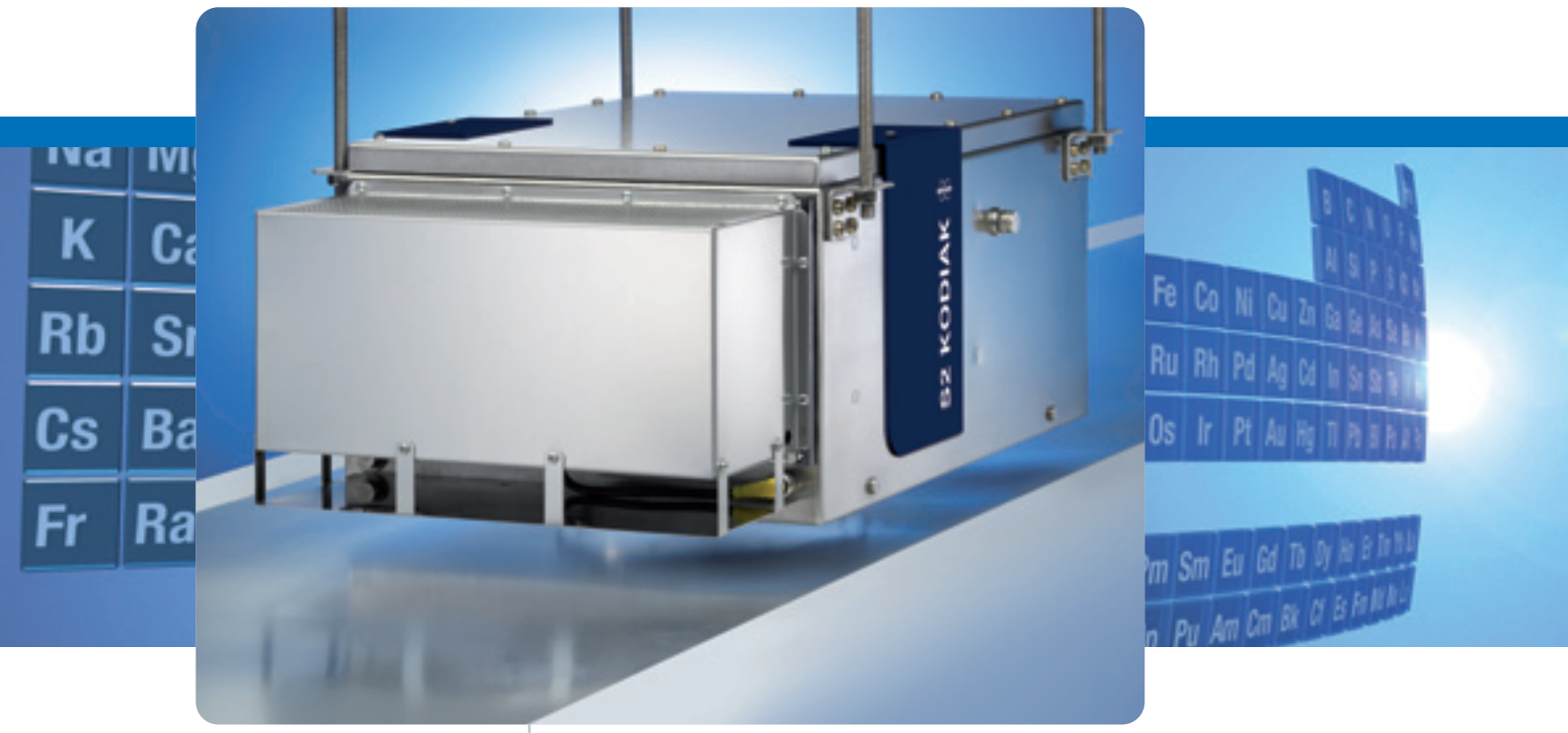


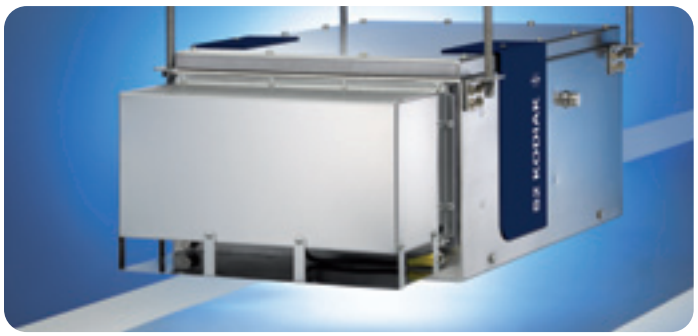
S2 KODIAK

- REAL-TIME COATING ANALYZER FOR METALS, PAPER, GLASS, POLYMERS, SOLAR CELLS AND ELECTRONICS

XRF

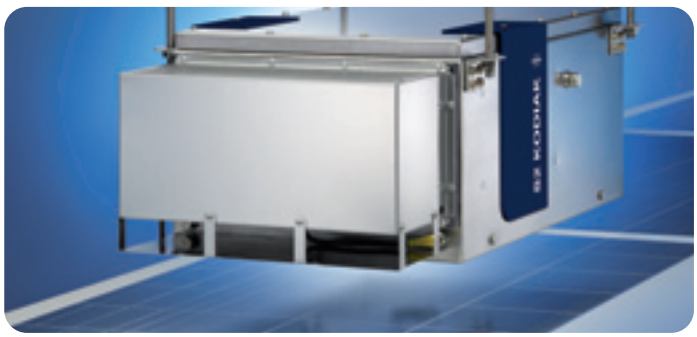
Innovation with Integrity

KODIAK - Good catch from the stream



S2 KODIAK: Galvanized steel

Beam Path S2 KODIAK



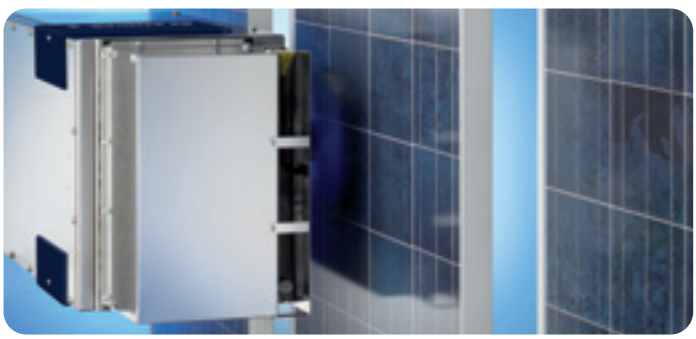
S2 KODIAK: Multilayer coatings for solar cells, wafers and touch panels

Rugged Design (Stainless Steel)

Galvanized steel coils

Safeguards: X-ray tube and detector

Coating of sheet metal



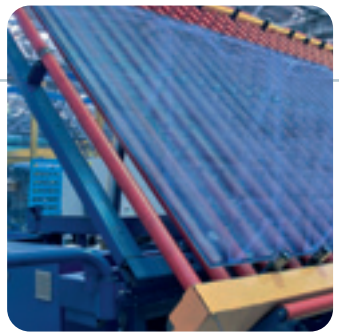
S2 KODIAK: vertical analysis of solar cells

Integrated camera and height sensor

Coating test sample

Sheet metal with decorative coatings

Hot metal



Coated glass

Coated polymere foils

The right solution, right away – S2 KODIAK!

High quality results for elemental composition and layer thickness – instantly, at any time, with the performance you need – thanks to S2 KODIAK.

The current and future demands for online analysis of coating processes are answered by the elemental analyzer S2 KODIAK. Whether you are analyzing galvanized sheet metal, aluminum with decorative coating, glass or polymers with functional single or multilayer systems and electronic components (such as ITO panels or solar cells), the S2 KODIAK delivers all essential information about the purity, layer thickness and area density in real time.

Based on energy-dispersive X-ray fluorescence technology, the S2 KODIAK is the ideal choice to act as a thickness gauge and element sensor for coating processes. Capable of providing information about elemental concentrations (majors, minors and traces from 100% down to a few PPM) and layer thickness (nm to mm) in real-time, the S2 KODIAK can send information back to plant and process automation to make necessary adjustments ensuring that your product is consistently of the highest possible quality.

