

ONLINE ELEMENTAL ANALYSIS

XRF

Multi-Stream Slurry Elemental Analyzer



EDXRF / SINGLE + MULTI-STREAM / SDD

Online X-ray fluorescence analysis for slurry grade monitoring, from single-stream measurement to engineered multi-stream sampling and process-control integration.

01 / PRINCIPLE & SYSTEM

From sample to process insight

Crismian XRF identifies elements and estimates their concentrations from the energies and intensities of characteristic X-rays emitted by a slurry sample. Energy-dispersive analysis follows the relationship between atomic number and characteristic X-ray energy described by Moseley's law. Results are displayed online for metallurgy, mineral processing and chemical engineering applications.

One connected analysis chain

01

Sample

Process sampling and flow conditioning

02

Select

Multiplexer and representative measuring cell

03

Analyze

X-ray excitation, SDD detection and spectrum processing

04

Return

Demultiplexer and process return

Local display / Host computer / PLC and central control / Remote service

General product-family data and an 11-stream engineering duty are shown separately. Project values are requirements for configuration review, not guaranteed standard ratings. Final performance depends on the sample matrix, mineralization, particle size and agreed calibration.

02 / FEATURES & APPLICATIONS

Designed around the sample

Faster grade visibility

Conventional laboratory routes can require sampling, drying, sieving, grinding and preparation before assay. Online XRF shortens this delay; the literature describes 1-3 minutes per stream, with a configurable 1-minute reference measurement.

Spectral separation

Nuclear-electronics and spectrum-processing methods analyze complex spectra from multiple excited elements and compensate for inter-element interference.

Built for process variation

The product literature describes adaptability to particle-size, concentration, bubble, flow-speed and stratification changes. Validate these effects against the actual slurry and calibration, rather than treating them as zero-error conditions.

Application areas

Copper flotation circuits / Lead-zinc beneficiation / Iron-ore grade monitoring / Metallurgy and mineral processing / Chemical-process slurry analysis

A representative measurement

The measuring cell is arranged to maintain fluidity and even mixing, so the analyzed sample more closely reflects the process slurry. Sampling and conditioning remain essential to the final result.

Practical detector technology

The SDD design provides high resolution and count rate at room temperature, avoiding the liquid-nitrogen arrangement described for conventional lithium-silicon detection. This reduces the associated field-maintenance burden.

Operation and maintenance

Local display, operator software, stable measurement and convenient servicing support continuous operation. A host computer can connect visualization, central control and remote-service functions.

03 / PRODUCT FAMILY DATA

General measurement performance

PARAMETER	TECHNICAL DETAIL
Measurement time	1 min reference, configurable; application description also cites 1-3 min per stream
Element coverage	Atomic numbers 20-92 in the general energy-dispersive family description
Concentration range	0.01-100% in the general product table
Typical precision	RSD 1-4% for high grade; RSD 3-6% for low grade
Ray-count repeatability and long-term stability	≤0.3% in the general product table
Process temperature	0-50 °C, continuous flow
Ambient temperature	-20 to +50 °C
Ambient humidity	The supplied table prints "0-90 °C, non-condensing" under humidity; unit requires confirmation
Detector	High-resolution, high-count-rate silicon drift detector (SDD)

Accuracy and relative standard deviation are different metrics. General RSD figures are not equivalent to the project accuracy requirement. The humidity unit is reproduced as an unresolved source-data item and must be confirmed.

04 / PROCESS REQUIREMENTS

An 11-stream project duty

Reference design requirements - not standard guaranteed ratings. The line schedule includes one spare input.

