The FluidScan 1000 Series provides quantitative measurement of a lubricant’s condition and plays an important role in predictive maintenance. Using the device, you can eliminate unnecessary oil changes or service by testing not just servicing the oil.

Applications include:
- Mineral and synthetic oils used in gear boxes, engines, transmissions
- Hydraulic systems, turbines and other machinery components
- Biodiesel/Fuel
- Quality assurance of new oils

Rugged Direct Infrared Spectrometer
- No moving parts, designed for handheld and field use applications
- High signal to noise ratio (>7000:1) to ensure high accuracy and repeatability

Easy to use
- Needs just one drop of oil and one minute to test
- No solvents required to clean
- Color-coded, user adjustable alarm limits

Determine when in service oil is no longer fit for use due to liquid contamination or degradation
- Direct immediate measurement of water, TAN and oxidation for lubricants used in gearboxes, turbines and hydraulic systems
- Also measures TBN, water, glycol, soot, additive depletion and oxidation for engine oil

Highly repeatable and reproducible results
- High correlation to KF water, TAN and TBN laboratory tests
- Reproducibility and repeatability comparable to benchtop FTIR method ASTM E2412
- Data analysis compliant to ASTM E1655

Comprehensive Fluid Library
- Over 700 fluids for immediate, out-of-the-box operation
- Results for critical properties such as TAN and water contamination for industrial lubricants or TBN, water, glycol and soot for engine oils

Easy dissolved water & free water measurement
- For both dissolved and free water using homogenization technique
- Solvent free alternative to Karl Fischer titration
- Patented total water algorithm for both dissolved and free water
- Ideal for turbine oil, hydraulic fluids, and rotating machinery oils such as gear oil and compressor oil
Innovation in hardware and calibration

At the core of the FluidScan is a patented, mid-infrared spectrometer with grating optics and a linear detector array. The spectrometer collects the infrared light transmitted through the fluid in the flip top cell into a waveguide. The waveguide then carries the light to a prism-like diffraction grating that reflects the light into a high-performance array detector which registers the infrared spectrum of the fluid. It provides more than adequate spectral range, resolution and signal-to-noise ratio for the rapid analysis of in-service lubricants.

The FluidScan Applications Library includes over 700 oils and growing. Parameters for the oils differ based on oil type so engine oil parameters are different from gear oils. Parameters such as water, TAN or TBN are calibrated according to ASTM methods used in common oil analysis labs with excellent correlation using multivariate calibration methods. Fresh oils not in the library can be matched and added as user fluids, and existing calibration can be applied to the user fluid with custom slope and offset adjustments, if needed.

Multivariate Calibrations

The FluidScan classifies fluids into groups called families based on their chemical makeup, usage and spectral signature. The spectrum of all fluids in each family changes in a similar way with a given amount of degradation or contamination. Family-specific algorithms are assigned that accurately quantify these amounts. These algorithms yield quantitative results for the most critical properties of the most common oil types. Multivariate calibrations are applied so that quantitative readings can be obtained, even with complex, contaminated samples.
Examples of fluid chemistry types included in the library
- Mineral oil-based hydraulic, compression, transmission, turbine and gear blends
- Polyol Esters
- Phosphate Esters
- Organic Esters
- Synthetic hydrocarbon-based hydraulic, compression, transmission, turbine and gear blends
- Ester-based Blends
- Biodiesel
- Diesel Fuel
- Polyglycols
- Polyalkylene Glycols
- Polyalphaolefins
- Polyinternal Olefins

Note: Fluid chemistry in the library is not inclusive. Call Spectro Scientific support for more details before ordering.