The advanced software of the S2 KODIAK is optimized for online analysis. The advanced features (hardware and software) of the S2 KODIAK mean that it can adapt to the changing sample properties passing underneath it, eg. sensors built into the instrument constantly measure the height of the sample and feed this into the evaluation software to account for changes in observed intensity due to the changing distance.

The S2 KODIAK is mounted above the moving material. The X-ray radiation excites the elements in the substrate and layers; the emitted fluorescence radiation from the elements is detected with an energy dispersive silicon drift detector. Today these detectors operate maintenance-free, requiring only thermoelectric cooling (the Peltier effect). The S2 KODIAK can withstand the harsh environmental conditions in a coating line and is completely dustproof. The advanced cooling system of the S2 KODIAK protects all system components and means that the instrument can withstand temperatures above 60 °C. The integrated UPS means that should the power supply fail, the system shuts itself down to a safe state. With automatic self-alignment, the S2 KODIAK delivers constant high-quality results.

No radioactive targets, integrated safety and ≥ 98 % uptime – in short: S2 KODIAK.

The S2 KODIAK uses an advanced safety circuit that ensures the unit is completely X-ray safe at all times. Most importantly, in contrast to other techniques, the S2 KODIAK operates without radioactive targets. Installation, setup, approval from authorities, and maintenance are becoming simple jobs. An integrated camera allows checking of the material flow below the analyzer or visual inspection of the tube and detector shielding. The S2 KODIAK's software enables remote checking and maintenance of the unit. Easy access to all system components allows our worldwide service network to quickly maintain the unit and to ensure instrument uptimes of 98% or more.

The benefits are clear: The S2 KODIAK delivers excellent real-time information about all process-relevant elements in your plant, constantly, instantly and completely safe.