PARAMETER	TECHNICAL DETAIL
Quantity / installation	1 analyzer system; indoor, inline installation; continuous duty
Site altitude	1,875 m above sea level
Site design temperature	-15 to +40 °C
Identification	Stainless-steel tag with equipment tag number; analyzer tag to be assigned
Sample medium	Various slurry sample streams
Stream capacity	11 input lines, including one spare; final operating-stream schedule to be confirmed
Flow per stream	Up to 6 m ³ /h
Feed particle size	D80 = 40 µm
Slurry density	1.0-1.4 t/m ³
Solids density	4 t/m ³
Solids content	15-35%

11 INPUT LINES / 4 RETURN DESTINATIONS / 30-60 s REQUESTED PER STREAM

05 / SAMPLE-HANDLING PACKAGE

Sampling and return routing

PARAMETER	TECHNICAL DETAIL
Copper grade range	0.17-35% in the concentrate duty
Stream temperature	Ambient
Stream pressure	0-3 barg
Stream pH	Neutral
Analysis time per stream	30-60 s requested; subject to configuration confirmation
Sampling / analysis	Automatic sampling, shift sampling and automatic analysis
Process connection	2-inch Class 150 RF flange, ASME B16.5; final confirmation required
Wetted materials	Stainless steel 316Ti requested; confirm chemical and abrasion compatibility
Multiplexer supply	Fully wired and ready for 11 lines, with interconnection piping/tubing, sample-handling station and analyzer
Demultiplexer / return routing	Required; route the active input stream to one of 4 output streams

Named sampling points

01 Rougher feed	05 Cleaner feed
02 Rougher 1st and 2nd cell concentrate	06 Cleaner concentrate / re-cleaner feed
03 Rougher concentrate	07 Cleaner tail
04 Rougher tail	08 Re-cleaner concentrate

Eight sampling-point descriptions are named, but 11 input lines are requested. Finalize the detailed stream allocation and spare assignment during engineering.

06 / PROJECT PERFORMANCE

Analyzer configuration requirements

PARAMETER	TECHNICAL DETAIL
Measurement principle	EDXRF or WDXRF requested as alternatives; the general family description uses EDXRF
Element requirement	Aluminum to uranium requested; this differs from the general Z20-92 coverage and needs confirmation
Analytes / channels	Fe, Cu and Mo; sulfur content by indirect analysis only; 4 measurement channels with one spare requested; final allocation to be confirmed
X-ray tube voltage / current	30, 45 or 50 kV; 0.3-1.0 mA; confirm selected source
Pulse count rate	Up to 50,000 pulses/s requested
Relative accuracy	Typical 0.5-1% requested, dependent on matrix composition, mineralization and particle size
Repeatability	σ <1% requested
Stability	0.1% requested
Measurable concentration range	0.001-100% by weight requested; confirm against general 0.01-100% data
Analyzer enclosure	IP65 requested
Calibration sampler	Integrated calibration sampler required
Cleaning system	Automatic; final design to be confirmed
Output signal	4-20 mA
Electrical conduit entry	1 inch requested; final confirmation required

Confirm ED / WD technology, aluminum coverage, indirect sulfur analysis and spare-channel allocation together. The requested range and performance values require configuration-specific acceptance criteria.

07 / COMMUNICATION & UTILITIES

Control and plant integration

PARAMETER	TECHNICAL DETAIL
Local PLC package	PLC, I/O cards, front-door keyboard and 22-inch LED monitor; TCP/IP, Profibus DP and hardwired 4-20 mA connections requested
Remote workstation	PLC/I/O interface, front-door keyboard and 22-inch LED monitor; TCP/IP, Modbus / Profibus DP and hardwired 4-20 mA requested
Architecture functions	Sampler, flow / conditioning system, analyzer, sample return, host computer, operator display, central control and remote service; OPC shown in the architecture
Instrument-air supply	Supply specification, pressure and temperature to be confirmed
Water supply	Water specification, pressure and temperature to be confirmed
Multiplexer / demultiplexer air consumption	To be confirmed
Multiplexer / demultiplexer flushing water	To be confirmed
Analyzer flushing water	To be confirmed

Iron-grade configuration

An iron-grade configuration in the product literature uses a high-energy X-ray tube to excite iron in slurry and determine Fe content by energy dispersion. It is described for feed, concentrate and tailings monitoring in iron concentration. The detector does not directly contact the slurry, helping reduce wear; the excitation source is an electrically generated X-ray tube rather than a radioactive-isotope source. The cited count-rate repeatability and long-term stability are <0.2% (1 σ), specific to this iron-grade description. Modular construction, automatic-control support and application-specific design aid installation and maintenance. Confirm this configuration separately from the multi-element package.

