

# Technical Offer

## JFA-70Xi Series Jet Fuel Viscosity, Density, Freezing Point Analyzer

Fast, Precise, and Easy  
Freezing Point, Viscosity and Density Determination



### Versatility and Convenience

- **Super-fast speed:** three tests from one sample, all in less than 15 minutes
- **Self-cleaning,** no solvent required
- **Self-contained cooling and heating:** no liquid bath, no breakable glassware

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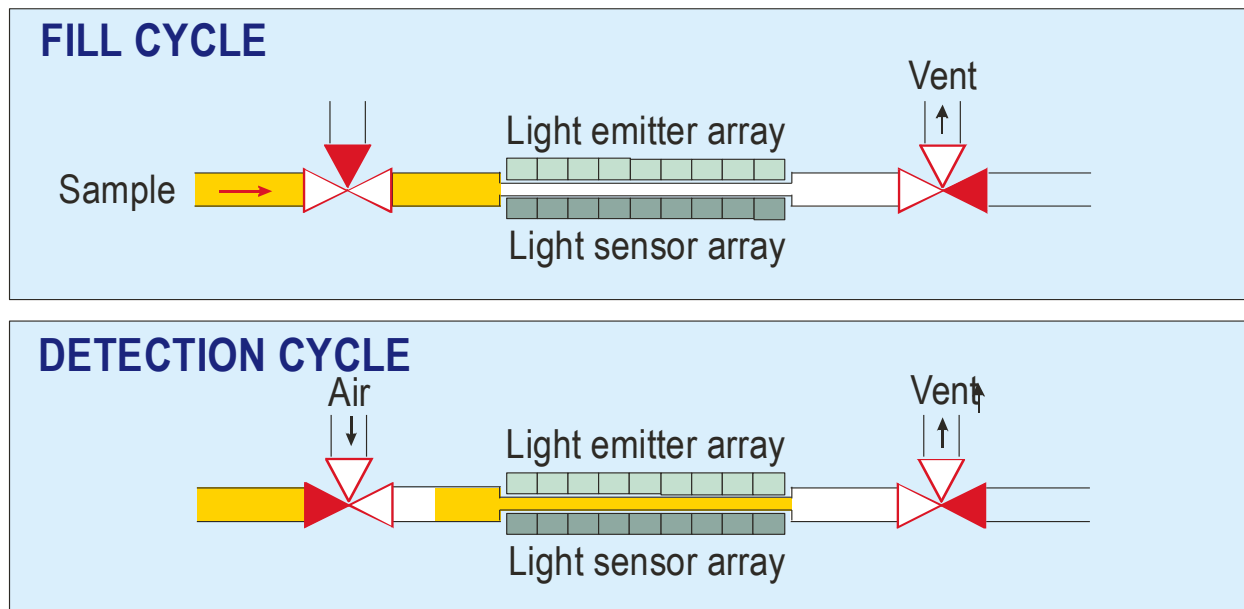
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## 1. System Description

**Viscosity** is a measure of a fluid's resistance to flow. It describes the internal friction of a moving fluid. Viscosity is an important parameter for aviation fuel. Viscosity is especially important for the proper operation of the airplane's Auxiliary Power Unit (APU). The APU is used as an emergency electrical power source while the aircraft is airborne. If the jet fuel's viscosity is too high, the spray of jet fuel will not be fine enough to ignite the APU. In such case, droplet evaporation is impeded.

The Phase Technology JFA-70Xi uses ASTM D7945 to measure viscosity. This method is based upon the Hagen-Poiseuille principle of capillary flow. To determine viscosity with the JFA-70Xi, the sample is drawn from a side-mounted injection port and then introduced into the measuring cell at a controlled, specified temperature. The measuring cell contains a horizontal capillary tube with optical sensors. A thermal block surrounds the measuring cell.

Dynamic viscosity is determined from the flow time of the sample through the capillary under a constant pressure of compressed air. Along the path, light is emitted as sensors measure the transit time. The U-tube densitometer's oscillating frequency is used to determine density. The sample's kinematic viscosity is calculated by dividing the dynamic viscosity by the density measurement.



