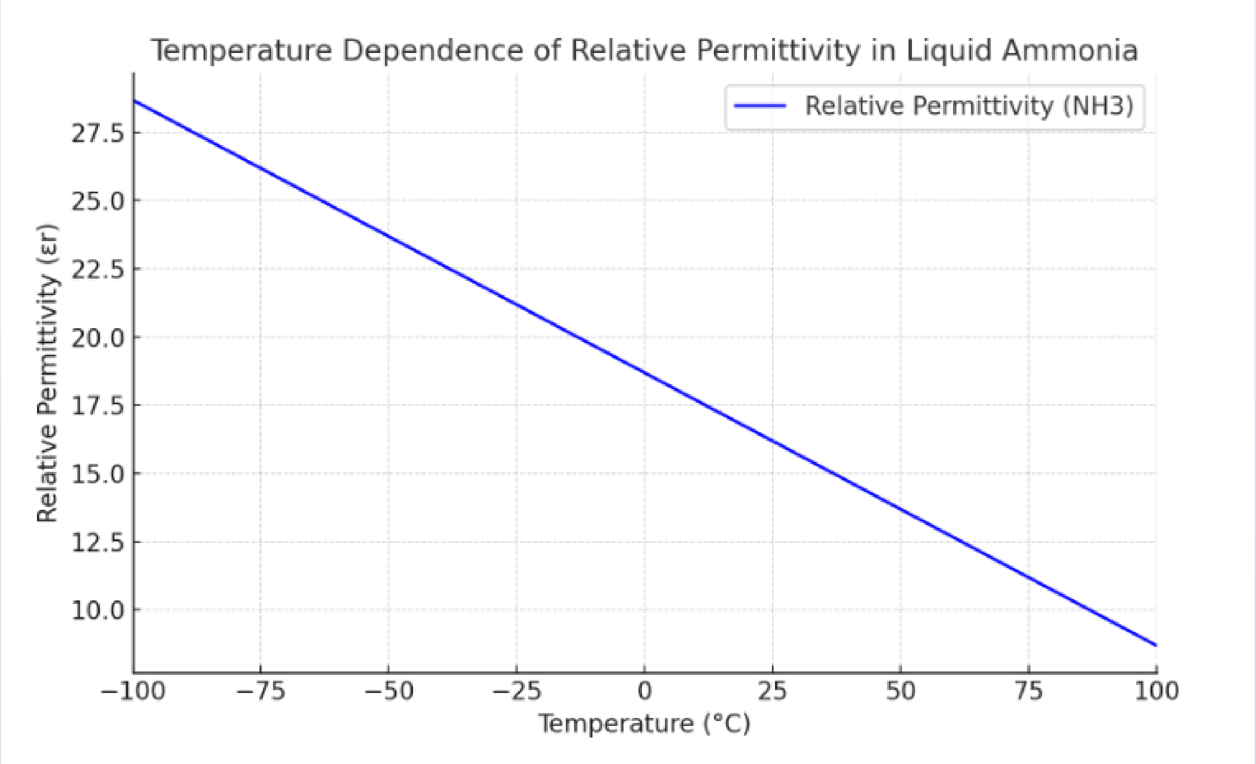


* This complete, patent-pending solution is currently being tested in a pilot project in Denmark where it has shown excellent results over the past several months. Based on the success of this pilot, we are working to integrate these features as standard functionality in our upcoming line of level sensors.

Temperature Compensation

Patent pending technology – The Level sensor is now able to measuring the temperature for the media and make any needed compensation for correct level measuring.





- Patent pending measuring technology
- Build in temperature compensation – measuring the media temperatures.
- Very suitable for CO2 and Heat Pumps Application and all other media.
- Level is not changed from temperature deviation

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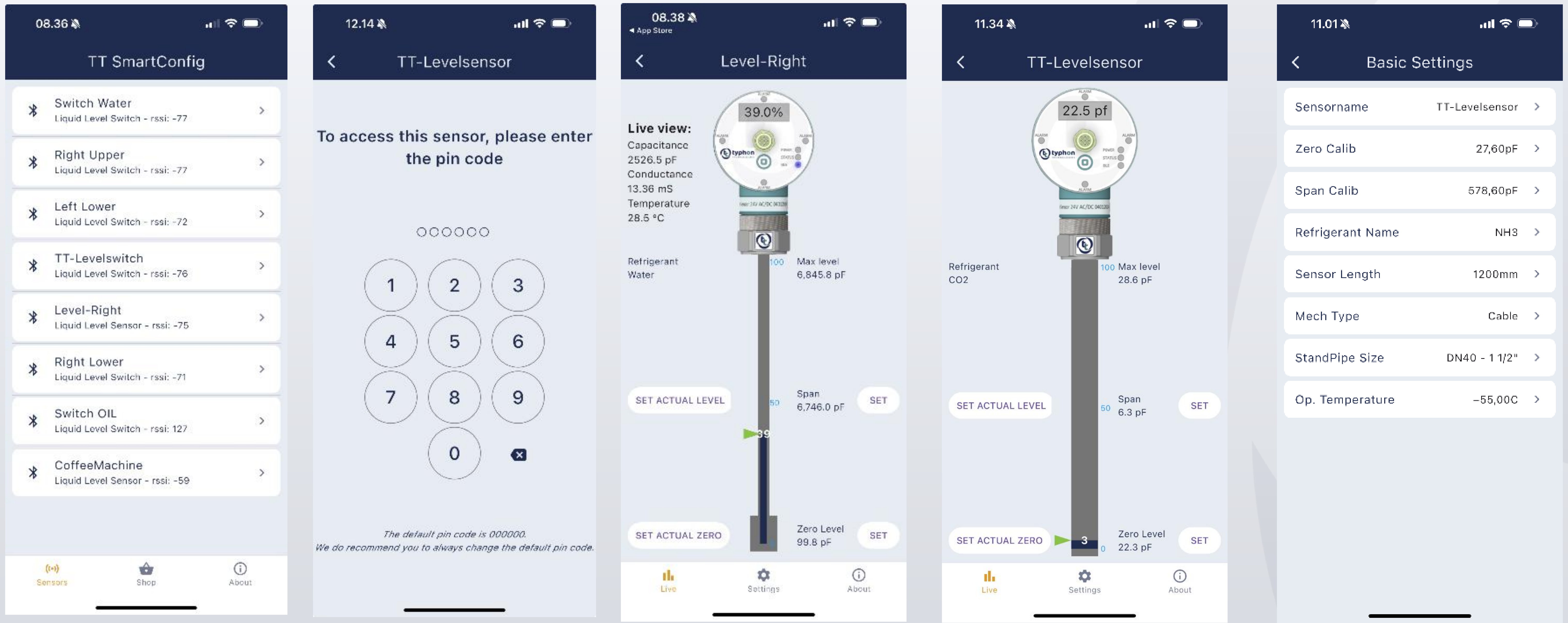
TT SmartConfig App

- TT SmartConfig App is used for configuration of Typhon Technologies sensors.
- TT SmartConfig App connects to the device using Bluetooth connection.
- TT SmartConfig App provides all configurations settings and gives live status of the sensors.

Download on the App Store

Available on the Google Play

“TT SmartConfig” App available for IOS and Android phone



THANK YOU