MDS-601B 6-Parameter Oil Condition Sensor

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Product Introduction

MDS-601B 6-Parameter Oil Condition Sensor is an online monitoring instrument designed for lubrication systems in industrial equipment. It integrates piezoelectric resonant MEMS technology, dielectric constant sensing, and polymer thin-film capacitive humidity measurement, enabling real-time, simultaneous measurement of six key parameters: temperature, dynamic viscosity, density, dielectric constant, water activity, and micro-water content.

The core resonator derives density and viscosity through variations in resonant frequency and quality factor (Q-factor). At the same time, the polymer thin-film membrane enables quantitative micro-water analysis based on dielectric response caused by moisture adsorption. The sensor is calibrated across a broad matrix of oil types and incorporates an embedded dynamic temperature compensation algorithm to ensure data stability under varying operating conditions. It is also equipped with electromagnetic interference (EMI) protection and an isolated power supply module, making it suitable for harsh field environments with variable-frequency drive (VFD) interference.

Constructed with a 316 stainless steel probe and standard threaded process connections, the sensor supports RS485 or CAN digital communication interfaces for easy installation.

By upgrading oil monitoring from periodic sampling to continuous online measurement, this sensor enables early detection of oil degradation and potential equipment faults. It is widely applicable to hydraulic power units, gearboxes, diesel engines, air compressors, and similar machinery. It can be deployed across industries including power generation, marine, mining, and construction equipment, providing reliable data support for predictive maintenance programs.

Features & Benefits

1. Comprehensive Multi-Parameter Output – Simultaneously measures temperature, dynamic viscosity, density, dielectric constant, water activity, and micro-water content. The correlation of multi-dimensional data enables a complete assessment of oil health status.
2. Piezoelectric Resonant MEMS Technology – Density and viscosity are derived from variations in resonant frequency and quality factor (Q-factor). With no moving parts, the sensor ensures long-term operational reliability.
3. Polymer Thin-Film Moisture Sensing – Micro-water detection is achieved through dielectric changes in a specialized polymer membrane upon moisture adsorption, offering high sensitivity to trace water content in oil.
3. Multi-Oil Matrix Calibration – The sensor is calibrated across a wide range of oil types and incorporates an embedded dynamic temperature compensation algorithm, effectively suppressing thermal drift and ensuring data consistency across varying operating conditions.
4. **Industrial-Grade EMI Protection –** Equipped with electromagnetic interference (EMI) shielding and an isolated power supply module, the sensor performs reliably in harsh electrical environments, including variable-frequency drive (VFD) interference and high-power start/stop transients.
5. Easy Installation & Digital Connectivity – Featuring standard threaded process connections and supporting RS485 or CAN digital communication, the sensor enables continuous data streaming for seamless integration into your existing condition monitoring system.

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Technical Specifications

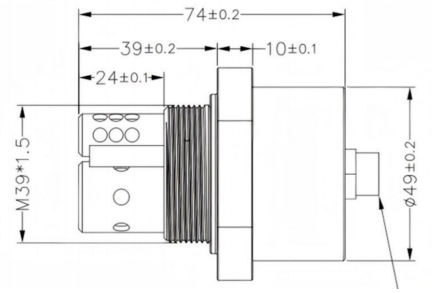
Digital Output	RS485 MODBUS RTU (Default) / Optional CAN
Operating Voltage	DC 12–32V (RS485)
Operating Current	< 20mA @ DC 24V
Electrical Connection	M12 × 1, 8-core aviation connector
Cable Assembly	8-core × 2 meters (standard)
Refresh Rate	1 Hz (Startup < 30s)
Compliance Standards	EN61326-1, EN61326-2-3, ICES-003 Class B
Ambient Temperature	-30 ~ +70°C
Fluid Temperature	-20 ~ +125°C
Storage Temperature	-40 ~ +85°C
Process Connection	M39 × 1.5 mm thread
Dimensions (Housing)	Φ49 × 74 mm
Wetted Material	316 Stainless Steel
Ingress Protection	IP66 standard; IP68 available on request (form factor may vary)
Pressure / Flow Limits	Maximum operating pressure: ≤ 2 MPa; Maximum flow velocity: ≤ 3 m/s

Measurement Performance

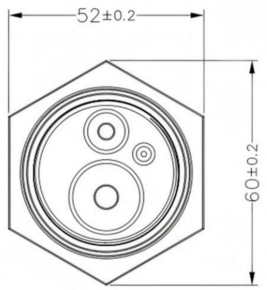
Parameter	Measurement Range	Resolution	Accuracy
Temperature	-40 ~ +125°C	0.1°C	±0.3°C @ 25°C
Dynamic Viscosity	1 ~ 400 cP (0 ~ 1000 cP full scale)	0.1 cP	±3% of reading
Density	600 ~ 1250 kg/m³	0.1 kg/m³	±3% of reading
Dielectric Constant	1 ~ 6	0.01	±3% of reading
Water Activity (Saturation)	0 ~ 1 aw	0.001	±0.02 aw (0–0.6 range) ±0.03 aw (0.6–0.9 range) ±0.04 aw (0.9–1.0 range)
Water Content	0 ~ 1000 ppm	1 ppm	±10% (based on averaged multiple measurements)

Note: Factory default calibration is performed using ISO VG 68 hydraulic oil. Custom calibration for specific oil types is available upon request.

Dimensions(mm)

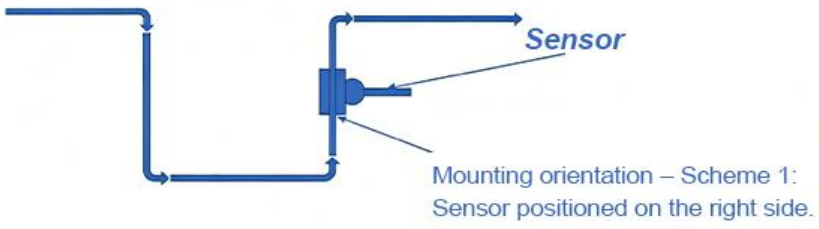


8-core aviation connector

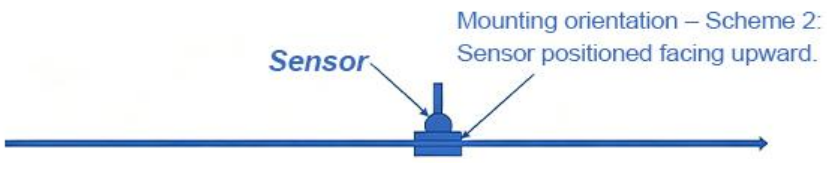


Installation method

Option 1: Curved/Bent Pipe Configuration



Option 2: Straight-Through Pipe Configuration



Thank You For Your Business!