

# ON-LINE SALT-IN-CRUDE MONITOR

45561D NEC Ex-Proof • 45561E CENELEC Ex-Proof

PROCESS/ON-LINE

*Measure salt content quickly,  
accurately, completely on-line!*

The PSPI Salt-In-Crude Monitor determines total salt content in real-time for an accurate analysis up to 400 PTB. The 45561 simulates ASTM D 3230 testing procedures with an average response time of only seven minutes. It comes equipped with an integral sample conditioning system and three standard measurement ranges. The 45561 Salt-In-Crude Monitor is completely microprocessor-controlled with self-test and diagnostic capabilities, making it simple to operate and maintain.

- Measures total salt content from 0–400 PTB
- Accuracy of  $\pm 5.0\%$  correlates with ASTM D 3230
- No sample recovery system for fast loop return required for return pressure up to 1.4 kg/cm<sup>2</sup> (20 psi) below inlet pressure
- Integral sample conditioning system designed to accept crude oil stream at 5.6 to 14 kg/cm<sup>2</sup> (80 to 200 psig), 15° to 50°C (60° to 122°F)
- Measurement frequency variable from continuous to on-demand
- Typical applications are locations where efficiency of crude oil desalting operations is required:
  - *desalting optimization*
  - *quality control monitoring*



## MEASUREMENT RANGE & REPEATABILITY

Select from one of three measurement ranges available:

0-15 PTB	$\pm 1.5\%$ ( $\pm 0.3$ PTB minimum)
0-100 PTB	$\pm 1.5\%$ ( $\pm 0.3$ PTB minimum)
0-400 PTB	$\pm 1.5\%$ ( $\pm 0.3$ PTB minimum)

Custom ranges are available.

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## THEORY OF OPERATION

The PSPI 45561 Salt-In-Crude Monitor determines salt content by measuring the AC conductivity of a crude oil solution and other petroleum products in a specialized solvent system.

Upon application of power to the analyzer, an initialization routine is activated. The crude valve is rotated to the “fill” position and the sample loop is filled with fresh crude oil. Simultaneously, the xylene and alcohol valves are rotated to the “deliver” position, and the cell drain solenoid is opened, pushing any liquid in the delivery lines thru the measuring cup and to the drain. After one minute of flushing, the drain valve closes, and the xylene and alcohol valves are rotated to the “fill” position. The solvent pumps are turned on to fill the volumetric loops with fresh alcohol and xylene. Any slop from the pumps is directed to the drain.

Once the initialization routine has been completed, the solvent pumps are turned off and the unit goes into “Standby” mode. The sample valve remains in the “fill” position to ensure a continuous flow of fresh crude oil through the analyzer. The analyzer is now ready to begin salt content measurements.

When a measurement is initiated, the xylene valve, alcohol valve and crude valve are all rotated to the “deliver” position. The delivery air solenoid is opened, allowing air to push the crude and solvents into the measurement cell. The test cell heater and stirrer are also energized. One minute is allowed for delivery of the sample. The valves are then rotated back to the “fill” position. The solvent pumps are activated, filling the volumetric loops with fresh xylene and alcohol. After replenishing the loops, the pumps are turned off.

Five minutes and 15 seconds into the measurement cycle, the stirrer and heaters are turned off and the conductivity of the crude/solvent solution is measured. The results are displayed on the local digital readout and output as both analog and serial signals.

Once the conductivity measurement has been completed, the stirrer is turned back on and the cell drain valve is opened, allowing the test solution to drain from the measurement cell. After 45 seconds, the stirrer is turned off and the drain valve is closed. The analyzer is now ready for the next measurement.

## SPECIFICATIONS

### Performance

- **Units of Measure:** User-selectable: PTB (Pounds per Thousand Barrels), mg/liter, or  $\mu$ S (micro Siemens)
- **Cycle Time:** Application dependent; typically 7 minutes per measurement
- **Ambient Temperature:** 0° to 40°C (32° to 104°F); weather protection required; no direct sunlight

### Sample Requirements

- **Maximum BS&W:** Raw crude - 1.0%, Desalted crude - 0.3%
- **Flow Rate:** 4.6 liters/minute minimum
- **Pressure:** 4.0 kg/cm<sup>2</sup> (60 psig) minimum, 14 kg/cm<sup>2</sup> (200 psig) maximum; regulated at the inlet to the analyzer at 1.75 kg/cm<sup>2</sup> (25 psig)
- **Temperature:** 15° to 50°C (60° to 120°F); sample conditioning system available for higher temperature samples. Consult PSPI for more details.
- **Fast Loop Return Pressure:** No sample recovery system required for return pressure up to 1.5 kg/cm<sup>2</sup> (20 psig) below inlet pressure
- **Measurement System Return Pressure:** Atmospheric drain required

### Utility Requirements

- **Electrical:** 110 or 220 VAC ( $\pm$ 10%), 50/60 Hz, single phase, 500 watts
- **Instrument Air:** Clean, dry instrument air at 5.6 to 17.5 kg/cm<sup>2</sup> (80 to 250 psig)
- **Measurement Solvents:** Xylene—Nitration grade (per ASTM D 843); Alcohol—37/63 mixture of Absolute Methanol and n-Butanol (reagent grade); Treating cartridge is required for alcohol
- **Cleaning Solvent:** Naphtha (per ASTM D 91)

### Signal Outputs

- **Analog Outputs:** One isolated 4–20 mAdc (standard); additional isolated 4–20 mAdc signal outputs available (optional)
- **Alarm Relays:** 2 SPDT fail-safe alarm relays (standard); additional alarm relay contacts available (optional)
- **Serial Output:** Current Loop (standard) or RS-485 (optional)
- **On Demand Analysis:** A dry contact closure from control room is required (standard)

### Area Classification

- **45561D:** NEC Class 1, Div 1, Groups C & D
- **45561E:** CENELEC components rated for Zone I Group IIC; **CE** compliant

### Dimensions & Weight

Uncrated:	H	W	D	units
340 kg (750 lbs)	1289	1524	1015	mm
	72	60	40	inches
Crated:	H	W	D	units
500 kg (1100 lbs)	2001	1651	1143	mm
	79	65	45	inches

### Optional Accessories

- **Sample Recovery System** collects and periodically returns analyzed sample to process line

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

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