

TECHNICAL OFFER

OptiFuel: FTIR Fuel Analyzer

2024.2



- Measure numerous physical & chemical properties all at once
- Ruggedized design, with mobile labs in mind
- Test all types of samples with one single instrument
- One-step, rapid transfer of calibration models
- Correlates to main standard methods



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About PAC

PAC develops advanced instrumentation for lab and process applications based on strong Analytical Expertise that ensures Optimal Performance for our clients. Our analyzers help our clients meet complex industry challenges by providing a low cost of ownership, safe operation, high performance with fast, accurate, actionable results, high uptime through reliable instrumentation, and compliance with standard methods.

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System Description

The PAC OptiFuel™ is an advanced Fourier Transform InfraRed (FTIR) spectroscopic system for measurement of fuel properties. The embedded computer and software apply mathematical algorithms to the spectra acquired, along with the on-board u-tube density measurement to predict fuel properties from models prebuilt from well-established known fuels.

Methods

Compliance: ASTM D8340, ASTM D6277, ASTM D5845, ASTM D7371, ASTM D7777, ISO 15212

Correlation: ASTM D2699, EN ISO 5164, ASTM D2700, EN ISO 5163, ASTM D5191, EN 13016/1, ASTM D86, EN ISO 3405, ASTM D6839, EN ISO 22854, ASTM D613, EN ISO 5165, ASTM D4737A, EN ISO 4264, EN 12916, ASTM D445, EN 3104

Provides correlation to methods in Specifications: D975, D4814, EN 228, EN 590

Key advantages

RELIABLE DESIGN

- Full-range, laser-referenced Michelson Interferometer with 10yr optics warranty
- 5yr warranty on IR light source
- Humidity & vibration resistant mirrors, beam splitters, and non-moving sample cell
- Ruggedized design with mobile labs in mind

EASE OF USE

- Auto detection of fuel type
- Measure many properties at once
- On-system, one-button-push model update with regional samples
- One-step rapid calibration transfer and cloning

LOW COST OF OWNERSHIP

- One instrument measures all types of samples
- All models built using hundreds of globally sourced real fuel samples are available from day one
- Calibration lasts for years
- On-site & quick preventive maintenance

Parameters

GASOLINE	Low	High	Unit	Type	Method (ASTM)	Method (EN ISO)
Properties						
Density	0.6	1.2	g/cm ³ @ 15 °C	Direct	D7777	-
RON	82	102	-	Correlation	D2699	EN ISO 5164
MON	76	93	-	Correlation	D2700	EN ISO 5163
DVPE	43	105	kPa	Correlation	D5191	EN 13016/1
Anti-Knock Index	85	98	-	Calculation	-	-
Driveability Index	380	665	-	Calculation	-	-
Vapor Lock Index	500	1450	-	Calculation	-	-
Oxygen	0	24	mass%	Calculation	-	-
Saturates	0	95	vol%	Calculation	-	-
VOC	1250	1560	mg/mi	Calculation	-	-
VOC Performance	-6	16	%	Calculation	-	-
Hydrocarbons						
Benzene	0	5.50	vol%	Direct	D6277	-
Benzene Plus	0	2.27	vol%	Correlation	D6839	EN ISO 22854
C7 Aromatics	0.8	18	vol%	Correlation	D6839	EN ISO 22854
C8 Aromatics	0.5	16	vol%	Correlation	D6839	EN ISO 22854
Total Aromatics	5	45	vol%	Correlation	D6839	EN ISO 22854
Olefins	0.3	27	vol%	Correlation	D6839	EN ISO 22854
Oxygenates						
MTBE	0	21	mass%	Direct	D5845	-
ETBE	0	21	mass%	Direct	D5845	-
TAME	0	21	mass%	Direct	D5845	-
DIPE	0	21	mass%	Direct	D5845	-
Ethanol	0	14	mass%	Direct	D5845	-
Methanol	0	6.5	mass%	Direct	D5845	-
t-Butanol	0	145	mass%	Direct	D5845	-
Distillation Points						
IBP	25	51	°C	Correlation	D86	EN ISO 3405
T10	40	73	°C	Correlation	D86	EN ISO 3405
T50	65	117	°C	Correlation	D86	EN ISO 3405
T90	113	182	°C	Correlation	D86	EN ISO 3405
FBP	165	240	°C	Correlation	D86	EN ISO 3405
E70	11	64	vol%	Correlation	D86	EN ISO 3405
E100	32	83	vol%	Correlation	D86	EN ISO 3405
E150	77	98	vol%	Correlation	D86	EN ISO 3405
E180	90	99	vol%	Correlation	D86	EN ISO 3405
E200	29	73	vol%	Correlation	D86	EN ISO 3405
E300	77	99	vol%	Correlation	D86	EN ISO 3405