Comparison of FluidScan ASTM D7889 and corresponding IR ASTM methods

<table>
<thead>
<tr>
<th>OIL PROPERTY</th>
<th>FLUIDSCAN REPEATABILITY</th>
<th>IR REPEATABILITY</th>
<th>IR ASTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidation (abs/0.1 mm)</td>
<td>0.2</td>
<td>0.68</td>
<td>D7414</td>
</tr>
<tr>
<td>Nitration (abs/cm)</td>
<td>0.53</td>
<td>0.078</td>
<td>D7624</td>
</tr>
<tr>
<td>Sulfation (abs/0.1 mm)</td>
<td>0.31</td>
<td>0.3</td>
<td>D7415</td>
</tr>
<tr>
<td>Antiwear Additive (abs/0.1 mm)</td>
<td>0.38</td>
<td>0.53</td>
<td>D7412</td>
</tr>
<tr>
<td>Soot (abs/cm)</td>
<td>0.43</td>
<td>0.8</td>
<td>D7844</td>
</tr>
</tbody>
</table>

Oil category and properties

<table>
<thead>
<tr>
<th>APPLICATION CATEGORIES</th>
<th>PROPERTIES MEASURED BY FLUIDSCAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>Water (ppm), Oxidation (Abs/O.1mm)</td>
</tr>
<tr>
<td>Hydraulic – Fire resistant</td>
<td>Water (ppm), TAN (mg KOH/g)</td>
</tr>
<tr>
<td>(Phosphate Ester)</td>
<td></td>
</tr>
<tr>
<td>Hydraulic – Aerospace</td>
<td>Water (ppm), Oxidation (Abs/O.1mm), Alien Fluid mineral based (MIL-H-2304) (%), and Alien Fluid engine oil (MIL-H-23699) (%)</td>
</tr>
<tr>
<td>(Synthetic Hydraulic Fluid)</td>
<td></td>
</tr>
<tr>
<td>Heat Transfer (Quenching Oil)</td>
<td>Water (ppm), Oxidation (Abs/O.1mm)</td>
</tr>
<tr>
<td>Industrial</td>
<td>Water (ppm), Oxidation (Abs/O.1mm), TAN (mg KOH/g)</td>
</tr>
<tr>
<td>(Steam and CCGT Turbine, Hydraulic, compressor, Chiller, Gear, etc.)</td>
<td></td>
</tr>
<tr>
<td>Turbine Aerospace (Synthetic Gas Turbine Oil)</td>
<td>Water (ppm), TAN (mg KOH/g), Antioxidant (% depletion)</td>
</tr>
<tr>
<td>Engines (Engine oil for different engine types, including Gasoline, Diesel, Heavy Duty Diesel, HFO, Natural Gas, etc)</td>
<td>Water (ppm), Oxidation (Abs/O.1mm), TBN (mg KOH/g), TAN (mg KOH/g) (Natural Gas only), Sulfation (Abs/O.1mm), Nitration (Abs/cm), Soot (%), Glycol (%), Anti Wear (%)</td>
</tr>
<tr>
<td>Ethanol in Gasoline</td>
<td>Ethanol (%)</td>
</tr>
<tr>
<td>FAME in Diesel</td>
<td>FAME (%)</td>
</tr>
<tr>
<td>Biodiesel Feedstock</td>
<td>Water (ppm), FFA %</td>
</tr>
<tr>
<td>Biodiesel</td>
<td>Water (ppm), TAN (mg KOH/g), Total Glycerin (%)</td>
</tr>
</tbody>
</table>

Fluid libraries and application categories included

<table>
<thead>
<tr>
<th>P/N</th>
<th>LIBRARY</th>
<th>OIL CATEGORIES INCLUDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL364</td>
<td>Automotive</td>
<td>Engine, Engine-Natural Gas, Hydraulic, Transmission</td>
</tr>
<tr>
<td>FL365</td>
<td>Aviation</td>
<td>Compressor, Engine, Hydraulic, Hydraulic – Fire resistant, Hydraulic-Aero, Turbine-Aero</td>
</tr>
<tr>
<td>FL366</td>
<td>Fuel QC</td>
<td>Biodiesel, Biodiesel Feedstock, Ethanol in Gasoline, FAME in Diesel</td>
</tr>
<tr>
<td>FL368</td>
<td>Lab Trend</td>
<td>ASTM Petroleum Engine, ASTM Polyol Ester (Turbin)</td>
</tr>
<tr>
<td>FL371</td>
<td>Railroad</td>
<td>Compressor, Engine, Engine-Natural Gas, Hydraulic, Transmission</td>
</tr>
<tr>
<td>FL360</td>
<td>All Libraries</td>
<td>All Categories of oils included</td>
</tr>
</tbody>
</table>

