Kongter

KT-550 Moisture & Temperature Transmitter

The KT-550 Moisture and Temperature Transmitter integrate thin-film capacitors and interdigital capacitors manufactured with special processes. It captures real-time changes in the electrical properties of oil-water mixtures, compensates via a high-precision temperature probe, and calculates moisture content in oil through optimized algorithms. It enables accurate single-sensor monitoring from trace moisture (dissolved water) to high water content (free water, emulsified water).

Featuring a highly reliable industrial design, the KT-550 continuously, accurately, and rapidly measures moisture and temperature variations in various oils under harsh conditions. It is widely used for online water content monitoring of lubricating oil, hydraulic oil, gear oil, engine oil, fuel oil, and more.

Application Significance

Moisture is highly destructive to most oils:

- For large continuous operating equipment and heavy machinery, real-time moisture monitoring in lubricating and hydraulic oils is critical to ensure normal operation. Moisture breaks down oil films, deactivates additives, causes metal corrosion, shortens oil life, and may lead to unplanned shutdowns, safety incidents, and economic losses.
- For generators and transformers, moisture degrades insulation properties and threatens power equipment safety.
- For engines, moisture reduces combustion efficiency and may cause stalling and traffic accidents.

Real-time moisture measurement in industrial oils is essential to avoid costly failures and major safety hazards.

Moisture in Oil

1. Water Activity (aw, 0…100%)

The ratio of actual moisture content to saturated moisture content in oil at the current temperature (range: 0…1 aw).

- 0 aw: no water in oil
- 1 aw (100% RH): dissolved water is saturated; free water will precipitate.

2. Dissolved Water (ppm, Parts Per Million)

Mass or volume ratio of dissolved water in oil.

- Mass ratio: mg/kg
- Volume ratio: μl/L

According to GB/T7600-2014, the unit is mg/L. Conversion: 58 ppm × 0.86 g/ml = 50 mg/L (0.86 g/ml = oil density).

3. Free Water & Emulsified Water (%)

Forms when dissolved water reaches saturation (aw=1). Expressed in % (e.g., 2% = 2 parts water in 100 parts oil-water mixture).

Dissolved Water

Water present at the molecular level. Related to base oil type, additives, and temperature. Oil appears clear before saturation.

Free Water

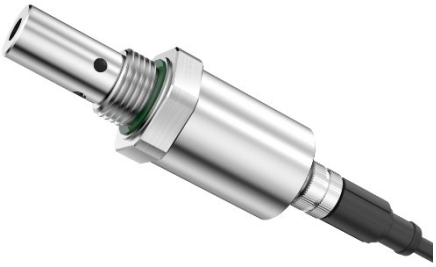
Formed when dissolved water precipitates (due to cooling) or external water intrudes. Water droplets sink to the tank bottom.

Emulsified Water

Formed when free water is intensely agitated or sheared, creating micro-droplets suspended in oil. Oil turns cloudy/white and causes severe system damage.

Key Features

- **Reliable**
  - Patented product, compatible with various oils
  - Sensor lifespan up to 10 years
  - High efficiency: <5mA@24Vdc
  - Unique grounding protection and signal sampling unit
- **Accurate**
  - Imported sensing chip, unique temperature compensation algorithm
  - Water activity accuracy: ±2%; temperature accuracy: ±0.3°C
  - Traceable calibration certificate from national metrology institute
- **Robust**
  - IP66 protection, full stainless-steel body
  - Reverse polarity protection, industrial isolation
  - Wide power input: 9–36VDC
- **Easy to Use**
  - G1/2” BSP standard interface, easy installation
  - Local digital output and calibration port
  - Built-in calibration curves for various oils



Applications：

- Oil fields, oil refining
- Wind, hydro, thermal, nuclear power power transmission
- Engineering machinery
- Aviation, marine
- Railway, highway transportation
- Iron and steel, metallurgy
- Oil storage, fuel stations
- Industrial production lines.

Applicable Oils：

- Lubricating oil
- Hydraulic oil
- Gear oil
- Engine oil
- Fuel oil
- Insulating oil
- Turbine oil
- Various light oils, heavy oils, etc.