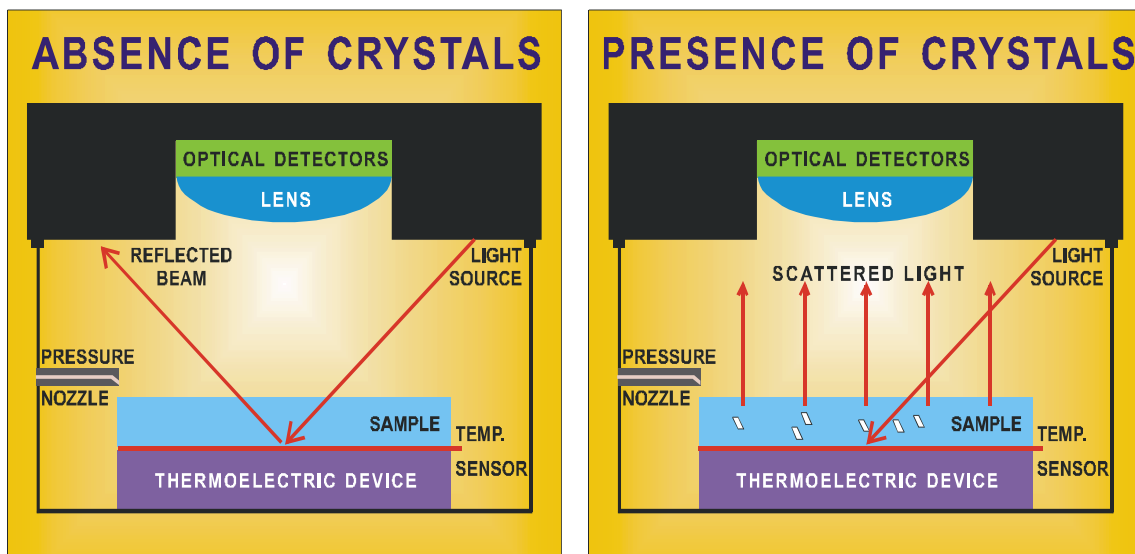
*Phase Technology ASTM D7945 Viscosity Method*

**Density** is the absolute relationship between mass and volume at a specific temperature. In addition to being used in the calculation from dynamic to kinematic viscosity described above, density measurement is needed to determine quantity and quality control. Density is also used in calculations for other fuel characteristics and key indicators.

**Freezing point** is the lowest temperature at which the aviation fuel remains free of solid hydrocarbon crystals that can restrict the flow of fuel through filters if present in the fuel system of the aircraft.

Phase Technology’s 70Xi analyzer performs a freezing point test in two stages. First, the sample is cooled at a prescribed rate as the optics system looks for crystal formation and signal rise.

Next, the analyzer warms the sample until all the crystals disappear. As soon as the signal drops and returns to the liquid phase, the analyzer displays the freezing point and completes the test by warming the sample back to room temperature.



*Phase Technology ASTM D5972 Freezing Point Method*

**Fully automated for easy use**

Phase Technology’s JFA-70Xi Jet fuel analyzer significantly increases lab productivity and improves profitability by providing quick, precise results. The JFA-70Xi analyzer helps minimize giveaway and ensure that released product is on spec.

Running a test is as simple as pressing one button. The 70Xi’s one-touch “Favorites” are user-defined presets that can be stored in the analyzer for quick access. Favorites can be created, organized, sorted or deleted as desired. With the single push of a button, lab operators can efficiently perform tests in significantly less time.

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An internal Peltier device is used to cool the sample, so no external chiller is ever needed. The cooler allows the 70Xi to reach down to  $-88^{\circ}\text{C}$ .

### **Innovative, flexible design**

The JFA-70Xi is the world's only analyzer that performs jet fuel viscosity, density, and freezing point in a single unit. Combining functions saves money and valuable bench space in the lab.

The JFA-70Xi can also be configured to add cloud and pour point testing for diesel fuels.

The Phase Technology JFA-70Xi is available as part of the company's "single-shot" series, which utilize a side-mounted automatic sample injection port. The JFA-70Xi is also available with a 48-position integrated autosampler.

