

Model P-800LT Freeze Point Analyzer, Low Temperature



On-line Freeze Point Analyzer for the continuous measurement of freeze point temperatures in petroleum products

- ▶ Operating range -150°F to +77°F (-100°C to +25°C)
- ▶ Straight path absorbance & 90° back-scatter detection
- ▶ Rapid analysis cycle of 15 minutes or less
- ▶ Superior repeatability of less than 0.5°F (0.25°C)
- ▶ P-800LT has an internal Cryo chiller cools to -125°C without external cooling system
- ▶ No Sample Recovery System needed, can return directly to process
- ▶ Stream switching and validation
- ▶ Remote diagnostics over IP
- ▶ ASTM D-2386



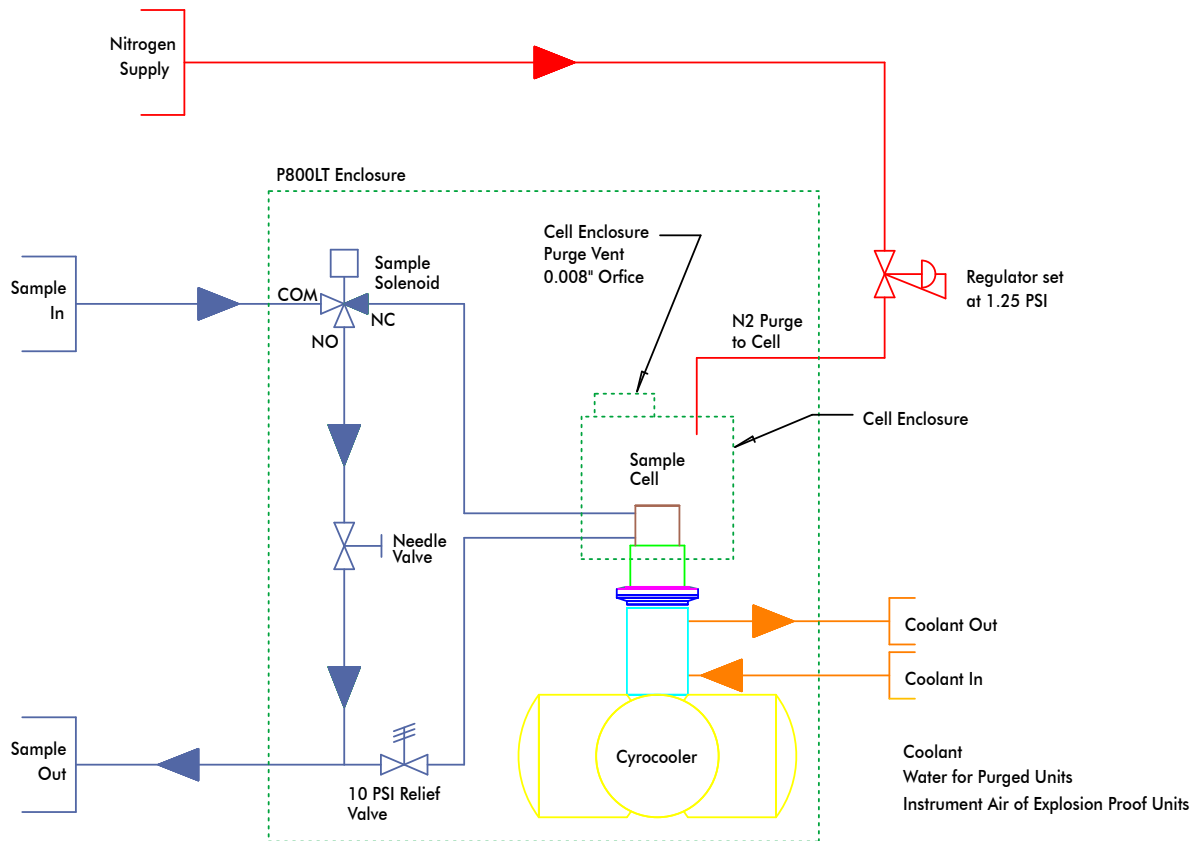
The Model P-800LT Freeze Point Analyzer is the result of combining the latest, state-of-the-art technology with over 45 years of industry experience. The result is an unsurpassed, high-quality Freeze Point measurement system that produces the process control signal required to perform today's optimized and cost-efficient petroleum refining operations.

