

Thermo Scientific MOLA-LS

Moisture On-Line Analyzer for the Steel Industry

Designed to meet stringent nuclear regulatory compliance in Europe and China, the Thermo Scientific MOLA-LS uses patented pulse mode, ion chamber technology in conjunction with a 100 mCi source (3.7 GBq) to ensure repeatability of $\pm 0.47\%$. It optimizes blast furnace performance by determining the moisture content in metallurgical grade coke and/or iron ore pellets to improve your operations and profitability.



Features

- Stability over wide temperature range
- High accuracy and repeatability
- Minimum size isotope complies with international nuclear regulations
- Patented, state-of-the-art ion chamber design
- Low maintenance
- Easy to install
- Rugged design—able to withstand tough environments

Rugged & Non-Intrusive

The Thermo Scientific MOLA-LS is a moisture on-line analyzer that accurately and reliably measures the concentration of hydrogenous material in a process vessel. Engineered for use in Europe, China and other international markets, it is powered by patented neutron backscatter, pulse mode, ion chamber technology to non-intrusively measure the moisture content in metallurgical grade coke and/or iron ore pellets.

Improves Operations

Optimizing blast furnace performance is the key to improving operations and increasing profitability. The MOLA-LS is engineered to help steel mills effectively manage the most pressing process issues, including variability in coke size, differing amounts of surface moisture, harsh environmental conditions at the point of measurement and high coke volume.

Stable & Repeatable

Pulse mode technology allows for excellent stability and repeatability over a wide temperature range without the need for high voltages or temperature stabilization of the circuitry. The signal from the detector is sent to a 1400S transmitter where the calculations and density compensation (external input from density gauge) are performed. The output from the transmitter is a 4 to 20 mA signal that can be set in many different units of measurement to facilitate international usage.

Easy-to-Install & Service

Like all Thermo Scientific nuclear gauges, the MOLA-LS is easy-to-install and service. With no component exceeding 45 pounds, installation is greatly simplified. The streamlined design also allows for rapid diagnostics and servicing of the unit.

Technology

The MOLA moisture head consists of a radioisotope neutron source with appropriate shielding and an ion chamber neutron detector. The source emits high-energy (fast) neutrons which pass through the hopper wall into the process material and are scattered by repeated collisions with the other types of nuclei in the process material, including the hydrogen in the moisture.

While the fast neutrons lose little energy in collisions with carbon, oxygen and the other nuclei, collisions with hydrogen nuclei convert them to low-energy (thermal neutrons). The number of thermal neutrons produced is proportional to the density of the hydrogen in the process material.

The detector produces a current output for every thermal neutron that strikes it, generating a signal that is proportional to this hydrogen density. If all the hydrogen in the process material is contained in the moisture, or if there is a constant amount of hydrogen contained in other forms, the current rate from the detector can be calibrated in terms of weight of moisture per unit volume. This rate can be calibrated in terms of the percent-by-weight moisture if the bulk density of the process material is reasonably constant or if optional bulk density compensation is provided.

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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	4 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 MOLA-LS surface; Less than 2.5 μ SV/hr at 100 cm from MOLA-LS 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 1400S transmitter
Materials of Construction	Detector and source head: 316 Stainless Steel
Precision	\pm 0.47% (results on 2-in steel wall hopper) or better, 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; All user data doubly stored in non-volatile memory with no battery backup required
Display	Four-line backlit display; 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	RS485 half duplex; RS232 full duplex
Contact Closure Outputs	Up to 16-115 VAC/28 VDC SPDT @ 10 amps (230 VAC SPDT @ 8 A)
Inputs	Up to three additional I/O available; dry contact closure
Programming Options	Menu-driven direct keypad entry
Mounting	Transmitter can be mounted up to 2500 ft (762 m) from the detector
Power	AC Version: 100-240 VAC 50/60 Hz; Power = 17.2 W DC Version: 20-28 VDC; Power = 12 W
Approvals	NEMA 4X/IP65 ATEX: II 3 G Ex nA IIC T6 (-40°C \leq Ta \leq 60°C) DC version, EPSILON 08 ATEX 2387; II 3 G Ex nA nC IIC T4 (-20°C \leq Ta \leq 50°C) AC version, EPSILON 08 ATEX 2387 CSA: Class I, Div 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III Enclosure type 4X, Temperature code T3C/T4 Power = 20-28 VDC, 12 W, 100 to 240 VAC, 50-60 Hz, 2 Amp, 25 VA maximum; Ambient temperature variation -40°C to +60°C (-40°F to +140°F) CE compliant Low Voltage Directive compliant EMC Directive compliant

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

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