Coated aluminium

Paper coatings

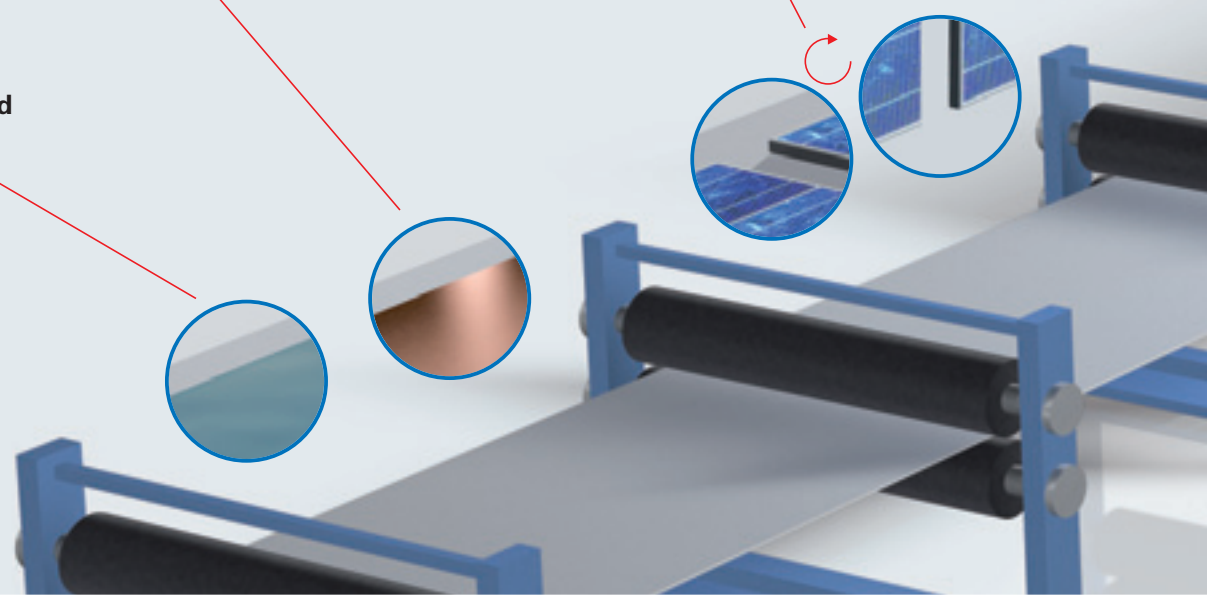
Solar cells

S2 KODIAK Online

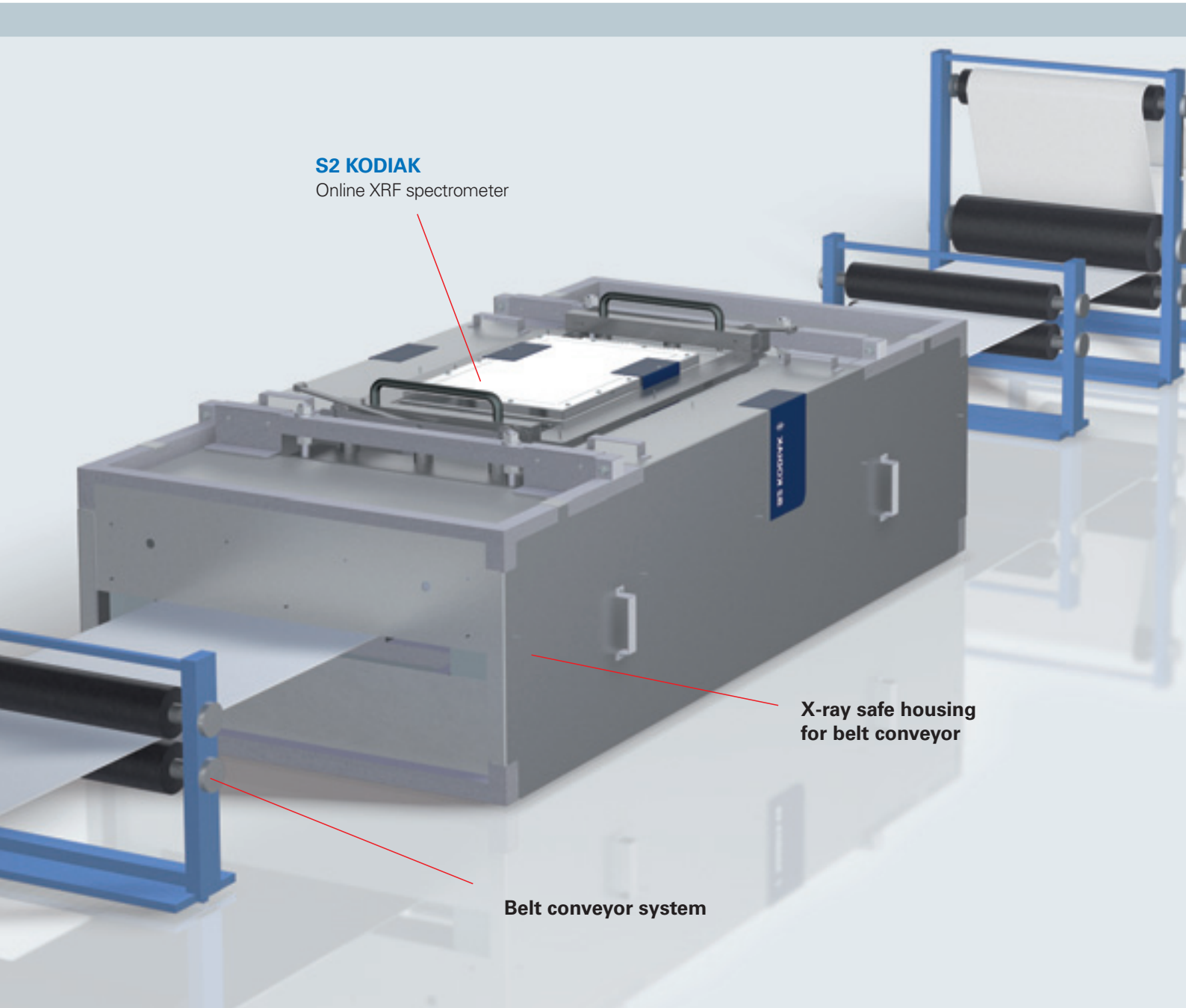
Solar cells
Mounting in all directions –
horizontal or vertical