DIESEL	Low	High	Unit	Type	Method (ASTM)	Method (EN ISO)
Properties						
Density	0.6	1.2	g/cm ³ @ 15 °C	Direct	D7777	-
Cetane Number	41	67	-	Correlation	D613	EN ISO 5165
Cetane Index	43	65	-	Correlation	D4737A	EN ISO 4264
Biodiesel						
FAME	0	100	vol%	Direct	D7371	-
Hydrocarbons						
Mono Aromatics	1.1	31.1	mass%	Correlation	-	EN 12916
Di Aromatics	0	13	mass%	Correlation	-	EN 12916
Tri Aromatics	0	2.2	mass%	Correlation	-	EN 12916
Total Aromatics	1.1	46	mass%	Correlation	-	EN 12916
Polycyclic Aromatics	0	15	mass%	Correlation	-	EN 12916
Viscosity						
Kinematic Viscosity	1.6	4.4	mm ² /s	Correlation	D445	EN 3104
Dynamic Viscosity	1	5.3	cP	Calculation	D445	EN 3104
Distillation Points						
IBP	109	212	°C	Correlation	D86	EN ISO 3405
T5	153	241	°C	Correlation	D86	EN ISO 3405
T10	164	251	°C	Correlation	D86	EN ISO 3405
T20	182	262	°C	Correlation	D86	EN ISO 3405
T30	197	275	°C	Correlation	D86	EN ISO 3405
T40	210	290	°C	Correlation	D86	EN ISO 3405
T50	225	304	°C	Correlation	D86	EN ISO 3405
T60	237	315	°C	Correlation	D86	EN ISO 3405
T70	250	342	°C	Correlation	D86	EN ISO 3405
T80	261	366	°C	Correlation	D86	EN ISO 3405
T90	273	390	°C	Correlation	D86	EN ISO 3405
T95	284	401	°C	Correlation	D86	EN ISO 3405
FBP	301	403	°C	Correlation	D86	EN ISO 3405
E250	10	72	vol%	Correlation	D86	EN ISO 3405
E350	75	99	vol%	Correlation	D86	EN ISO 3405

JET FUEL	Low	High	Unit	Type	Method (ASTM)	Method (EN ISO)
Properties						
Density	0.6	1.2	g/cm ³ @ 15 °C	Direct	D7777	-

Note: Accuracy of the results of correlated properties depends on the matrix of the sample. Slope and bias correction, or addition of local samples to the factory database can be used to improve accuracy.

Technical Requirements & Specifications

General Info	
Spectrometer Type	Mid-FTIR Interferometer
Standard Test Methods	- Compliance: ASTM D8340, ASTM D6277, ASTM D5845, ASTM D7371, ASTM D7777, ISO 15212 - Correlation: ASTM D2699, EN ISO 5164, ASTM D2700, EN ISO 5163, ASTM D5191, EN 13016/1, ASTM D86, EN ISO 3405, ASTM D6839, ASTM D613, ASTM D4737A, EN ISO 22854, EN ISO 5165, EN ISO 4264, EN 12916, ASTM D445, EN 3104
Method Applications	Correlation Results for Methods in Specifications: D975, D4814, EN 228, EN 590
Performance	
Mirror Design	FTIR Michelson Interferometer - Thermally controlled laser referenced
Mirror and Beam Splitter	Humidity Resistant Zinc Selenide
Density Measurement	Oscillating U-tube Cell
Units of Measurement	%m, %v
Scan Range	550 - 4000 cm ⁻¹
Spectral Resolution	2 cm ⁻¹
Measurement Time	30 seconds
Sample Introduction	From sample container
Sample Volume	30 ml
Calibration	Factory calibrated with matrix of several hundred global fuels
Regional Calibration Update	Yes
Cleaning	Solvent (99.9% Toluene or 99.9% Hexane)
Operating Temperature	5 °C to 35 °C
Humidity	0% to 80% RH
Storage Temperature	-40 °C to +85 °C
Leak Test	Automatic
Filter Replacement Monitor	Automatic
Fume Sensor	Yes
Real-time Safety Monitoring	Yes
Display	7" color touch screen
Interface	3x USB - 1x Ethernet
Instrument Memory	100,000 test results

Dimensions & Requirements

Electrical	110V-230V-50/60 Hz, 60 W (24V battery pack option available, connects to 12VDC car power)
Dimensions	8.5" x 14" x 16" (W x H x D)
Weight	32 lbs (14.5 kg)
Packaging	24" x 24" x 24" (W x H x D) - 56 lbs (25.4 kg)
Certifications	ISO 9001, CE, ROHS-II