A self contained cryogenic cooling compressor out performs traditional Peltier modules reaching colder temperatures and eliminating the need for an expensive external cooling system. This small cooling system allows captured samples to be cooled to -125°C. The high pressure sample cell optics allow sample extraction and return to process and pressure conditions, thereby eliminating the need for atmospheric recovery.

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APPLICATION

Given today's highly competitive environment, oil refiners are demanding instrumentation that aids in the optimization of the refining process. Therefore, refineries require a reliable and accurate analysis system of the Freeze Point temperature to meet the required specifications. This analysis will allow the operators to optimize the refining process and therefore lower production costs while improving product quality.



OPERATING PRINCIPLE

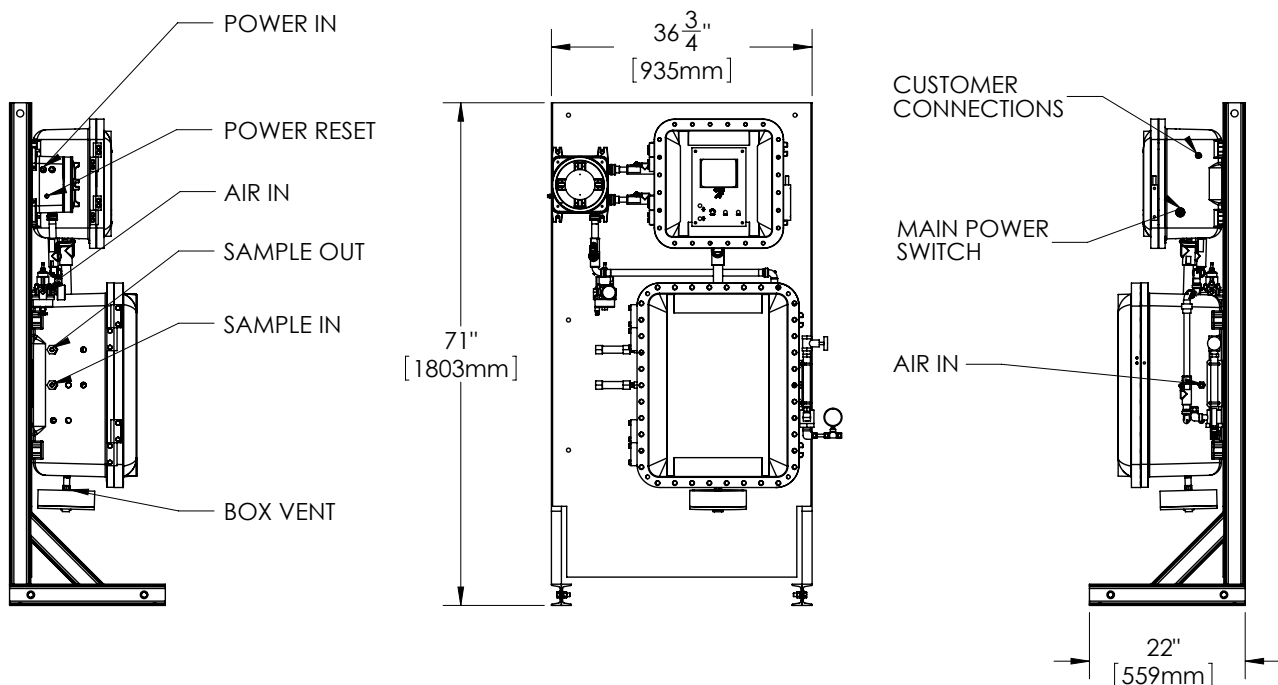
The P-800LT measurement cycle is designed to correlate to ASTM Method D-2386 and IP-16. A near infrared fiber-optic sensing system has been employed to monitor the formation and melting of the wax crystals during the measuring cycle. The optical emitter and detectors monitor the state of the crystals through high-pressure optical windows that allow measurement cycles to occur at process pressures, eliminating the need for expensive sample recovery. A state of the art, Stirling Thermoacoustic (Pulse Tube) Cryocooler has been incorporated in the P-800LT. This cooler is a helium-based device that can cool at a capacity of 8 Watts at 77 °K. The cryocooler hot surface is cooled by either plant cooling water or by instrument air. The use of the cryocooler eliminates the requirement of an external explosion proof re-circulating chiller system. It also allows cooling to $-125\text{ }^{\circ}\text{C}$, significantly colder than the $-85\text{ }^{\circ}\text{C}$ conventional Peltier cooled systems reach.

