

## MiniLab EL Series for High Performance Engine Development and Maintenance



Optimize  
performance  
output

Detect  
problems  
early

Ensure  
safety in  
operation



# Engine Oil Analysis:

## A Reliable Technique for Engine Condition Monitoring

Engine oil analysis is a reliable and mature non-destructive testing (NDT) technique used to monitor the condition of the engine in development, on the production line and for in-service maintenance. High performance reciprocating engines and jet turbines are complicated mechanical systems with many high-speed moving parts. Comprehensive engine oil analysis provides a complete picture of engine wear and other mechanical failures in addition to lubricant condition and contamination, in almost real time with a small amount of oil. This information advances engine design and development, ensures quality in production and reduces maintenance and repair costs.



### ENGINE WEAR

- > Elemental wear analysis
- > Total ferrous measurement



### CONTAMINATION

- > Fuel dilution
- > Coolant leak
- > Water
- > Soot
- > Sand and dirt



### OIL CONDITION

- > Viscosity
- > Total Base Number (TBN)
- > Oxidation, Sulfation, Nitration
- > Antiwear additive depletion
- > Total Acid Number (TAN – natural gas engines only)



## The need for real time engine oil analysis for high performance engines

Achieving and maintaining optimal performance from high performance engines in airplanes, racing cars or locomotives requires much care in engineering, production, and maintenance due to size, high speed or high power output. They also need great sensitivity in oil analysis as only a few parts per million (ppm) of trace metals in the oil can indicate abnormal wear of a critical part. Near real time, lab quality engine oil analysis can significantly improve the productivity of research and development, production quality, and performance and reliability of these engines.

## MiniLab EL Series: A new non-destructive tool for use throughout an engine's lifecycle

The new MiniLab EL Series oil analyzer is an ideal non-destructive testing (NDT) tool for engineers in research and development, production QC or in-service maintenance. The MiniLab EL system allows organizations to gain deep insights into engine and lubricant condition when and where it is needed.

### HIGH PERFORMANCE

- Comprehensive (up to 36 parameters)
- Full ASTM compliance
- Wear, contamination, oil condition

### CONVENIENT

- Fast (less than 5 minutes)
- No sample preparation
- No special facility requirements

### ENVIRONMENTALLY FRIENDLY

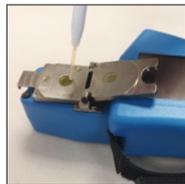
- Low waste (total 4ml of oil used)
- No solvent
- No hazardous chemicals

