Caledonia Instrumentation Systems Ltd

MFI Sensor

Lubrizol Multi Frequency Impedance Sensor

Product Description

The MFI sensor system can measure, diagnose and predict a lubricant's condition by monitoring temperature-compensated electrochemical responses to electrical signals applied between electrodes immersed in the lubricant.

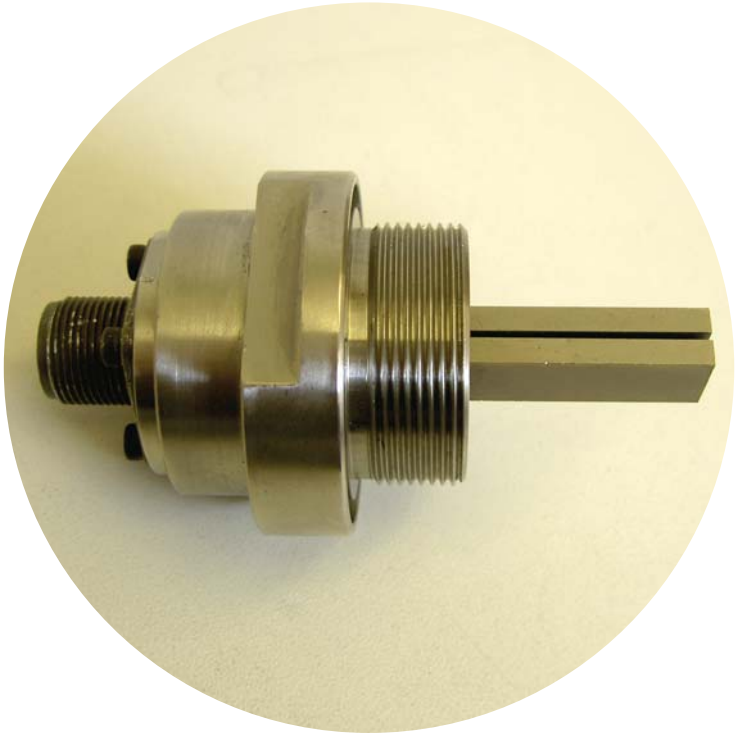

Figure 1 MFI Transducer

The output signals are referenced as high frequency, medium frequency and low frequency impedance responses.

The sensor head is shown in figure 1.

The Lubricant's high-frequency electrochemical response is related to friction reduction property of bulk fluid and is sensitive to presence of major polar contaminants (soot, water) in the solution. Lubricant's medium frequency electrochemical response is related to contamination and acidity control property of a lubricant and is sensitive to presence and condition of detergent and dispersant additives and polar degradation products in the bulk solution. Lubricant's low frequency electrochemical response is related to surface protection property of interfacial layer between a lubricant and industrial equipment and is sensitive to presence of surface active additives and very small (ppm) quantities of water/ coolant contamination.

The instrument is a digital communications device which utilizes a serial port on the electronics and can communicate either RS232 or RS485. The instrument interfaces with SCADA and DCS systems using a MODBUS serial software protocol for ease of installation into end user's systems.

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The MFI sensor system includes a pair of electrodes (transducer) and a separate or integrated thermocouple that are immersed in a lubricant, electronics that apply signals to the electrodes and measure impedance responses and temperature, and hardware and software that diagnose fluid condition based on temperature-compensated impedance responses.

The sensor transducer is shown in Fig.1 and the complete MFI sensor system is shown in Fig. 2.

The lubricant responses at the three frequencies allow a comprehensive diagnosis for determining lubricant endof-life, typically based on OEM or enduser requirements, and predicting when the next lubricant change will be needed.

Figure 2 The MFI Sensor Electronics

Installation

The sensor would typically be installed within a circulating pump and filtration system and be on the clean side of the filter. A manifold T piece or pipe outlet ‘T joint’ will allow the sensor to be simply installed. Oil would flow through the manifold and return out to the piping system or reservoir.

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Product Specifications

Electronics Part	
Power Supply	Vs=9-32VDC (Preferred ~24VDC)
Operational temperature range	40˚ C to +140˚ C
Oil Temp Measurement Accuracy	±1˚ C
Device Ambient Temp	- 40˚ C to 150˚ C
Impedance Measurement Accuracy	
A. High Frequency	0.25%
B. Medium Frequency	3%
C. Low Frequency	3%
Lubricant remaining life prediction accuracy	5%
Data Output Method	5V Digital Pulse, Serial Digital Data through MODBUS Protocol
Transport Method	A. RS232 / RS 485 Communication Protocol
Sampling Rate	1 ~ 5 Minutes
Case Structure	Housing + Lid
Case Material	Housing (Plastic) + Lid (Metal)
Transducer Part	
Oil Pressure	150psi
Oil Temperature	- 40˚ C to 150˚ C
Transducer Material	LCP, all metal parts made of 316 Stainless Steel
Transducer Specification	Stable electrode gap and size critical; 5cm^2 surface area and 1mm gap size, accuracy ±1%
Insertion Length	Electrode completely covered by a sample, covered area must remain the same
Thermocouple	Separate or Integrated

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