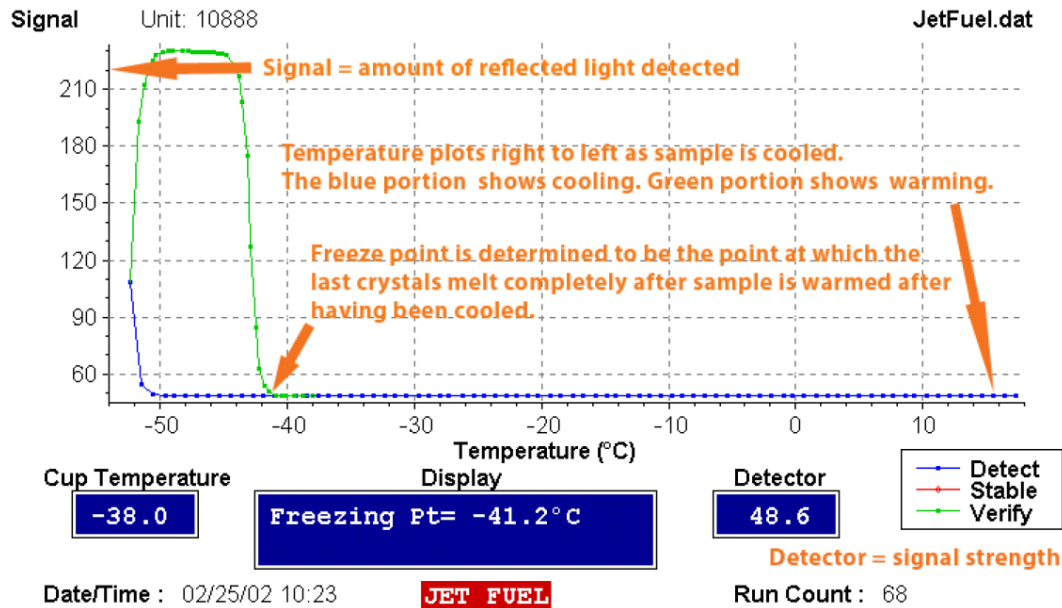
### **Valuable on-screen verification and diagnostics**

The JFA-70Xi analyzer displays an onscreen, real-time phase plot which graphs the temperature on the horizontal axis and the optics (scattered light) signal on the vertical axis.

Phase plots are very useful for interpreting and verifying test results, understanding the cold temperature characteristics of test samples, and diagnosing problems.

### **Freezing point phase plot**

For freezing point tests, phase plots depict the optics signal maintaining a low and flat baseline level when the sample is completely liquid at warm temperature. The signal rises as wax crystals form when the sample is cooled, and the signal returns to baseline level when the sample is warmed to its freezing point.



## Test Methods

### Freezing Point

- ASTM D5972 (IP 435)
- ASTM D2386 (IP 16/ ISO 3013) equivalent or better

### Viscosity

- ASTM D7945
- ASTM D445 (IP 71/ ISO 3104) equivalent or better

### Density

- ASTM D7777
- ASTM D4052 (IP 365/ ISO 12185) correlation

## Main Features

- Super fast speed – Four different tests in less than 15 minutes
- Automatic sample input – No pipette required. New vial injection system loads sample automatically.
- Self cleaning; no solvent required – Cost savings of solvent usage and time savings as resources can be used for more productive activities
- No external chiller – Quiet, cool, self-contained thermoelectric cooler; no hazardous liquid bath medium (methanol toxicity)
- No breakable glassware – Internal capillary system eliminates need for fragile glass viscosity tubes
- Superior precision – Best measured repeatability and reproducibility of any automatic or manual method
- One-touch preset Favorites – Frequently-used test settings can be stored in the analyzer for quick access. Favorites can be created, organized, sorted or deleted

as you desire. With the single push of a button, lab operators can efficiently perform tests in significantly less time


- Optimized for quality control – Automatic QC runs with instantaneous control charts. Retest sample option increases confidence in test result.
- Unsurpassed detection of contamination in jet fuels
- Easy-to-use interface; intuitive and easy to understand
- Full-color, touch-sensitive, 15” high resolution screen
- USB and Ethernet connectivity
- Programmable user access levels streamlines workflow and prevents accidental changes
- Import and store any user documents (.doc, .pdf, .ppt and .pps) for customized operating procedures (SOP) or training
- Configurable desiccant replacement count
- Customizable reporting – test history, plot data and self-diagnostics can be displayed on-screen, printed, or transferred to computer for statistical analysis, presentations, email sharing, archival storage
- Test uses small sample volume

