NEXOL

Elemental analysis by X-ray fluorescence

Multi-element process analyzer

Rigaku

Applied Rigaku Technologies, Inc.

Compact multi-element process analyzer for liquid streams or fixed position web applications

Featuring advanced third generation energy dispersive X-ray fluorescence (EDXRF) technology, the Rigaku NEX OL represents the next evolution of process elemental analysis for liquid stream and fixed position web or coil applications. Designed to span from heavy industrial through to food grade process gauging solutions, the NEX OL is configurable for use in both classified and non-classified areas.

Analyze from aluminum ($_{13}$Al) to uranium ($_{92}$U)

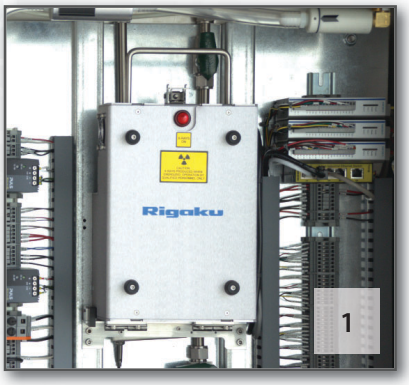
To deliver superior analytical performance and reliability, the EDXRF measuring head assembly was derived from the established Rigaku NEX QC^{+} high resolution benchtop instrument. With this proven technology, the Rigaku NEX OL delivers rapid, non-destructive, multi-element analyses — from parts-per-million (ppm) levels to high weight percent (wt%) concentrations — for elements from aluminum ($_{13}$Al) through uranium ($_{92}$U).

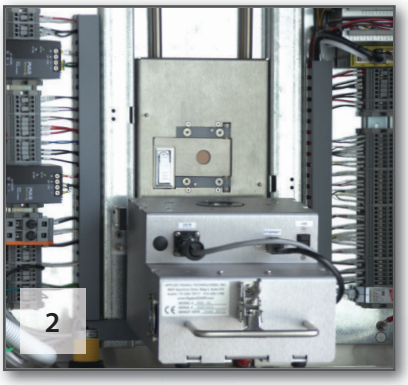
NEX OL features and benefits

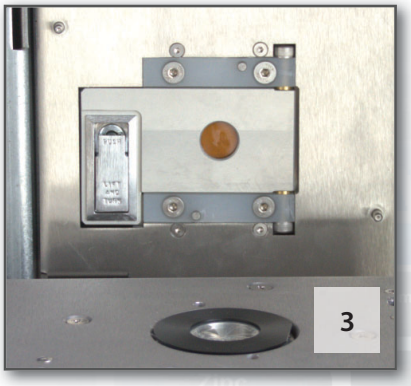
- **Real-time process control by elemental analysis**
- **Measure elements aluminum ($_{13}$Al) to uranium ($_{92}$U)**
- **From ppm levels to weight percent (wt%) concentrations**
- **Optical kernel includes 50 kV X-ray tube with SDD detector**
- **Industrial touch screen user interface**
- **Easy empirical calibration and routine operation**
- **Routine maintenance typically requires no tools**
- **Multiple remote analysis heads for non-classified areas**
- **No dangerous radioisotopes**

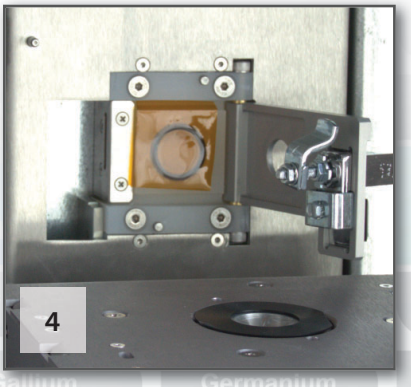
Unique toolless flow cell design

For the elemental analysis of liquid streams, an analyzing head is mated to a unique toolless flow cell assembly incorporating the X-ray window. The X-ray window contains the liquid stream but is transparent to X-rays; it is typically a plastic film. As illustrated below, routine replacement of the plastic X-ray film is a simple process: isolate and drain the flow cell (1), then flip the release latch and lower head (2); release flow cell door latch (3) and open door to replace film (4). Reversing the steps brings the head back to operational status. This basic routine maintenance procedure can be accomplished in just a few minutes and without any tools.

