

PROCESS/ON-LINE

# ON-LINE COLD FILTER

## PLUG POINT ANALYZER

42902DX NEC Ex-Proof • 42902EX CENELEC Ex-Proof

*Measure Cold Filter Plug Point of hydrocarbon products quickly, accurately, completely on-line!*

The PSPI Cold Filter Plug Point Monitor duplicates the ASTM D 6371 and IP 309 CFPP test methods for determining CFPP temperature automatically. The 42902 is preprogrammed with the prescribed test conditions and both temperatures, or it may be programmed for a custom measurement cycle. The vacuum system and second stage chiller are incorporated into the analyzer, eliminating the need for an external vacuum pump and minimizing external coolant requirements. The CFPP monitor is microprocessor controlled with self-test and diagnostic capabilities, making it simple to operate and maintain.



- Designed to measure CFPP from  
-35° to 25°C (-31° to 77°F)
- Repeatability and Reproducibility correlate with ASTM D 6371 and IP 309 testing methods
- No Sample Recovery System required for return pressure up to 6.3 kg/cm<sup>2</sup> (90 psi)
- Fully programmable - all parameters of the measurement cycle can be customized
- Typical applications are locations where real time, on-line process control is necessary to maintain tight production specifications and optimize fuel blending operations:
  - *process operation*
  - *blending optimization*
  - *quality assurance*

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## THEORY OF OPERATION

The PSPI 42902 Cold Filter Plug Point Analyzer is designed to duplicate the ASTM 6371 and IP 309 laboratory test methods for determining CFPP temperature. A typical measurement cycle proceeds as follows: Sample flows through the instrument's internal sampling system, which consists of a sample inlet solenoid, 45 ml stainless steel volumetric chamber, and sample outlet solenoid. This sample path is kept open at all times (except during "sample loading") to ensure that representative sample is always available for analysis.

When a test cycle is initiated, the sample inlet and sample outlet solenoids close. Instrument air pushes the sample in the pipette into the glass test vessel. Once the loading sequence is completed, the inlet and outlet solenoids open, allowing sample to again flow through the internal sampling system. The sample in the glass test vessel is pulled back by vacuum through the 45 micron mesh screen into a 20 ml pipette and then allowed to drain back into the test vessel. This process is repeated three times to ensure that the mesh screen is not clogged and that the instrument's meniscus detectors are functioning properly. Once this initial system check is completed, the sample is drained out of the test vessel and into the sample recover tank. A fresh test sample is then loaded into the test vessel. The fresh sample is then pulled by vacuum through the 45 micron mesh screen into the 20 ml pipette, allowed to drain back into the test vessel, and sample cooling initiated.

Initial sample cooling is performed at the programmed #1 bath temperature (-34°C as specified in IP 309 or user-defined temperature). When the sample temperature reaches the programmed test temperature, it is pulled by vacuum through the 45 micron mesh screen and then allowed to drain back into the test vessel. This procedure is repeated with each 1°C drop in sample temperature. Testing continues until either (1) it takes longer than the programmed test duration 60 seconds (as specified in IP 309) for the 20 ml pipette to fill or (2) the sample fails to completely return to the test vessel before the sample has cooled an additional 1°C. The sample temperature at which this occurs is reported as the CFPP temperature. If the 45 micron mesh filter has not clogged by the time the sample temperature has reached -20°C, the cooling bath temperature is dropped to programmed #2 bath temperature (-51°C as specified in IP 309) and testing continues as above. If CFPP is not detected by the time the test sample reaches a temperature of -35°C, testing is terminated and the "No CFPP Detection" alarm activated. Once CFPP detection occurs, the sample is heated and drained into the sample recovery reservoir. When this reservoir is full, its contents are pumped out of the analyzer via the sample outlet line.

## SPECIFICATIONS

### Performance

- **Response Time:** Typical cycle time is 15 to 60 minutes; sample dependent
- **Ambient Temperature:** 0° to 38°C (32° to 100°F); weather protection required; no direct sunlight

### Sample Requirements

- **Flow Rate:** 200 cc/minute minimum, 4 liters/minute maximum
- **Pressure (inlet/outlet ΔP):** 0.28 kg/cm<sup>2</sup> (4 psig) minimum, 2.1 kg/cm<sup>2</sup> (30 psig) maximum
- **Temperature:** At least 10°C (18°F) above CFPP temperature, but no higher than 70°C (158°F) at inlet to analyzer
- **Return Pressure:** 6.3 kg/cm<sup>2</sup> (90 psig) maximum
- **Water Influence:** Proper sample conditioning techniques to keep water out of sample are required
- **Particulate:** Less than 45 micron

### Utility Requirements

- **Electrical:** 110 or 220 VAC (±10%), 50/60 Hz, single phase, 1200 watts
- **Coolant:** Clean cooling water 0° to 25°C (32° to 77°F) at a flowrate of 2 to 4 liters/minute; 2.8 kg/cm<sup>2</sup> (40 psig) minimum pressure; 7 kg/cm<sup>2</sup> (100 psig) maximum
- **Instrument Air:** Clean, dry filtered air at a pressure of 3.5 to 7 kg/cm<sup>2</sup> (50 to 100 psig), regulated at 2.8 kg/cm<sup>2</sup> (40 psig)
- **Purge Gas (optional):** Clontrol Enclosure - Dry Instrument Air; Measurement Enclosure - Dry inert gas with a -40°C or below dewpoint at a flowrate of 50 to 100 cc/minute

### Signal Outputs

- **Analog Outputs:** One isolated 4–20 mAdc (standard); Additional isolated 4-20 mAdc signal outputs available (optional)
- **Alarm Relays:** 2 SPST (N.O.) fail-safe alarm relays (standard): Level 1 and Level 2 conditions
- **Measurement Programs:** Analyzer may be programmed with up to 8 different measurement programs (optional)
- **Serial Output:** RS-232C serial output available (optional)
- **Local Digital Display:** Alphanumeric/graphic LCD (standard) contact switching between two process streams (optional)

### Area Classification

- **42902DX:** NEC Class 1, Div 1, Groups C & D
- **42902EX:** IEC EExd IIB T4

### Dimensions & Weight

Unrated:	H	W	D	units
272 kg (600 lbs)	1803	864	889	mm
	71	34	35	inches
Crated:	H	W	D	units
363 kg (800 lbs)	1930	966	991	mm
	76	38	39	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.*

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