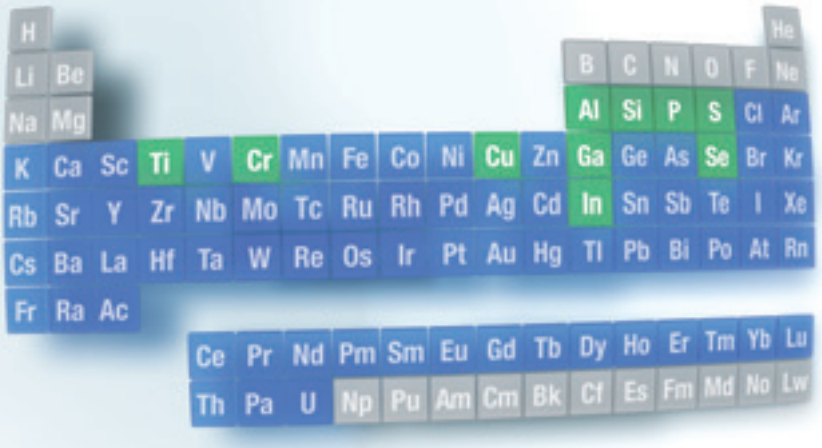
Single Coating on metals

Multilayers and substrates



- Online multi-elemental analysis with XRF
- Real-time control of thickness and area density of single and multiple layers
- Simultaneous analysis of the elemental composition of layers (major, minor and trace elements)
- Inline control of coatings on metal, glass, polymers and ceramics
- Autonomous operation 24/7
- Integrated UPS, camera and distance sensor
- Optimal occupational health and safety, operates without radioactive sources
- Integrated online analyzer with TCP/IP data transfer to any plant control SW
- Maintenance-free operation, operates with electrical power only
- Encapsulated, rugged design with stainless steel housing
- Optimal results with fully featured analytical X-ray evaluation software
- Empty line recognition
- Distance compensation
- Automated self-alignment and data quality check
- High resolution state-of-the-art detector





S2 KODIAK – the Perfect Fit for Real-time Process Control in Coating.

The S2 KODIAK is perfectly suited for online process control in all kinds of coating processes. By measuring the exact material composition and layer thickness (or area density) at any time, the coating process can be optimized for product quality and cost efficiency. Real-time control of the coating process ensures a constant layer thickness establishing the specified minimum coverage of the material.
This ensures a complete protection of the material, in case of sheet metal, or functionality in case of touch displays, solar cells or similar materials. At the same time that the S2 KODIAK analyzes the thickness of single or multiple layers, it also delivers information about the material composition to ensure that the coating is homogenous and not contaminated. The S2 KODIAK works for steel or aluminum sheet metal, glass, polymer films, ITO coatings or coated paper.

The S2 KODIAK is suited for almost every coating system: The composition and layer thickness is either measured directly based on the emission of the elements from this layer or based on the absorption of the elements from a layer below or the substrate itself. Due to this principle and the enhanced evaluation software with fundamental parameter corrections the S2 KODIAK analyzes the elemental concentrations and layer thickness at the same time, from ppm to % and from nm to mm. With its advanced cooling system the S2 KODIAK can be brought closely even into hot processing lines. With the integrated distance sensor the S2 KODIAK can even work in case of material height variations.

The S2 KODIAK comes in three different setups providing the optimum geometry to analyze smaller spot sizes when positioned close to the material or for larger spot sizes with a distance of more the 30 cm.

Enhance your coating process, improve quality and achieve significant cost savings – S2 KODIAK!

One of the most challenging processes in industry is the coating of advanced materials: Thin layer systems are used to protect valuable material, making it resistant to environmental impacts whereas multilayers are crucial to the functionality of solar cells and some electronic components. In all these production processes, the coating speed, precision of layer thickness and composition of the layer are critical to cost efficiency and yield. Therefore real-time analysis of the thickness and the element concentrations in every single layer and the substrate is vital reaching both goals.

