

Elemental analysis

Thermo Scientific MSA-430 Multi-Stream Slurry XRF Analyzer



6 Stream MSA-430 Multi-Stream Analyzer

The Thermo Scientific™ MSA-430 Multi-Stream Analyzer provides accurate, fast, cost-effective elemental analysis of up to 12 slurry streams. The information provided by the MSA allows plant operators to follow process trends in real time, enabling automatic or manual changes to optimize the process.

Features

- Advanced X-ray tube technology
- Latest energy dispersive X-ray detector
- Air cooled X-ray tube and detector that does not require liquid nitrogen or chiller
- High availability
- Accuracy and reliability
- 3 to 12 analysis streams
- Streams remain separate through the complete system
- Dedicated composite sampling included
- Low slurry head loss of less than 0.8m across the MSA

The MSA-430 Multi-Stream Analyzer takes advantage of the Thermo Scientific™ MEP-400 In Stream Analysis (ISA) probe with its modern ED-XRF technology Silicon Drift Detector (SDD) and X-ray tube. This eliminates the need for isotopes and cryogenic cooling requirements, significantly improving safety. Coupled with our integrated and dedicated sampling technology for exceptional sampling accuracy and analysis availability, the MSA-430 is highly versatile in slurry sampling and analysis, and a vital partner in process control.

The MEP-400 probe attains higher count rates than previous generations, with a more than 10x improvement in copper lower limit of detection compared to the MEP-300 model, enabling exceptional analyzer accuracy. Similar improvements are also realized for other base metals.

A further benefit of the MEP-400 probe is the long-life X-ray tube which requires less change-overs. An innovative Quick-Change window design reduces time needed for maintenance as well as the overall maintenance effort for operators. This also lowers the cost of ownership over the life of the mine.

MSA-430 Multi-Stream Analyzer sampling and sample presentation

The MSA-430 Multi-Stream Analyzer provides online analysis for 3 to 12 streams of slurry. Each of the streams to be analyzed by the MSA-430 system is provided with a dedicated analysis tank. The analysis tanks consist of a de-aeration zone, followed by an analysis zone and a cross-cut sampler. The standard 300-mm wide analysis tank can accept flows up to approximately 12 m³/hr. Wider tanks are available, which means flows up to 30 m³/hr can be analyzed, thus eliminating the need for primary samplers in some cases and providing enhanced sampler accuracy.

Sample return is simplified by the fact that the MSA-430 Multi-Stream Analyzer maintains separated sample streams from sample point to the analyzer and through sample discharge. The slurry head loss is less than 0.8 m across the MSA-430 analyzer. With proper plant design and layout considerations, numerous sample streams can be transported from the samplers to the MSA without sample transfer or return pumps.

The sampled or full flow process streams operate continuously, ensuring the most representative sampling and allowing the MSA-430 analyzer to take readings on any stream at any time without needing to wait for sample to be prepared.

Unlike a simple process stream sampler, the combination of the Thermo Scientific™ Samstat-30C Slurry Sampling Station with the MSA-430 analyzer provides full metallurgical accounting quality sampling. With such a setup, the full stream of up to 36,000 m³/hr is sampled down to the point where it goes into the MSA-430 analyzer and is then sampled to the shift composite bucket or optional vacuum filter.

The metallurgical sampler can be used for both shift and calibration sampling, automatically taking calibration samples for each stream.

MSA-430 Multi-Stream Analyzer benefits

The MSA-430 Multi-Stream Analyzer provides a valuable window into your mineral separation processes. The system provides stable, accurate, and reliable assays of core and nuisance elements in your slurry streams from calcium (Ca) to uranium (U). The quality of the information allows greater control of your process. When combined with experienced operators or an expert control system, the analyses from the MSA-430 analyzer can provide many benefits, such as:

- Enhanced process control
- Improved efficiency
- Reduced energy consumption
- Improved metal recovery
- Optimized reagent consumption
- Minimized amount of off-spec material in product

For a large base metal concentrator with AnStat-430 dedicated analyzers in the critical Feed, Concentrate and Tails streams, the MSA-430 Multi-Stream Analyzer can be used to provide online analysis to the intermediate streams within the rougher, cleaner and scavenger circuits.