08 / MOTOR - ELECTRICAL DUTY

Agitator drive package

PARAMETER	TECHNICAL DETAIL
Reference motor tag / duty	33-XZ-01; one working package, no standby package; final tag and quantity to be coordinated with 11 agitators
Motor site / classification	Abrasive copper-smelter duty; safe area; reference site named Khatoon Abad
Motor ambient temperature	-15 to +40 °C
Relative humidity, max / min / average	76 / 11 / 35%
Efficiency / duty / service factor	Minimum IE2; S1; service factor 1.15 subject to confirmation
Motor standards	IEC 60034, IEC 60072, IEC 60079 and IEC 60085 listed as project requirements
Motor type / rotor winding	Asynchronous induction motor; squirrel-cage rotor
Insulation / temperature rise	F / B
Phases / voltage	3-phase, 400 V $\pm 10\%$ selected; 1-phase and 230 V not selected
Frequency / winding connection	50 Hz $\pm 5\%$; delta selected, star not selected

The reference motor tag and package quantity must be coordinated with the 11 separate 0.37 kW agitator drives. Final current, efficiency, site derating and starting data remain subject to engineering.

09 / MOTOR - INSTALLATION

Motor protection and mechanics

PARAMETER	TECHNICAL DETAIL
Agitator power	11 × 0.37 kW, one agitator per multiplexer line; confirm final motor rating
Poles / speed	4 poles; synchronous speed 1,500 r/min; actual rated speed to be confirmed
Drive / starting	No VSD selected; DOL starting selected; variable-speed range not applicable
Permitted starts, cold / hot	3 / 2
Cable construction	CU/PVC/PVC
Motor / terminal-box protection	IP55 / IP55 selected; IP65 alternative requires confirmation
Noise at 1 m	Maximum 85 dB
Housing / rotor materials	Cast-iron enclosure; copper rotor material listed
Cooling / fan supply	TEFC / IC411 selected; IC416 not selected; fan 230 V, 1 phase, metal; fan power to be confirmed
Rotation	Both directions selected, viewed from drive end

Conditional motor provisions

The motor sheet also contains conditional provisions for other motor sizes: PTC winding sensors for VFD motors or 45-132 kW motors; above 132 kW, two Pt100 sensors for bearings and two per winding; a space heater for motors ≥45 kW at 230 V / 1 phase with load to be defined. These clauses do not automatically apply to the listed 0.37 kW agitators. Bearing / shaft vibration measurement and the auxiliary-circuit terminal box require engineering advice.

10 / FINAL CONFIGURATION REVIEW

Complete the engineering brief

PARAMETER	TECHNICAL DETAIL
Analyzer mechanical package	Body material; final type, model and size; height, width, length; general-arrangement drawings; erection mass and total empty mass
Communication and utilities	Final data-communication implementation, instrument-air conditions, water conditions and all air / flushing-water consumptions
Motor identification	Manufacturer, year of construction, country of origin, final tag and quantity
Motor electrical data	Site derating, rated current, power factor and efficiency at 100/75/50% load
Motor starting data	Starting-current ratio; locked-rotor current, torque and time; cold/hot starting-time limits; rated, starting, maximum and breakdown torque; inertia GD ²
Motor installation	Cable-entry thread, gland type/size, mounting orientation, coupling method, terminal-box location, dimensions, mass and paint color

Note 1 items in the supplied duty must be specified, confirmed and finalized by the vendor. Note 2 items require vendor advice. Missing dimensions, masses, utility consumptions and approvals have not been invented.

Lead-zinc application context

The supplied technical literature describes a lead-zinc application at Xitieshan, Western Mining, commissioned in 2019. Variable Pb/Zn grades made timely feedback valuable for stabilizing production, improving product compliance and reducing cost. The report describes stable operation, minimal maintenance and no false measurements or fault stops during its reporting period. This is a literature application example, not a Crismian installation reference or a guarantee of future operating results.

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