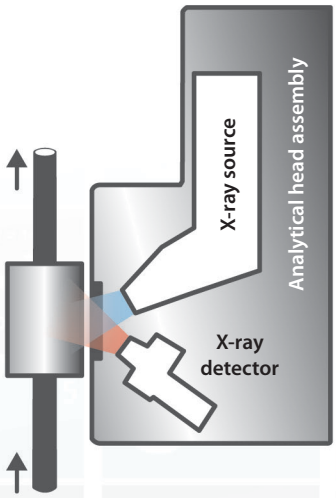








Flow cell for liquid streams



Broad range of applications

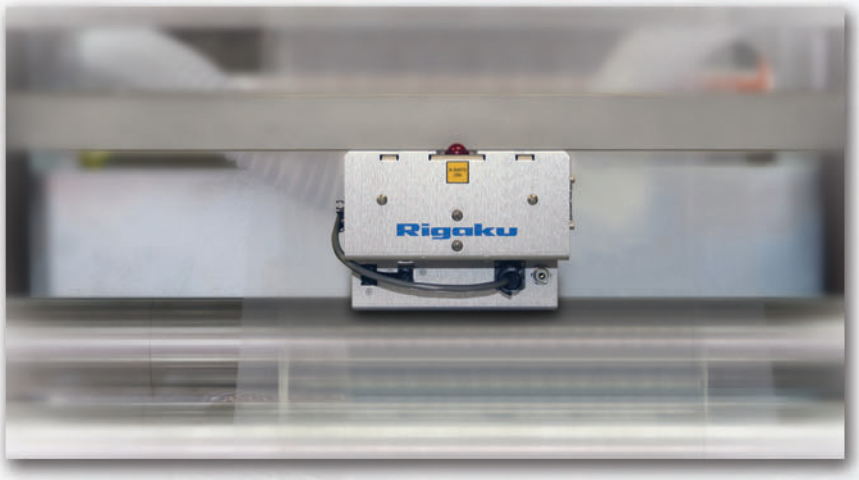
Equipped with a 50 kV X-ray tube and SDD detector — together with a standardized, optimized suite of tube filters — the Rigaku NEX OL is engineered to solve a broad range of process control applications. Some of the most common applications include:

- **Polyethylene / PET manufacturing: TPA and PTA catalysts**
- **Metal finishing: plating, pickling and pre-treatment baths**
- **Mining: solvent extractions**
- **Chemicals: blending additives and resins**
- **Paper and plastics: release / barrier coatings, fire retardants, UV stabilizers**
- **Woven and nonwoven fabrics: fire retardants, UV stabilizers**
- **Metals: conversion coatings, other surface coatings**
- **Petroleum: lubricating oil additives and blending**
- **Pulp and paper: process water**
- **Industrial: waste water**

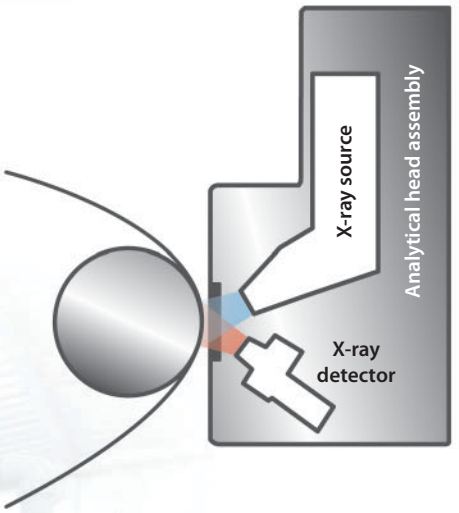
Proven technology and performance

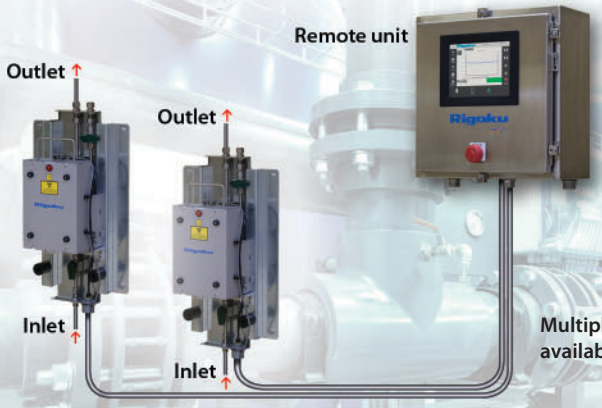
Coating thickness and composition

In addition to analyzing liquid streams, the Rigaku NEX OL is designed to service web and coil applications, with the ability to perform multi-element composition and/or coating thickness. Typically a head is mounted in a fixed position over a roller so that the head-to-surface distance is constant. Whereas elemental composition is measured directly, coating thickness may be measured directly (where counting rate for an element is proportional to thickness) or indirectly by measuring attenuation of some substrate element (where counting rate is negatively correlated to thickness).



Fixed roller mount for web coils





Multiple remote analysis heads available for non-classified areas

XRF technique

With X-ray fluorescence (XRF), an electron can be ejected from an inner atomic orbital by the absorption of light (photon) from an X-ray tube. An electron from a higher energy orbital transfers to fill the vacant orbital. During this transition, a photon may be emitted. Because the energy difference between two specific orbital shells is always the same for a specific element, the emitted photon will always have a unique characteristic energy (keV). At any characteristic energy, the number of photons per unit time (counts per second) detected is correlated to the concentration of that element in a process stream.

Backed by Rigaku

Since its inception in 1951, Rigaku has been at the forefront of analytical and industrial instrumentation technology. Today, with hundreds of major innovations to our credit, the Rigaku Group of Companies are world leaders in the field of analytical X-ray instrumentation. Rigaku employs over 1,400 people worldwide in operations based in Japan, the U.S., Europe, South America and China.