### EXPANDABLE

- Extended metals (up to 31 elements)
- Coolant analysis
- Fuel analysis

# MiniLab EL Series

5 simple tests to comprehensive engine oil analysis



## Oil Chemistry

ASTM D7889

60 microliters of oil with no sample preparation

1 minute test time

No solvent or chemicals



## Viscosity

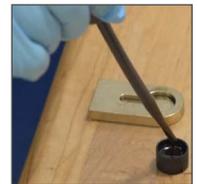
ASTM D8092

60 microliters of oil with no sample preparation

2 sec- 6 min, viscosity dependent

Temperature controlled at 40C

No solvent or chemicals



## Elements

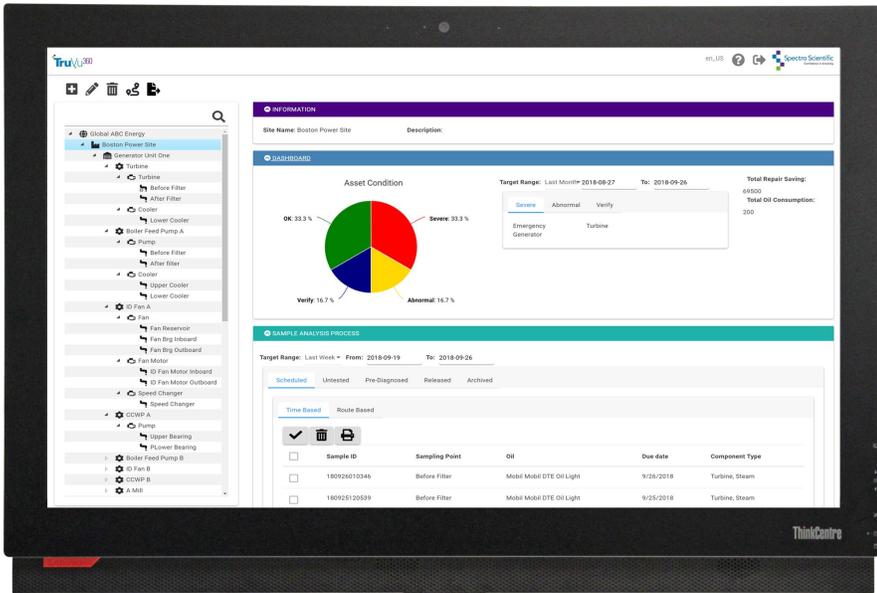
ASTM D6595

2 ml of oil with no sample preparation

30 seconds test time

No solvent or chemicals

24 elements by default



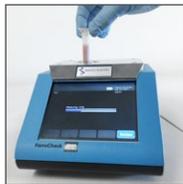
### Fuel Dilution

ASTM D8004

0.5 ml of sample with no sample preparation

1 minute test time

No solvent or chemicals



### Total Ferrous

ASTM D8120

2 ml sample with no sample preparation

30 sec test time

No solvent or chemicals

Spectro Scientific		Boston Power Site				
Location:		Generator Unit One				
Unit ID:		Boiler Feed Pump A Pump Before Filter				
Model:		Machine Type: Pump, Combustion				
Machine Type:		Pump, Combustion				
<b>Observations:</b> Particle count (ISO #4) is severely high. Particle count (ISO #5) is severely high. <b>Diagnoses:</b> - Secondary sources include filter bypass or plugged filter. - Suspect source of particulate for oil, bulk shipment, or soft contaminants. - Missing components are also suspected. <b>Recommended Actions:</b> - Clean system oil by filtration or centrifuging. <b>Additional Recommendations:</b>						
23 Sep 2018						
Oil Sheet Title #6	Sample ID	18092010258	18092010259	180920114709	180920114710	180920114712
None	Sampled on	28 Aug 2018	28 Aug 2018	28 Aug 2018	28 Aug 2018	28 Aug 2018
	Received on	28 Sep 2018	28 Aug 2018	28 Aug 2018	28 Aug 2018	28 Aug 2018
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at					
	Sampled by					
	Received by					
	Sampled at					
	Received at				</	

# TruVu 360 Software — Cloud Hosted or Local Installation

The TruVu 360 Software is powerful yet easy to use and includes two components: the TruVu 360 Device Console (TDC) and the TruVu 360 Fluid Intelligence platform.

The TruVu 360 Device Console is installed on a local PC and controls:

- Sample selection
- Instrument operation
- Data acquisition
- Automatic data transfer to TruVu 360 system

**1** Sample list from TruVu 360

**2** Test

**3** Upload test results

**4** Trivector chart from rules engine

**Instrument Control**

**Results Display**

TruVu 360 Device Console

TruVu 360 v. 2.11.101 Expiration Date: 2018-10-25

Copyright 2018 Spectro Scientific

The TruVu 360 software is a browser-based tool; it can be installed on local PCs, local networks, or hosted in the cloud server. TruVu 360 software includes:

- Asset management
- Alarm limits and alarm management
- Reports, including multi-parameter trend graphs
- Enhanced notification and email options
- Option to support multiple MiniLab EL Series analyzers in different locations across an enterprise

# MiniLab 143EL or 123EL

Two MiniLab EL Series models are available:

**MiniLab 143EL** – Elements, Oil Chemistry, Viscosity, Fuel Dilution, Total Ferrous

**MiniLab 123EL** – Elements, Oil Chemistry, Viscosity



	PARAMETER	Elements ASTM D6595	Oil Chemistry ASTM D7889	Viscosity ASTM D8092	Fuel Dilution ASTM D8004	Total Ferrous ASTM D8120
<b>Contamination</b> 	Boron, Sodium, and Potassium	✓				
	Water		✓			
	Soot		✓			
	Glycol		✓			
	Fuel dilution				✓	
<b>Chemistry &amp; Viscosity</b> 	Total Base Number (TBN)		✓			
	Oxidation, Nitration, and Sulfation		✓			
	Fluid integrity		✓			
	Additive depletion (ZDDP)		✓			
	Total Acid Number (TAN) for NatGas engines and lube oils		✓			
	Magnesium, Calcium, Barium, Zinc, Molybdenum, and Phosphorus	✓				
	Viscosity			✓		
<b>Wear</b> 	Total Ferrous					✓
	Copper, Silver, Chromium, Titanium, Aluminum, Nickel, Iron, Manganese, Lead, Tin, Cadmium, and Vanadium	✓				

## OPTIONAL ACCESSORY

The **CoolCheck 2** complements the MiniLab EL Series by providing measurement and profiling of coolant condition with a near IR (NIR) and UV/Visible dual spectrometer design that measures 8 different properties in less than 45 seconds.



