

# ON-LINE FREEZE POINT MONITOR

PROCESS/ON-LINE

42702D NEC Purge • 42702E CENELEC Purge  
42702DX NEC Ex-Proof • 42702H CENELEC/ATEX Ex-Proof

## *Measure cloud point of hydrocarbon products quickly, accurately, completely on-line!*

The PSPI Freeze Point Monitor determines cloud point in correlation with ASTM and IP testing procedures even at ultra-low temperatures! Utilizing on-stream process technology, the 42702 arrives pre-programmed with three different operational modes, each with cycle times of less than 10 minutes. And because the spent sample is returned directly to process, no sample collection system is needed. The Freeze Point Monitor is completely microprocessor-controlled with self-test and diagnostic capabilities, making it simple to operate and maintain.

- Measures Freeze Point from  $-62^{\circ}$  to  $25^{\circ}\text{C}$  ( $-80^{\circ}$  to  $77^{\circ}\text{F}$ ) with repeatability of  $\pm 0.5^{\circ}\text{C}$
- Measurement correlates to ASTM D 2386 and IP 16
- No sample recovery system required for return pressure up to  $1.4\text{ kg/cm}^2$  (20 psi) below inlet pressure
- Programmable operation and display in Celsius or Fahrenheit scales
- Microprocessor controlled instrument with self test and diagnostic capabilities
- Typical applications are locations where automatic, on-line composition analysis of aviation fuel, diesel fuel, cycle oil or gas oil streams is required:
  - *quality monitoring*
  - *blending optimization*
  - *closed loop process control*
  - *quality assurance*

### THEORY OF OPERATION

The PSPI Freeze Point Monitor measures the freeze point temperature of hydrocarbon products in correlation with ASTM D 2386 and IP 16 procedures. The instrument has the capability to handle a wide range of petroleum products, including cycle oil and gas-oil streams. Freeze point is determined by passing a single beam of monochromatic light through the sample, measuring the amount of light reaching the detector as wax crystals form and melt, and calculating the change from a baseline measurement. To minimize the effect of material buildups on the sample cell windows, a new baseline is established on every cycle. As the sample is initially cooled, the formation of wax crystals results in a sudden drop in the amount of light reaching the detector. The sample temperature when these crystals form is the cloud point. Once cloud point has been reached, the sample is cooled for an additional five seconds and then the power to the cooling cell is turned off. As the sample warms and the wax crystals melt, the amount of light reaching the detector increases. When all wax crystals have melted and there is no further increase in light intensity, the freeze point has been reached. The freeze point temperature is then displayed in either degrees C or F on the local readout and output as an analog signal; the sample cell is then flushed and a new measurement cycle initiated.



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**PRECISION**  
SCIENTIFIC PETROLEUM INSTRUMENTS

## SPECIFICATIONS

### Performance

- **Response Time:** Typical cycle time is 2 to 10 minutes (user-programmable); sample dependent
- **Operation Modes:** High Speed Trending Monitoring, Laboratory Test Simulation, Combination Trend & Laboratory Simulation
- **Measurement Range:** -62° to 25°C (-80° to 77°F) requires 0°C (32°F) coolant; Lower temperatures possible; consult PSPI
- **Ambient Temperature Limits:** 4° to 38°C (41° to 100°F); weather protection required; no direct sunlight

### Sample Requirements

- **Flow Rate:** 0.8 to 1.6 liters/minute (0.2 to 0.4 gallons/minute)
- **Inlet Pressure:** 10.5 kg/cm<sup>2</sup> (150 psig) maximum
- **Return Pressure:** Minimum differential pressure inlet to outlet 1.4 kg/cm<sup>2</sup> (20 psig)
- **Temperature:** 10° to 37°C (50° to 100°F), but at least 10°C (20°F) above expected cloud point temperature
- **Color Influence:** Nil below ASTM 8 color
- **Water Influence:** Nil below 5000 ppm

### Utility Requirements

- **Electrical:** 115 or 230 VAC (±10%), 50/60 Hz, single phase, 300 watts
- **Purge Gas (DX/H models optional):** Clean, dry Nitrogen (98% pure) or other inert gas at 2.0 to 4.2 kg/cm<sup>2</sup> (30 to 60 psig) input pressure; 42 liters/minute (1.5 SCFM) initial purge rate at 2.8 kg/cm<sup>2</sup> (40 psig) input
- **Coolant:** 50/50 water/glycol mixture at 10.5 kg/cm<sup>2</sup> (150 psig) maximum pressure; minimum pressure differential of 2.8 kg/cm<sup>2</sup> (40 psig)

### Signal Outputs

- **Analog Outputs:** One isolated 4–20 mAdc Cloud Point Value (standard)
- **Alarm Relays:** 3 SPST fail-safe alarm relays (standard): Level 1 Alarm, Level 2 Alarm, Purge Alarm
- **Serial Output:** RS-232C serial output available (optional)
- **“Come Read” Contact:** Dry relay contact for end of measurement cycle notification (optional)

### Signal Inputs

- **Remote Program Selection:** Terminals available for four 24 VDC dry contact relays (optional)
- **Remote Standby:** Terminals available for customer-supplied dry contact control of instrument; allows control room to take monitor “off-line” (optional)
- **Automatic Validation Check:** Terminals available for dry contact or user-selectable intervals (optional)
- **Stream Switching (42702D only):** Terminals available for customer-supplied dry contact switching between two process streams (optional)

### Area Classification

#### Explosion-Proof Enclosures:

- **42702DX:** NEC Class 1, Div 1, Groups C & D
- **42702H:** CENELEC EExd IIC T4; KEMA 03 ATEX 2033 (pending); **CE**

#### Purged Enclosures:

- **42702D:** NEC Class 1, Div 1, Group D
- **42702J:** JIS Purged (Japan)

### Dimensions & Weight

Uncrated:	H	W	D	units
• Analyzer (42701D) 99 kg (217 lbs)	889	788	305	mm inches
• Analyzer (42701DX / H) 272 kg (600 lbs)	1804	724	762	mm inches
Crated:	H	W	D	units
• Analyzer (42701D) 159 kg (350 lbs)	1041	889	407	mm inches
• Analyzer (42701DX / H) 340 kg (750 lbs)	1956	838	864	mm inches

### Optional Accessories

- **Filter Coalescer** separates water from petroleum liquids and acts as high-efficiency filter
- **Sample Conditioning System** prepares and presents representative sample to analyzer with minimum lag time

*Due to PSPI's commitment to continual product development, specifications are subject to change without notice.*



42701D

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