

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

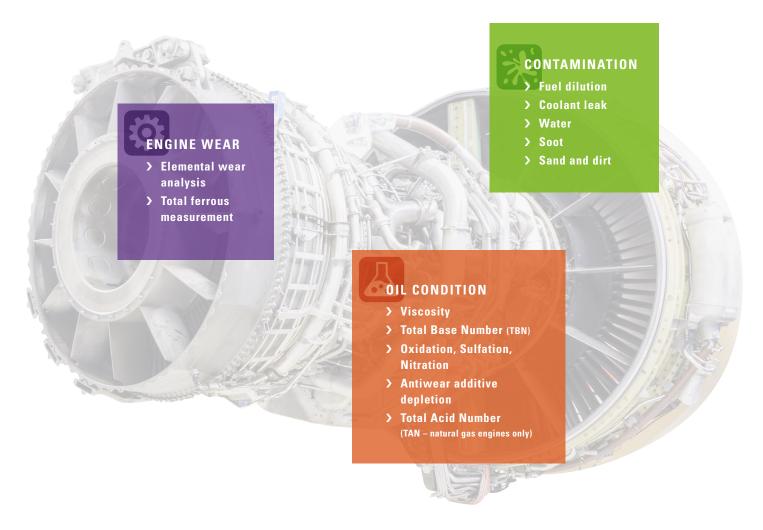




# Engine Oil Analysis:

## 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.





### 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.



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







5 simple tests to comprehensive engine oil analysis







SpectrOil 100 Series



### 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



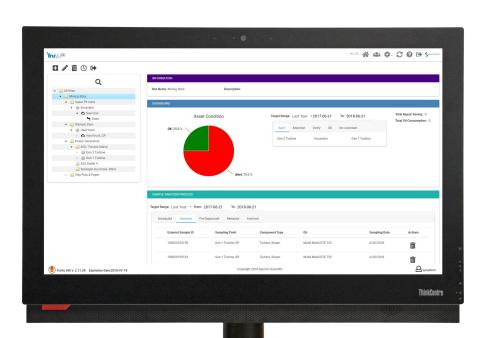
### ASTM D6595

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 Cutificate to baseing		Boston Power Location: Unit ID: Model: Machine Type:		Generator U Geod Pump A I Before Pump, Cent	Pump Filter	<u> </u>	
** Continu		S Total	Diagnostics:  Secondary source Suspect source Wearing compo Recommende Clean system of	O >4) is severely roes include filter of particulate to ments are also so	bypass or clogge edit, dust ingre spected.	d filters.	
Oil Shell Tellus	16	Sample ID	180925121255	180925121221	180925114709	180925114702	1809251316
		Sampled on	25 Sep 2016	25 Aug 2018	25 Jul 2018	25 Jun 2018	25 May 2018
Note:		Received on	25 Sep 2018	25 Aug 2018	25-Jul 2018	25-Jun 2218	26 May 2018
		h Total					
		h Oil Top up (l.)					
		rap val (L)		_		_	Α.
			<u> </u>		•	0	<u> </u>
	Iron	дрт	<1.00	1.48	<1.00	<1.00	<1.00
	Lead	дрт	<1.00	6.74		2.44	<1.00
	Copper	ррт	<1.00	3.81	2.11	<1.00	<1.00
	Tin	дрт	1.43	9.13	18.33	6.63	1.43
	Fe Wear Severity		0.00	0.00	0.00	0.00	0.00
AK.	Chrome	ppm ppm	<1.00 <1.00	<1.00 1.70	<1.00	<1.00	<1.00
Wear	Aluminium	ppm	<1.00 <1.00	<1.00	<1.00	<1.00	<1.00
	Tranium	ppm nom	<1.00 <1.00	<1.00 <1.00	<1.00 <1.00	<1.00 <1.00	<1.00
	Silver	gam	11.00	<1.00 ≤1.00	<1.00 ≤1.00	₹1.00	11.00
	Antimony	9977	0.00	0.00	0.00	0.00	0.00
	Cadmium	ppm	0.34	4.87	3.57	7.37	0.34
	Manganese	ppm	1.47	7.94	6.54	2.24	1.47
	Silicon	дрт	4.40	7.40	9.22	1.40	4.40