## STANDARDS & CONSUMABLES



Validation standards for MiniLab 143EL



Consumables for MiniLab 143EL

## SERVICE CONTRACTS AND REPAIR

Spectro Scientific's service offerings for the MiniLab Series include:

- **System Installation & Training** for instrument operation and routine maintenance.
- **Service Contracts** for extended warranty and preventive maintenance.
- **Field Repair** by certified customer service engineers on site.
- **In-house Instrument Calibration, Maintenance, Repair, and Upgrades** performed at our facility near Boston, MA.
- **On-line Training**

## MiniLab EL Series Product Information

For MiniLabs with TruVu 360 Basic, software is provided in a USB/DVD media pack.

For MiniLabs for TruVu 360 Cloud Hosting Service, Hosting service and User Licenses are ordered separately.

PART NUMBER	
800-00204	MiniLab 123EL, 115VAC, 60Hz, with TruVu 360 Basic software
800-00205	MiniLab 123EL, 115VAC, 50Hz, with TruVu 360 Basic software
800-00206	MiniLab 123EL, 230VAC, 60Hz, with TruVu 360 Basic software
800-00207	MiniLab 123EL, 230VAC, 50Hz, with TruVu 360 Basic software
800-00084	MiniLab 123EL, 115VAC, 60Hz, for TruVu 360 Cloud Hosting Service
800-00085	MiniLab 123EL, 230VAC, 50Hz, for TruVu 360 Cloud Hosting Service
800-00086	MiniLab 123EL, 115VAC, 50Hz, for TruVu 360 Cloud Hosting Service
800-00087	MiniLab 123EL, 230VAC, 60Hz, for TruVu 360 Cloud Hosting Service

MiniLab 123EL instruments includes Win 10 laptop, TruVu 360 Device Console and instrument software, SpectrOil 120C with CS24 calibration, FluidScan 1100 with All Oils library, MiniVisc 3050 viscometer, and User's Guide. Requires 800-00088 Standard Accessories kit.

800-00212	MiniLab 143EL, 115VAC, 60Hz, with TruVu 360 Basic software
800-00213	MiniLab 143EL, 230VAC, 50Hz, with TruVu 360 Basic software
800-00214	MiniLab 143EL, 115VAC, 50Hz, with TruVu 360 Basic software
800-00215	MiniLab 143EL, 230 VAC, 60Hz, with TruVu 360 Basic software
800-00089	MiniLab 143EL, 115VAC, 60Hz, for TruVu 360 Cloud Hosting Service
800-00090	MiniLab 143EL, 230VAC, 50Hz, for TruVu 360 Cloud Hosting Service
800-00091	MiniLab 143EL, 115VAC, 50Hz, for TruVu 360 Cloud Hosting Service
800-00092	MiniLab 143EL, 230 VAC, 60Hz, for TruVu 360 Cloud Hosting Service

MiniLab 143EL instruments includes Win 10 laptop, TruVu 360 Device Console and instrument software, SpectrOil 120C with CS24 calibration, FluidScan 1100 with All Oils library, MiniVisc 3050 viscometer, FDM 6001, FerroCheck 2000, and User's Guide. Requires 800-00093 Standard Accessories kit.

