

FUEL QUALITY AND PRODUCT ID SENSING





DVD PROBE





Multi-Parametric Measurement Ranges	Sym	Min	Тур	Max	Unit
Density	ρ	0.70	0.80	0.85	g/ml
Density Accuracy		± 2	± 2	± 2	Kg/m ³
Viscosity (dynamic)	μ	0,5	15	30	mPa-s (cP)
Viscosity (dynamic) Accuracy for viscosity < 10 mPa-s (cP)			$\pm 0,2$		mPa-s (cP)
Dielectric Constant		1,5	2,0	4,0	-
Dielectric Constant Accuracy		-3	± 1	+3	% Value
Temperature Accuracy	Т		±0.2		°C
Fluid Temperature	Т	10		40	°C





FUEL QUALITY ANALISYS AND PRODUCT IDENTIFICATION

FUEL DENSITY ρ (Kg/m³) FUEL DYNAMIC VISCOSITY μ (cP) FUEL DIELECTRIC CONSTANT TEMPERATURE (°C) WITH MULTI-PARAMETRIC CALCULATION TUNING FORK RESONATOR

DVD (Density Viscosity Dielectric) DESCRIPTION:

The DVD Sensor is equipped with an integrated TUNING FORK sensor that will directly and simultaneously measure the viscosity, density, dielectric constant, temperature of fuels. Relying on patented tuning fork technology, the sensor monitors the direct and dynamic relationship between multiple physical properties to determine the quality, condition and contaminant loading of fuels such as diesel biodiesel, gasoline, Jet fuel, kerosene, biodiesel concentration and urea quality. The multi-parametric analysis capability improves fluid characterization algorithms. The sensor provides in-line monitoring of fluids for a wide range of applications including fuel tanks, process lines and pressurized high flow conduits. A digital serial compliant protocol provides easy to connect interface to Consoles controller.

DVD FEATURES:

- Patented Tuning Fork Technology with high accuracy
- Static and direct measurement, no moving parts, resistant to turbulence
- No dead zone, full range level measurement
- Rugged construction for high pressure and high flow environments
- Proprietary corrosion and contaminant resistant coating for wetted parts
- On-board microprocessor for real-time data analysis
- Highly reliable and long term stability
- ATEX Compliance, suitable for 0 zone

DVD APPLICATION

- Density solution for retail and depots automation
- Real time fuel quality
- Biodiesel in diesel concentration
- Anti-crossover fuels detection
- Sump and Interstitial sensors with liquid discriminating (empty status / type of fuel / water)



TEST ON DIESEL (LIGHT FUEL)

Below is displayed the result of product identification.

The DVD sensor, based on relation among Density Viscosity Dielectric, is able to determine the fuel type with a confidence index.

In the below picture the sensor is inserted in a general diesel (called light fuel in this application).

As it is possible to see the DVD sensor is detecting the product as Light Fuel (diesel) with a confidence index of 69.5%. This means that this product is not pure, but there is inside something mixed with it.



Looking at the below screen is visible the Viscosity, Density and Dielectric values.





Using a multi-parametric calculation and patented algorithm we can obtain another information: Percentage of Biodiesel inside Diesel.

As we can see, in the previous Diesel there is 5,2% of Biodiesel. This is the reason why before we had a confidence index of 69,5%



If we analyze a pure diesel we should obtain 0,0% of Biodiesel inside Diesel, as indicated in the below figure.





During the measurement we have added few seed oil inside the previous diesel and we got the below result: percentage of Biodiesel inside Diesel is changed from 5.2% to 8%





TEST ON GASOLINE

We have performed the same type fuel test in a Gasoline SP95.

As is visible in the below figure the DVD sensor has detected the fuel type with a confidence index of 97.1%

Identification Physical parameters			
Identified Fuel	Confidence Index (%)		
Unavailable Heavy Fuel	100.0-		
	90.0-		
	80.0-		
	70.0-		
	60.0-		
	50.0-		
	40.0-		
B100 Rapeseed Kerosene	30.0-		
•	20.0-		
Light Fuel	10.0-		
	0.0-		
Light ruci	97.1 [%]		
	STOP ABOUT EXIT		

Here in the figure below there are the Viscosity, Density and Dielectric values measured.