Technical Specifications

Temperature	
Measuring range	-40 … 120 °C

Accuracy (@25°C)	±0.3°C
Resolution	0.1°C
Water Activity	
Measuring range	0 … 1aw
Accuracy	0…0.6: ±0.02aw; 0.6…1: ±0.03aw
Resolution	0.001aw
Dissolved Water (calibrated per oil type)	
Measuring range	0…2000ppm or customized
Accuracy	±10% or 10ppm (whichever is greater)
Resolution	1ppm
Dielectric Constant	
Measuring range	1…6
Accuracy	±0.1
Resolution	0.001
Free/Emulsified Water	
Measuring range	0…10% or customized
Accuracy	±0.5 %
Resolution	0.1 %
General	
Mechanical interface	G1/2” ISO
Signal output	RS485 MODBUS RTU
Ambient temperature	-40 … +80 °C
Allowed oil temp	-40 … +80 °C
Probe pressure	20bar (customized on request)
Probe material	316 & 304 stainless steel

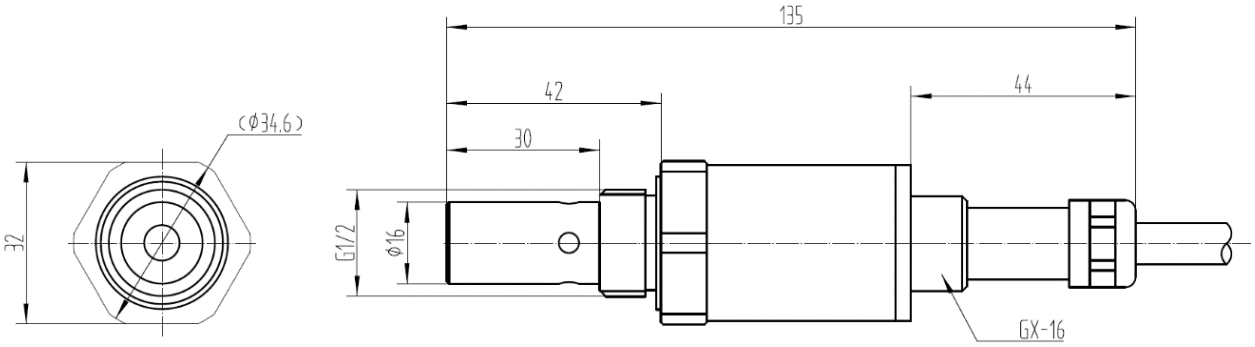
Protection class	IP65
Power supply	10–28V DC
Supply current	<20mA@DC24V
Transmitter weight	200g
Total package weight	270g
Package dimensions	172*117*53 mm (carton)
Connector	GX16, 5-pin
Cable	4-core, 2 m, UL20866 4×22AWG
EMC standards	EN61326-1, EN61000-3, EN61010 Class B

NOTE:

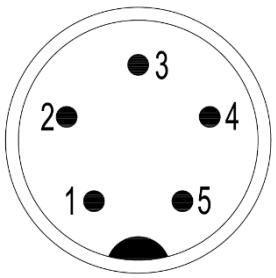
Moisture content = total dissolved + free + emulsified water (output in ppm).

Conversion: 1% (free/emulsified water) = 10000 ppm (e.g., 0.58% = 5800 ppm).

Size (mm)



Pin Definition (Sensor Male)



Pin Definition (Sensor Male)

1 — Red: DC+

2 — Black: DC-

4 — White: RS485+/A

5 — Green: RS485-/B

Order Information:

Item	Specification		
Measuring Range	Water Activity (aw):	0 … 1 aw	Fixed
	Temperature (T):	-40 … 120 °C	Fixed
	Dissolved Water (ppm):	0 … ____ ppm	Need confirmation
	Water Content (%):	0 … ____ %	Need confirmation
	Dielectric Constant (ε_r):	1 … 6	Fixed
Oil Sample	Manufacturer: _____	Model: _____	

NOTE:

- aw (water activity), temperature (T), and dielectric constant (ε_r) are not oil-dependent.
- Dissolved water (ppm) requires calibration coefficients programmed for different oil types. Recommended ranges by experience:
  - Mineral transformer oil: 0 … 100 ppm
  - Gear oil: 0 … 5000 ppm
  - Hydraulic oil: 0 … 1000 ppm
  - Turbine oil: 0 … 500 ppm
  - Phosphate ester hydraulic oil: 0 … 20000 ppm
- Water content (%) requires initial zero-point calibration for each oil type. Three recommended ranges:
  - 0 … 5 %
  - 0 … 10 %
  - 0 … 20 %
- Please specify oil manufacturer and grade/model as clearly as possible.
  - Example:
    - Manufacturer: Mobil
    - Model: Gear Oil SHC™ XMP 320

Therefore, to specify the right model per your real field test, we will need your confirmation for ppm range, water content range and oil type info.