## 2. Technical Requirements & Specifications

General Info			
Configuration	JFA-70Xi Freezing Point, Viscosity, Density Analyzer with built-in cooling system		
Standard Test Methods	Freezing Point:	ASTM D5972 (IP 435 / SH/T 0770-2015 / GOST 52332) ASTM D2386 (IP 16 / ISO 3013) equivalent or better	
	Viscosity:	ASTM D7945 ASTM D445 (IP 71 / ISO 3104) equivalent or better	
	Density:	ASTM D7777 ASTM D4052 (IP 365 / ISO 12185) correlation	
Certifications	CE Compliance		
Precision			
Repeatability & Reproducibility		Repeatability	Reproducibility
	Freezing Point	0.5 °C	0.8 °C
	Kinematic Viscosity	0.011 cSt @ -20°C 0.0018X <sup>1.4</sup> cSt @ -40 °C 0.14 °C @ 12 cSt	0.021 cSt @ -20°C 0.0021X <sup>1.4</sup> cSt @ -40 °C 0.17 °C @ 12 cSt
	Density	0.0001 g/mL	0.0005 g/mL
Operation			
Detection	Diffusive Light Scattering (DLS)		
Cooling System	Internal Peltier Cooler Linear cooling profiles according to method Optional user defined, customizable stepped cooling profiles		
Test Interval	Freezing Point: automatic 0.1 °C or according to the method		
System Cleaning	Automatic flush cycle; no solvent required		
Application Range			
Freezing Point Temperature Range	Sample: -80 to +70 °C °C or °F configurable		
Measurements			
Test Duration	Freezing Point: 8 to 10 minutes Viscosity & Density combined: <10 minutes Freezing Point, Viscosity, Density combined: <15 minutes		
Required Operator Time	0.5 minutes		
Documentation			
Display	Screen size 15" with 1024x768 resolution; resistive touchscreen with real time graphic display		
Printing	Label printer: Detailed test report in °C or °F with date & time stamped, sample information, test mode Full-size printer: Detailed detection curve tracking of fuel behaviors during the test; can be printed as part of test report.		
Result Documentation	Storage up to 5000 test runs (minimum)		

<b>QC-Functions</b>	Automatic QC-sample handling and QC-Chart
<b>Interface</b>	
<b>User Interface</b>	Full-color, touch-sensitive, 15" high-resolution LCD screen with virtual keyboard Languages: English, Chinese
<b>Printer</b>	USB interface for label printer or full-size HP/PCL printer
<b>LIMS interface</b>	Ethernet or RS232, Used defined Data String, Automatic LIMS transfer
<b>Data Export</b>	USB Memory Stick, Import into Excel
<b>Password Protection</b>	Different access levels for Operator, Manager, Service
<b>Diagnostics</b>	Automatic diagnostic functions
<b>Accessories</b>	Barcode Reader, label printer
<b>Utility Requirements</b>	
<b>Electrical</b>	90V to 280 VAC; 47-63Hz; 350W
<b>Ambient Conditions</b>	Temperature: max. 10.° to 30.°C; extremes not recommended
<b>Dimensions</b>	54.6 cm (21.5" deep x 33.7 cm (13.25") wide x 44.5 cm (17.5") high
<b>Weight</b>	Unit: 24 kg (53 lb.) Boxed: 28 kg (62 lb.)

### 3. System Configuration

Ordering No.	Description	Non Contractual Picture	
JFA-70Xi	JFA-70Xi freezing point, viscosity & density analyzer Accessories included:		
	000-50-0608		Power Cord
	*See DRD-601P DRD-605P DRD-610P to reorder		Dryer desiccant (single pack) for analyzer purging system
	*See DRP-06C to reorder		Sample dryer sacs (30 sacs) for removing moisture in fuel sample. Recommended for jet fuel freezing point test.
	*See PFILM-70Xi to reorder		70Xi 15" Screen Protector, Anti-Glare, 303mm x 226mm (1 piece)
	000-05-0217-A		Waste Bottle for 70Xi-AS/SS/JFA Assembly
	*See APX48-30G JFA-30G to reorder		Vial, Clear S/C Dram, 22-400 Thread 25 x 95mm (Quantity: 5)
			User Guide
			Quick Start Guide
			Calibration Certificate
	1 Year warranty		