Specifications

Elemental coverage:
- Aluminum (Al) to uranium (U)
- Multi-element analysis

Analytical head:
- Toolless removal
- Quick disconnects for all connections
- Toolless X-ray window

Excitation:
- 50 kV X-ray tube
- 4 W max power
- 6 tube filter positions

Detection:
- Silicon drift detector (SDD)
- Thermoelectrically cooled

Liquid flow cell:
- Application specific body material
- Toolless flow cell window change
- Leak sensor

Available configurations:
- Self-contained one box analyzer
  - liquid flow cell
- Control unit box plus remote analyzer head
- Multiple remote heads (non-classified only)

Communications:
- MODBUS over Ethernet

Discrete outputs:
- Process results - 4 – 20 mA
- Application indicator - 4 – 20 mA
- Alarm - Relay
- Warning - Relay
- Leak alarm - Relay
- Process alarm - Relay
- On-Line state - Relay
- Measure state - Relay

Discrete inputs:
- Application select - 4 – 20 mA input
- Flow – 4 – 20 mA input
- Temperature - 4 – 20 mA input
- Pressure - 4 – 20 mA input
- Collect sample – Digital Input
- On-Line/Off-Line request – Digital input
- Start analysis request – Digital input

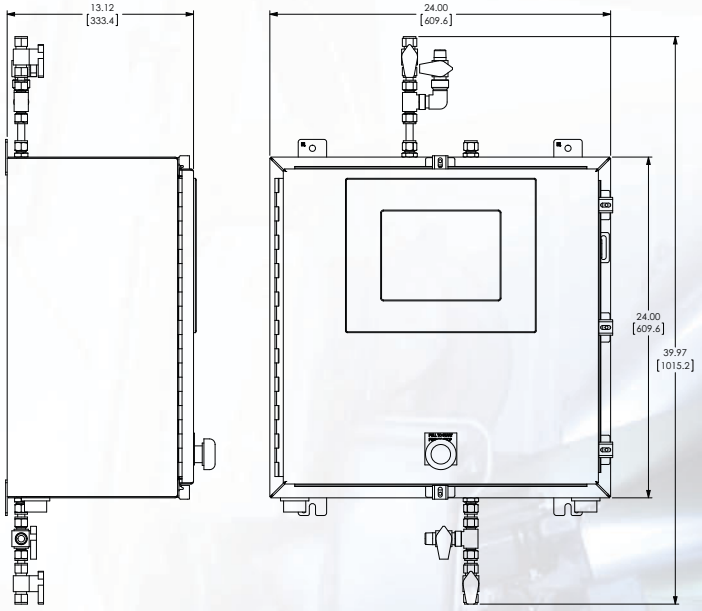
Area classifications:
- Unclassified
  - Remote head / NEMA 4 box configuration
- Class 1 Div 1 Groups B, C, D
- Class 1 Div 2 Groups B, C, D
- ATEX zone 2

Ambient conditions:
- 0 – 35°C (32 – 95°F)
  - Consult Rigaku for other temperature ranges

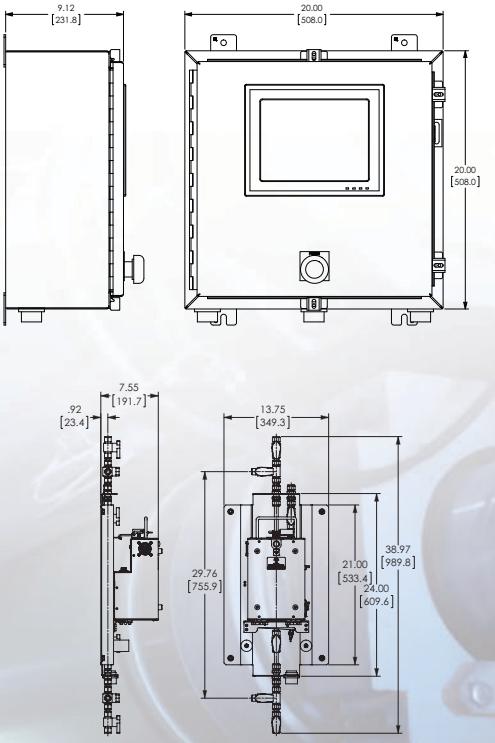
Air supply:
(NEMA 4 classified configuration):
- Purge
  - 4.0 – 8.0 bar (60 – 115 psig) air pressure
  - 115 – 225 l/m (4 – 8 scfm) rapid exchange
  - Leakage compensation (application specific)
- Optional vortex cooler
  - 710 – 990 l/m (25 – 35 scfm) dry oil free air
  - 6.2 – 8.0 bar (90 – 115 psig) air pressure

Power requirements:
- 110/240 V, 2.5/1.5 A (47 – 63 Hz)
  - Dedicated supply

Integral unit



Remote unit



Units of measure in inches [millimeters]

www.RigakuEDXRF.com

Applied Rigaku Technologies, Inc.
9825 Spectrum Drive, Bldg. 4, #475, Austin, TX 78717 USA
phone: +1-512-225-1796 | fax: +1-512-225-1797
website: www.RigakuEDXRF.com | email: info@RigakuEDXRF.com

Rigaku Corporation and its Global Subsidiaries
website: www.Rigaku.com | email: info@Rigaku.com

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