Online analysis with our S2 KODIAK – Meet the future of process control

Functional coatings are the key to better products and gateway to new technologies and protective coatings are essential for the resistance of materials against environmental conditions. For example galvanized steel or anodized aluminum enable the cost efficient construction of machinery for long-term outdoor usage. Cardboard must be coated with aluminum or polymer coatings for food packaging. New technologies such as solar cells, touchscreens and data storage rely on precisely manufactured functional coatings. The perfect fit to analyze both, thickness and composition of single or multiple layers is XRF. The analytical precision of XRF guarantees, that coating systems are working with the utmost efficiency.

The S2 KODIAK offers seamless integration into plant control software which allows it to deliver immediate results back to process machinery. This is of critical importance if the process is to be controlled efficiently. In addition, working safety is an important topic; conventional systems are based on prompt gamma neutron activation analyzers (PGNAA) and require extensive shielding and strict safety regulation. Not with the S2 KODIAK: X-rays are emitted in operation only, simple shielding and the safety circuit ensure the highest safety level, 100% of the time.

S2 KODIAK – on duty, online, 24/7

The S2 KODIAK online XRF analyzer delivers reliable, 'real-time' results for both elemental composition and thickness and is capable of running in a production environment 24/7. It measures processed material non-destructively, without sample preparation meaning that the S2 KODIAK is the ideal instrument for online process control. Maintenance-free and with few installation requirements, the S2 KODIAK is easily integrated into industrial processes.

Element/ Compound	Layer Thickness	Typical Application
16 S	1 to 20 µm	Anodized coating on aluminum
14 Si	10 to 100 µm	Silicone coating on paper
15 P	5 to 100 µm	Passivation coating and pretreatment on steel
24 Cr	0.05 to 600 µm	Passivation layer on galvanized steel
13 Al	5 µm	Metallized coating on polymers for food packaging
22 Ti	5 µm	Decorative coating on steel, hardening of metal surfaces
CH_2	5 to 20 µm	Protection of cardboard packaging for food
31 Ga 29 Cu 49 In 34 Se	3 to 7 nm	Solar cells (CIS)

Technical Data

Analytical Specifications	
Detector type and energy resolution	Maintenance-free, Peltier-cooled Silicon Drift Detector (no LN_2 supply)
Close geometry	
Spotsize	~ 30 mm
Small distance	< 5 mm
Range of detectable elements	Silicon (Si) to Uranium (U)
Medium geometry	
Spotsize	~ 60 mm
Small distance	< 5 cm
Range of detectable elements	Calcium (Ca) to Uranium (U)
Large spot size	
Spotsize	~ 160 mm
Large distance	< 30 cm
Range of detectable elements	Titanum (Ti) to Uranium (U)
Analysis precision	Depends on application; typically between 1% (relative) and 1% (absolute) for compound concentration range 0.5% to 90%. Coating thickness in the nm range, material dependent.
Measurement time	Configurable (1 s – 1 h) based on the required accuracy
Technical Specifications	
Mains supply voltage	95 … 264 VAC
Maximum power consumption	max. 900 VA
Surge according to EN61000-4-6	Installation class 3
Overvoltage category acc. to IEC 664	II
Connection data transfer	TCP IP, RS 232 data transfer protocol with AXS-COM to communicate with plant control software
Dimensions	29.0 cm (21.4") x 91.7 cm (36.1") x 40.0 cm (15.7"), 70 kg (154.3 lbs) (height x width x depth, weight)
Control box (optional)	50.0 cm (19.7") x 45.0 cm (17.7") x 19.0 cm (7.5"), 10 kg (22.0 lbs) (height x width x depth, weight)
Environmental Specifications	
Operating temperature range	Standard: -25°C – 50°C, Extended: -25°C – 60°C
Operating altitude	Standard: 0 to 3000 m, Extended: -2000 to 4000 m
Enclosure protection class	Storage/cleaning mode: IP69K; Acquisition mode: IP65
Radiation leakage	< 1 µSv/h at 10 cm from the side and top surfaces

Bruker AXS GmbH

Karlsruhe · Germany
Phone +49 (0)721-50997-0
Fax +49 (0)721-50997-5654
info.baxs@bruker.com

www.bruker.com