	ISO 4406 Code (P		19	18	19		16
	ISO 4406 Code (P	6µm)	16	16	16	16	14
	ISO 4406 Code (P		12	11		11	10
ME	Boron	дет	20.72	4.42	6.82	10.22	20.72
ME. Contamination		дрт	<1.00	2.40	1.40	<1.00	<1.00
Mt. Contamination	Sodium		<1.00	2.15	6.65	<1.00	<1.00
ME Contamination	Vanadium	дрт					0.38
ME Contamination	Vanadium Potassium	дат	0.38	5.58	4.68	1.78	
Mt. Contamination	Vanadium Potassium TAN	ggm mg KONIg	0.38 0.38	3.22	0.76	0.54	0.38
Mt. Contamination	Vanadium Potassium TAN Oxidation	ggm mg XONg assmm2	0.38 0.38 0.90	3.22 1.44			
Mt. Contamination	Vanadium Potassium TAN Oxidation Viso 40	ggm mg KONg assimm2 452	0.38 0.38 0.90 101.2	3.22 1.44 98.8	0.76 0.90	0.54 0.84	0.38
Contamination	Vanadium Potassium TAN Oxidation Viso 40 Molybdenum	gam mg KONtp aasimm2 457 gam	0.38 0.38 0.90 101.2 <1.00	3.22 1.44 98.8 <1.00	0.76 0.90 <1.00	0.54 0.84 <1.00	0.38 0.90 <1.00
Contamination	Vanadium Potassium TAN Oxidation Viso 40 Molybdenum Calolum	gam mg KONg absimm2 dSZ gam gam	0.38 0.38 0.90 101.2 <1.00 21.68	3.22 1.44 98.8 <1.00 58.98	0.76 0.90 <1.00 71.38	0.54 0.84 <1.00 62.18	0.38 0.90 <1.00 21.68
Contamination	Vanadium Potassium TAN Oxidation Viso 40 Molybdenum Calcium Magnesium	gam mg KONIg abammo 450 gam gam gam	0.38 0.38 0.90 101.2 <1.00 21.68 1.07	3.22 1.44 98.8 <1.00 58.98 13.37	0.76 0.90 <1.00 71.38 11.17	0.54 0.84 <1.00 62.18 9.97	0.38 0.90 <1.00 21.68 1.07
Contamination	Vanadium Potassium TAN Oxidation Viso 40 Molybdenum Calolum	gam mg KONg absimm2 dSZ gam gam	0.38 0.38 0.90 101.2 <1.00 21.68	3.22 1.44 98.8 <1.00 58.98	0.76 0.90 <1.00 71.38	0.54 0.84 <1.00 62.18	0.38 0.90 <1.00 21.68

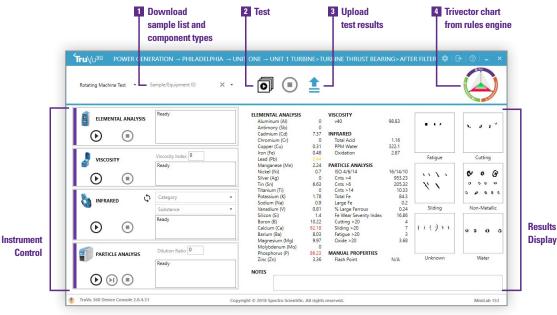
Sample report

## TruVu 360 Software Suite

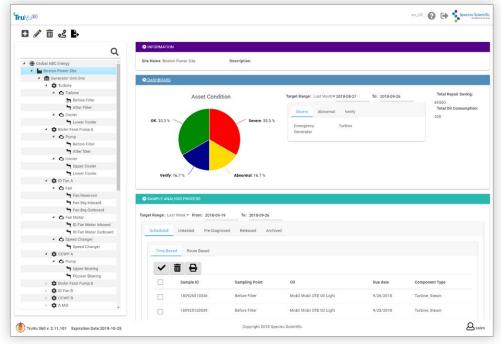
The TruVu 360 Software Suite is powerful yet easy to use and includes two components: the TruVu 360 Device Console (MDC) and the TruVu 360 LIMS system.