The P-800LT measurement cycle is initiated by a sample flush through the sample detection cell. This flush time is programmable and allows fresh sample to be placed in the detection cell for the next cycle. This flush also helps to warm and dislodge any remaining wax crystals that have adhered to detection cell windows.

Second, the sample solenoid is closed, capturing the sample. The cryocooler is then turned on to a programmed power level. This level is monitored on each cycle and adjusted on the next cycle to maintain consistent cooling times to Cloud Point Detection. As the cooling cycle begins the temperature of the sample is monitored as well as the optical signal. The P800LT uses 0 and 90 degree optical sensors to improve accuracy and reduce errors due to entrained water or other contaminants. The cooling power is maintained until Cloud Point is determined, the temperature at which the wax crystals form.

Third, with the cryocooler power off, the low power heating is applied to the detection cell, allowing the sample to warm. As this warming occurs the wax crystals start to disappear. The temperature at which the last of the crystals disappears is recorded as the Freeze Point of the sample. At this point, the sample solenoid is turned on and the sample flush is initiated, starting the cycle over again.

DIMENSIONS inch (mm)





PRODUCT GUIDE

Petroleum Analyzers

- Cloud Point
- Cold Properties
- Flash Point
- Freeze Point
- Pour Point
- RVP
- RVP /VL20
- Salt-in-Crude
- Viscosity
- Viscosity Index

Other Products

- UV-Oil in Water
- Environmental Cabinets
- Sample Conditioning Systems
- Sample Recovery Systems
- Shelter Systems
- Spare Parts

Analyzer Services

- Field Service
- Start-Up & Commissioning
- Training
- Technical Support

SPECIFICATIONS: MODEL P-800LT FREEZE POINT ANALYZER

ANALYSIS PERFORMANCE	
Measurement Cycle Time	less than 15 minutes
Measurement Range	Min. -148°F (-100°C) Max. +77°F (+25°C)
Repeatability	± 1°F (0.5°C)
Reproducibility	Meets or exceeds ASTM D-2386 or IP16 requirements
Resolution	± 0.5 °F (0.25°C)
Accuracy	Meets or exceeds ASTM Method D-2386 or IP-16
Temperature Accuracy	± 1°F (0.5°C)
SAMPLE REQUIREMENTS	
Sample Bypass Flow Rate	Min. 1 L/min – Max. 2 L/min
Sample Return Pressure	Atmospheric – Max. 150 psi (10 bar)
Sample Pressure	Min. 20 psi (1.4 bar) – Max. 200 psi (14 bar)
Sample Temperature	Min. 35°F (2°C) – Max. 150°F (65°C)
Sample Particulates	less than 10 µm - optional sample conditioning system available
Sample Conditions	homogenous, single-phase sample without free water
ENCLOSURE/INSTALLATION REQUIREMENTS	
Dimensions	Width 37.0 in (940mm) – Height 71 in (1803mm) – Depth 30.0 in (762mm)
Weight	Exd Unit 500 lbs (228 kg)
Operating Temperature	Min. 40°F (5°C) – Max. 105°F (40°C)
Area Classification	CSA/CUS Class 1 Div 1 Group B, C + D or ATEX Zone1 II B + H2 T6
Power	self-selecting 100 to 120VAC or 200 to 240 VAC, 50/60 Hz, single phase, 5A
Cyco Cooling	Air cooled: 80-120psi 70 scfm / Water cooled: clean plant water 35°C or cooler
END USER CONNECTIONS	
Analog Output Signal	single isolated 4-20 mA output (optional second output available), selectable for sample Freeze Point values, analyzer system/maintenance warning or analysis measurement indication
Relay Output Contact	three SPDT Relays with contacts rated at 3A resistive load at 250VAC, selectable for sample Freeze Point value alarm, analyzer maintenance warning or analyzer fault alarm
Serial Input/Output Signal	TCP/IP or Serial/RTU ModBus output available

HOW TO ORDER

ANALYZER SYSTEMS	
Catalog Number P-800LT-1400	ORB Model P-800LT Freeze Point Analyzer, CSA/CUS Class 1 Div 1 Group B, C,D
Catalog Number P-800LT-1500	ORB Model P-800LT Freeze Point Analyzer, ATEX Zone1 II B + T6
OPTIONS	
Catalog Number 700538	Sample Conditioning System
Catalog Number 700858	MODBUS TCP/IP Protocol
ACCESSORIES	
Catalog Number 700506	1-Year Spare Parts Kit
Catalog Number 700507	2-Year Spare Parts Kit

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