ACCESSORIES AND CONSUMABLES	
800-00088	MiniLab 123EL standard accessories
600-00034	MiniLab 123EL consumables kit for 500 samples
800-00093	MiniLab 143EL standard accessories
600-00035	MiniLab 143EL consumables kit for 500 samples
600-00126	MiniLab 123EL validation standards kit
600-00127	MiniLab 143EL validation standards kit
M99948	Extended Wear Metals calibration program for SpectrOil 120C (31 elements, factory install)
M99903	Coolant analysis capability program for SpectrOil 120C (factory install)
450-00030	MiniLab tray assembly for FluidScan and MiniVisc
42000-00	Coolcheck 2, 115/220VAC, 50/60 Hz
29701-00	Coolcheck 2 standard accessories

PRODUCT INFORMATION	
Applications	Mineral and synthetic lubricants including gear, engine, hydraulic, turbine and distillate fuels
Methodology	ASTM D6595, D8120, D8092, D7889, D8004
Calibration	Factory calibrated, field calibration not required. Validation and standardization fluids supplied.

OPERATIONAL SPECIFICATIONS	
Environmental requirements	5-40°C ambient temperature, 10-80% RH non-condensing
Sample volume	< 5 ml
Solvents	None required

USER INTERFACE SPECIFICATIONS	
Software/operating system	Win 10 Pro laptop included with system, or user supplied personal computer with Windows 7 Pro or Win 10 Pro, 32 or 64 bit, US English version. Quad core microprocessor speed 2.6 GHz or higher and 8 GB RAM minimum.

POWER REQUIREMENTS	
Power	1 phase power, 1200W maximum (123EL and 143EL)

MECHANICAL SPECIFICATIONS	
Dimensions (H x W x D)	MiniLab 123EL: 71 cm x 183 cm x 66 cm (28" x 72" x 26") MiniLab 143EL: 71 cm x 214 cm x 66 cm (28" x 84" x 26")
Weight	MiniLab 123EL: 76 kg (167 lbs) MiniLab 143EL: 82 kg (180 lbs)

COMPLIANCE	
CE Mark-EMC directive, RoHS.	

ANALYTICAL RANGE AND REPEATABILITY		
Output	Analytical Range	Repeatability
Elemental concentration of 24 elements, ppm	Range and repeatability varies with element	
Total ferrous, ppm	0-10,000 ppm	≤ 3% RSD
Fuel dilution	0.2-15%	≤ 5% RSD + 0.2% fuel dilution
40°C Kinematic viscosity, cSt (100°C Kinematic viscosity calculated from V40C and viscosity index)	1-320 cSt at 40°C 320-700 cSt at 40°C	≤ 3% RSD ≤ 5% RSD
Total Acid Number (TAN), mg KOH/g	0-6 mg KOH/g	≤ 3% RSD
Total Base Number (TBN), mg KOH/g	0-70 mg KOH/g	≤ 3% RSD
Oxidation, abs/0.1 mm	0-150	≤ 3% RSD
Nitration, abs/cm	0 -50	≤ 3% RSD
Sulfation, abs/0.1 mm	0-75	≤ 3% RSD
Fluid Integrity Index	varies by oil	≤ 3% RSD
Soot	0-2%	≤ 3% RSD
Glycol	0.2-10%	≤ 3% RSD
Additive depletion (ZDDP)	0-100%	≤ 3% RSD
Water, dissolved ppm	100 ppm-saturation*	≤ 3% RSD

\*Oil specific. RSD = Relative Standard Deviation.

	TruVu 360 Basic	TruVu 360 Pro	TruVu 360 Hosting Service
License	None	One included with TruVu 360 Pro upgrade	Requires Site User or Enterprise User license
Duration	Perpetual use	Perpetual use	Annual fee
Installation	On Local PC	Local PC or on company network	Hosted by Spectro Scientific
Use case	Single site, No login	Single site/MiniLab, 1 user login per license Pro Site User licenses can be assigned with Site Admin (primary user), Operator, or Reader privileges.	Single or Multiple sites/MiniLabs Site User licenses can be assigned with Site Admin (primary user), Operator, or Reader privileges. Enterprise Users can access multiple sites.
Email report distribution	None	Allows email notifications	Allows email notifications



AMETEK Spectro Scientific | One Executive Drive, Suite 101, Chelmsford, MA 01824-2563  
978-431-1120 | www.spectrosci.com | sales@spectrosci.com | An ISO 9001:2015 company

Copyright © 2018 Spectro Scientific. All rights reserved. While every effort is made to assure the information in this document is accurate, Spectro Scientific does not accept liability for any errors or mistakes that may arise. Specifications are subject to change without notice.  
Engine\_BRv1\_2019-07-03