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

- Sample or asset ID entry
- Instrument operation
- Data acquisition
- Automatic data transfer to TruVu 360 LIMS system



TruVu 360 Device Console



TruVu 360 Enterprise cloud software

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
- Customizable 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
Contamination	Boron, Sodium, and Potassium	<b>V</b>				
※ 4	Water		<b>V</b>			
	Soot		<b>V</b>			
	Glycol		<b>✓</b>			
	Fuel dilution				<b>V</b>	
Chemistry	Total Base Number (TBN)		<b>✓</b>			
& Viscosity	Oxidation, Nitration, and Sulfation		<b>✓</b>			
	Additive depletion (ZDDP)		<b>✓</b>			
	Total Acid Number (TAN) for NatGas engines and lube oils		<b>✓</b>			
	Magnesium, Calcium, Barium, Zinc, Molybdenum, and Phosphorus	<b>✓</b>				
	Viscosity			<b>✓</b>		
Wear	Total Ferrous					<b>V</b>
<b>*</b>	Copper, Silver, Chromium, Titanium, Aluminum, Nickel, Iron, Manganese, Lead, Tin, Cadmium, and Vanadium	<b>✓</b>				

## **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.

- 15 ml sample volume with no sample preparation
- 45 second test time
- No solvents needed for cleaning
- Parameters reported are:
  - Type of coolant
  - Clarity
  - Contamination
  - Freeze point
  - Glycol content
  - Boiling point
  - Nitrites

## SpectroCare

SpectroCare is a service designed to provide the best customer experience using TruVu 360 enabled solutions, which include:

- Onboarding/startup service
- Expedited customer support response
- Unlimited software upgrade
- Annual preventive maintenance and calibration
- Extended warranty
- Off-site laboratory support for emergency and special diagnostics from our partner labs worldwide



### MiniLab EL Series Product Information

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PART NUMBER	
800-00084	MiniLab 123EL with TruVu 360 Software Suite, 115VAC, 60Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00085	MiniLab 123EL with TruVu 360 Software Suite, 230VAC, 50Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00086	MiniLab 123EL with TruVu 360 Software Suite, 115VAC, 50Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00087	MiniLab 123EL with TruVu 360 Software Suite, 230VAC, 60Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00089	MiniLab 143EL with TruVu 360 Software Suite, 115VAC, 60Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00090	MiniLab 143EL with TruVu 360 Software Suite, 230VAC, 50Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00091	MiniLab 143EL with TruVu 360 Software Suite, 115VAC, 50Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
800-00092	MiniLab 143EL with TruVu 360 Software Suite, 230VAC, 60Hz Includes Windows 10 Pro Workstation, 1 Site User License (1 year) and access to the TruVu 360 Cloud (1 year).
ACCESSORIES AN	D 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
29701-00	Coolcheck 2 standard accessories
PRODUCT INFORM	1ATION
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 SP	ECIFICATIONS
Environmental requirements:	5-40°C ambient temperature, 10-80% RH non-condensing
Sample volume	< 5 ml
Solvents:	None required

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Software/ operating system Win 10 Pro Workstation 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					
	RAPOLIA NI	101	ODEO	ILLO /	TIONIO

Dimensions	MiniLab 123EL:	71 cm x 183 cm x 66 cm (28" x 72" x 26")
(H x W x D)	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					
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	1-320 cSt at 40°C	≤ 3% RSD			
(100°C Kinematic viscosity calculated from V40C and viscosity index)	320-700 cSt at 40°C	≤ 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	5-32	≤ 3% RSD			
Nitration, abs/cm	0.5-18	≤ 3% RSD			
Sulfation, abs/0.1 mm	16-39	≤ 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			

<sup>\*</sup>Oil specific. RSD = Relative Standard Deviation.







Consumables for MiniLab 143EL

To learn more about Spectro Scientific products please call 978-431-1120 or visit us online at www.spectrosci.com.



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