Examples of fluid chemistry types included in the library
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Fluid properties and corresponding (compliance or correlation) methods

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidation</td>
<td>D7889¹</td>
</tr>
<tr>
<td>Nitrination</td>
<td>D7889¹</td>
</tr>
<tr>
<td>Sulfation</td>
<td>D7889¹</td>
</tr>
<tr>
<td>AW Additive</td>
<td>D7889¹</td>
</tr>
<tr>
<td>Soot</td>
<td>D7889¹ Gravimetric²</td>
</tr>
<tr>
<td>TBN</td>
<td>D4739²</td>
</tr>
<tr>
<td>TAN</td>
<td>D664²</td>
</tr>
<tr>
<td>Water</td>
<td>D6304²</td>
</tr>
<tr>
<td>Glycol</td>
<td>Gravimetric²</td>
</tr>
<tr>
<td>Antioxidant</td>
<td>E2412² Gravimetric²</td>
</tr>
</tbody>
</table>

Notes:
1. FluidScan complies with ASTM D7889
2. FluidScan correlates to ASTM method for TBN, TAN, Water, and gravimetric method for Glycol, antioxidant
FluidScan 1000

FluidScan 1100

SA1001

Spectro 1000/3050

SA1004

SA1018

FluidScan 1100

Spectro 1100/3050

SA1022

400-00051

400-00053

400-00092

400-00093

Application Library

Output (varies by fluid type and application)

Methodology

Standard Analytical Range

Accuracy

Repeatability

Calibration

Operational Specifications

Sample Volume

Solvents/Reagents

PART NUMBER

FluidScan 1000

FluidScan 1000 (requires SA1001 and Library license to operate)

SA1001

FluidScan standard accessories

Spectro 1000/3050

FluidScan 1000 & MiniVisc 3050 Combination Kit (requires SA1004 and Library license to operate)

SA1004

Spectro Combination Kit standard accessories

SA1018

Spectro 1000/1100 & 3060 Combination Kit Standard Accessories

FluidScan 1100

1100 FluidScan. Requires SA1001 Accessory Kit.

Spectro 1100/3050

FluidScan 1100 & MiniVisc 3050 Combination Kit. Requires SA1022 Accessory Kit.

SA1022

Spectro Combination Kit standard accessories

400-00051

Comprehensive Water Solution with Portable Homogenizer and license, 115 V, 60 Hz charger

400-00053

Comprehensive Water Solution with Portable Homogenizer and license, 220 V, 50 Hz charger

400-00092

Comprehensive Water Solution with table top Homogenizer and license, 115 V, 60 Hz

400-00093

Comprehensive Water Solution with table top Homogenizer and license, 220 V, 50 Hz

PRODUCT INFORMATION

Application Library

Mineral and synthetic lubricants including gear, engine, transmission, hydraulics, turbine and biodiesels

Output (varies by fluid type and application)

TAN (mgKOH/g), TBN (mgKOH/g); Oxidation (abs/0.1 mm); Nitration (abs/cm); Sulfation (abs/0.1 mm); Water, ppm (dissolved, dissolved + free water with Comprehensive Water Solution option); Glycol (% by weight); Soot (% by weight); Incorrect Fluid (% by weight); Antioxidant Depletion (% remaining); Antiwear Depletion (% by weight).

Methodology

ASTM D7889, ASTM E1655, E2412 modified

Standard Analytical Range

Mid infrared range 950-3850 cm$^{-1}$

Accuracy

≤ ± 3% of measured value, typical

Repeatability

≤ ± 6% of measured value, typical

Calibration

Factory calibrated to wet chemistry methods ASTM D664 for TAN and ASTM D4739 for TBN. Use Check Fluid for instrument validation.

OPERATIONAL SPECIFICATIONS

Sample Volume

100 μL (1 drop)

Solvents/Reagents

None

FluidScan Series Ordering Information

FluidScan can also be ordered in a combination kit with the MiniVisc 3050 portable viscometer. The battery-operated MiniVisc 3050 is a 40°C kinematic viscometer. It uses a few drops of oil to measure viscosity and does not require solvents to clean between samples.

PART NUMBER

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