

Powered by an extremely small source, the Thermo Scientific KRILPRO fills the need for an ALARA-compliant yet highly precise level/interface detection system. Rugged and reliable, it features neutron backscatter technology and is engineered to endure harsh environments to help you optimize your delayed coking operations and improve your profitability.

Thermo Scientific KRILPRO

Neutron Backscatter Foam Level/Interface Device



Features and Benefits

- Neutron backscatter enables measurement through thick-walled vessels of any diameter
- Extremely small source size is ALARA-compliant
- Non-contacting measurement unaffected by temperature, pressure, viscosity, corrosives and abrasives
- Continuous self-diagnostics provide instant check of system integrity
- Requires minimal maintenance and ensures no unnecessary downtime
- Precision of less than 0.5% of span

Applications

- Coke drum level
- Vacuum tower draw-off tray
- Amine contractor packed column
- Linear reaction polyethylene applications
- Interfaces

Rugged & Non-Intrusive

Backed by 30 years of engineering expertise, the Thermo Scientific KRILPRO meets the demand for a rugged, reliable, non-contacting level/interface system. With an ALARA-compliant reduced source size (100 mCi/3.7 GBq AmBe 241) and a drift-free sensor, this highly precise, next-generation gauge significantly enhances delayed coking operations. It uses an advanced detection technique that indicates vapors, foams, liquids and solids to provide rapid indication of process changes. With the KRILPRO, operators confidently maximize coke drum capacity while heightening process efficiency.

Increased Accuracy & Stability

A neutron source mounted in the sensor housing directs fast (high energy) neutrons through the steel vessel walls into the vessel interior. If hydrogen bearing material

is present, the fast neutrons are converted into slow (low energy) neutrons which are scattered back to the neutron sensor in direct proportion to hydrogen density. The detector's interface electronics receive and condition the sensor signal and communicate to the transmitter, providing a visual indication and an isolated 4-20 mA output that represents the level of interface within the vessel. This communication between the sensor and transmitter provides increased accuracy and stability.

Easy-to-Install & Service

Like all Thermo Scientific nuclear gauges, the KRILPRO is easy-to-install and service. The sensor mounts on one side of the coke drum and no component exceeds 45 pounds, making installation simple and cost-effective. The streamlined design also allows for rapid diagnostics and servicing of the unit.

Specifications

Coker Control Hybrid Solution

Refiners use the KRILPRO in combination with the Thermo Scientific LevelPRO and Thermo Scientific DensityPRO to create a comprehensive coker monitoring system from the fractionation tower feed line to the coke drum. The LevelPRO is a non-contacting continuous gamma level that reliably monitors foam level inside the upper portion of the coke drum. It provides vapor density compensation using gamma level to improve accuracy. Due to vapor densities varying in the coke

drum from cycle-to-cycle, vapor density correction is required to maintain the 0.5% accuracy of the continuous gamma level. The DensityPRO nuclear density gauge performs this mass balance calculation as well as uses the same gamma source as the LevelPRO to minimize the number of sources needed. Specifically engineered for control of coke drum operations, our Thermo Scientific devices ensure maximum process control while reducing anti-foam consumption and eliminating costly foam-over conditions.



**Thermo Scientific
LevelPRO**



**Thermo Scientific
DensityPRO**

Thermo Scientific KRILPRO

General Specifications

Moisture Gauge Head	3 components, none weighing more than 20.4 kg (45 lbs); Total weight 44.5 kg (98 lbs)
Response Time Constant	128 sec default, adjustable to 1024 sec
Radiation Source	100 mCi AmBe (3.7 GBq)
Source Decay Effects	Negligible. 432-year half-life
Surface Radiation	Less than 25 μ SV/hr at 5 cm from KRILPRO surface; Less than 2.5 μ SV/hr at 100 cm from KRILPRO surface
Sealed Source and Device Registry	Meets General License Device requirements (US)
Operating Temperature	-40°C to +80°C (-40°F to +176°F) CSA; -20°C to +70°C (-4°F to +158°F) ATEX
Power Requirements	\pm 15 VDC for the detector; 110 to 240 VAC or 24 VDC for the 1400A 'M' transmitter
Materials of Construction	Detector and source head: 316 Stainless Steel 1400A 'M' transmitter: NEMA 4X
Accuracy	Up to \pm 0.47%, depending on application
Approvals	CSA (C, US) approved for use in Class I Div 1, Groups B, C, D; Class I Div 2, Groups A, B, C, D; Class II Div 1, Groups E, F, G; Class III; Temp Code: T6; Encl. type 4X; Ta: -40°C to +80°C (-40°F to +176°F) ATEX approved for use in II 2 G IIC T3-T6; (T6: Tamb -20°C to +40°C); (T4: Tamb -20°C to +55°C); (T3: Tamb -20°C to +70°C)

Transmitter Specifications

System Architecture	Multiprocessor based electronics means uninterrupted output during data entry and system interrogation. Surface-mounted technology provides high degree of reliability. All user data doubly stored in non-volatile memory with no battery backup required.
Approvals	FMRC approved for use in Class I, Div. 2, Groups A, B, C, D; Class II, Div. 2, Groups F, G; Class III, Div. 2; NEMA 4X; CSA approved as above plus Class II, Div. 2, Group E; ENCL. TYPE 4X CE Mark: Compliant Low Voltage Directive: Compliant EMC Directive: Compliant
Display	Four-line backlit display; easy to use setup menus; displays up to eight readouts simultaneously
Current Outputs	4 to 20 mA isolated self-powered or loop-powered into 800 ohms, field scalable One (1) current output standard Up to three current outputs available, each representing independent span channels
Serial Outputs	RS 485 half duplex; RS 232 full duplex
Contact Closure Outputs	Up to 6 - 115 VAC/28 VDC SPDT @ 10 amps (230 VAC SPDT @ 8 A)
Inputs	4 to 20 mA linear; Dry contact closure
Programming Options	Menu-driven direct keypad entry
Mounting	Transmitter can be mounted up to 1000 ft (300 m) from the detector.

Commissioning included with the purchase of a detector. Contact Thermo Fisher Scientific concerning the disposal of sources from existing detectors.

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