For example, a 4 stream MSA-430 analyzer can be used within the cleaner circuit to provide quick assay updates for each of the cleaner feed, 2nd cleaner feed, cleaner conc and cleaner tails streams.

With careful layout, the 4 streams are gravity fed to the MSA-430 analyzer and then gravity returned, requiring no sample transport pumps.

A simplified sampling system that eliminates pumps reduces the capital costs for design, piping and pumps, as well as providing a reduction in ongoing pumping, maintenance and other operational costs.



Feed options for MSA-430. From left: Full flow process stream, gravity sampler, SamStat-30C and pressure sampler

MSA-430 Multi-Stream Analyzer Analysis - MEP-400 Multi Element Probe

The MEP-400 Multi Element Probe is a product of over 50 years of experience with immersion probe based in stream elemental analysis. It is the safest MEP ever, utilizing a fail-safe retractable shutter and controllable X-ray tube with automatic interlock and visual beacon to reduce the risk of radiation exposure for operators. This design allows for the radiation to be switched off when not in use or for maintenance. The new MEP-400 probe attains higher count rates than previous generations, with a better than 10x increase in copper lower limit of detection compared to the MEP-300 probe that makes exceptional analyzer accuracy possible. Similar improvements are also realized for other base metals.



**MEP-400
Multi-Element Probe**

Cross-cut sampler

- A final-stage, cross-cut sampler is located at the outlet of each analysis tank for calibration and composite sampling.
- It is environmentally hardened to minimize maintenance and maximize availability
- Optional vacuum filters are available.

Individual analysis tanks

- Designed to provide the best analysis with maximum amount of slurry measured (this reduces sampling error)
- Analysis sequence is programmable

Traverser and probe

- Traverser with pneumatic hoist moves probe to correct tank as required
- Safety lockout point located at control box
- Full set of safety interlocks on doors
- Raises probe on loss of air pressure



Thermo Scientific MSA-430 Multi-Stream Analyzer

Analysis performance

Number of streams	3-12	
Analysis time per stream	Typically, 1 minute	
Sample flow rate	Nominally 10m³/hr for standard tank, from 1m³/hr to 30 m³/hr	
Detection system	Silicon drift detector, peltier cooled. Typical resolution 132 eV at FeKα	
Excitation	X-ray Tube (ED XRF)	
Accuracy	All elements with atomic number above 20 (i.e., above Ca in the periodic table)	
	Assay range (% element by weight)	Relative error¹
	0.05 to 0.2	4%-6%
	0.2 to 1.0	3%-5%
	1 to 10	2%-4%
	10 to 80	1%-2%

¹Guide only; dependent on particle size, mineralogy and matrix variations

Utilities required

Electrical power	Factory selectable 360-600 Volts AC $\pm$ 10%, 3-phase, 48-62 Hz $\pm$ 2 Hz (3 wire plus earth) Maximum power consumption: 3-stream, 1.8kW; 6-stream, 2.9kW; 9-stream, 3.8kW – with standard 250W stirrer motors
Air	Instrument Air, ISO 8573.1 Class 3, 4, 3, Dewpoint <3°C. Pressure 550 kPa minimum, 1000 kPa maximum, nominal 600 kPa (87psi). Consumption: maximum flow rate 420 SLPM
Water	Clean plant water. 300 – 800 kPa Individual tank sprayers: 3.8 L/min per tank @350 kPa. Probe spray ring - 0.15 L/min @350 kPa
Communications	Ethernet TCP/IP: 100 MBps. Remote login to WinISA computer recommended. Reserve Static IP addresses: One for WinISA server and one for each analyzer

Environmental

Operating temperature (Ambient)	-10°C to 55°C (measured at enclosure surface temperature, temperature to not exceed 55°C)
Operating temperature (Process fluid)	0°C to 45°C
Temperature – MEP-400 Probe, ambient	0°C to 55°C
Humidity	0 to 95% RH - non-condensing
Vibration	< 0.5G at installation tank supports