System Configuration

Part Number	Description		
106446	OptiFuel FTIR Interferometer Fuel Analyzer - 115-230V 50/60Hz		
	Accessories included:		
	QTY	Part Number	Description
	4	106483	Bottle, 30ml, Clear Glass, PTFE Cap Seal, Wide Mouth, Graduated mL and oz
	1	106540	Power Cord for AC Adapter
	50	106817	Filter, Capsule, 20µ Glass Fiber, Luer-Lock Female-Male
	1	106946	POWER CORD, EUROPEAN, CEE 7/7 TO C5, BLACK, ROHS COMPLIANT
	5	106966	Tubing, Versilon SE-200, 1/16" ID, 1/8" OD, Ultra-Chemical-Resistant
	20	107035	Desiccant Pack, FTIR
	1	107036	Assy, USB Flash Drive, OptiFuel
	1	107040	Screwdriver, Torx, T20 x 100mm
	1	107318	Assy, Waste Bottle
	8	107543	Reusable Needle, 304-SS, 1" Length, Gauge 12, Blunt Tip
	2	107546	Reusable Needle, 304-SS, 55mm Length, Gauge 12, Blunt Tip
	2	107548	Solvent Bottle, 60 ml, Amber Glass, OptiFuel
1	107926	Power Supply, External, AC Adapter, 5.5x2.1x11mm barrel connector	

Accessories

Part Number	Description
106483	Sample Bottle, 30ml, Glass, PTFE Seal with Black Plastic Lid
107548	Solvent Bottle, 60 ml, Amber Glass, OptiFuel
107318	Waste Bottle
108921	Assy, Waste Line, OptiFuel
106817BAG	Sample Filter Assy. 50 Piece Bag of 106817
107543	Reusable Needle, 304-SS, 1" Length, Gauge 12, Blunt Tip (pack of 1)
107546	Reusable Needle, 304-SS, 55mm Length, Gauge 12, Blunt Tip (pack of 1)
107035-10	Desiccant Pack, FTIR (pack of 10)
106539	External Power Supply 115/230 to 24VDC
106946	POWER CORD, EUROPEAN, CEE 7/7 TO C5, BLACK, ROHS COMPLIANT
106540	Power Cord for AC Adapter

Optional Accessories

Part Number	Description
106948	12 VDC to 24 VDC Battery Pack (see Mobile Accessory Package below)
107278	Anti-vibration Platform
107326	Mobile Lab Anti-Vibration Platform w/Battery Pack Bundle
1700-000-007	Ethernet Cable 3m for LIMS connection
108224	Pelican Case

Spare Parts

Part Number	Description
107318	Waste Bottle
106490	Gasket, Kalrez, Sample Bottle
108921	Assy, Waste Line, OptiFuel
107134	Lamp, FTIR
106780	Dryer Cover Lid (Acrylic)
106539	External Power Supply 115/230/24VDC
106946	Power Cord, EUROPEAN, CEE 7/7 TO C5, BLACK, ROHS COMPLIANT
106540	Power Cord for AC Adapter
106503	Power Switch
106511	Air Pump
106538	Sensor, LP Gas Detector, TO-5 Package
106535	Assy, Main Control
106469	Touch Screen Display
106468	Density Meter
106869	Valve Manifold



CAUTION! The spare parts mentioned in this list must be replaced by PAC authorized service technicians. For any replacement only genuine PAC parts must be used.

Please refer to commercial offer for pricing information.

Consumables

Part Number	Description
106483	Sample Bottle 30 mL Glass with PTFE Seal
106817BAG	Sample Filter Assy, 50 Piece Bag of 106817
107035-10	Desiccant Pack, FTIR (pack of 10)
102590	Air Dryer Tube
107998	1% Benzene/99% Isooctane (m/m) Check Standard, 30 mL
108222	10% Ethanol/90% Base Gasoline (m/m) Check Standard, 30 mL
108223	10% FAME/90% (m/m) Base Diesel Check Standard, 30 mL

Consumables for One Year Operation

QTY	Part Number	Description
100	106483	Sample Bottle 30 mL Glass with PTFE Seal
30	106817BAG	Sample Filter Assy. 50 Piece Bag of 106817
3	107035-10	Desiccant Pack, FTIR (Pack of 10)
1	102590	Air Dryer Tube

Mobile Lab Options

Part Number	Description
106948	Battery Pack and Car Charger for Mobile Application

MOBILE ACCESSORY PACKAGE



NOTE: OptiFuel runs for more than 5 uninterrupted hours on just the battery pack, untethered from a vehicle or an external power outlet.

Mobile Accessory Package Includes:

- 1 300 Watt/Hour Super High-Capacity Lithium Battery 1 AC Charger
- 1 DC to DC Power Adapter
- 1 12 VDC Car Battery Port to 115 VAC Adapter

