

# M1 MISTRAL

- Tabletop Micro-XRF Spectrometer

# M1 MISTRAL – Fast and accurate Micro-XRF



The M1 MISTRAL is a compact spectrometer for the analysis of bulk materials and layers using X-ray fluorescence technology. It allows non-destructive measurements on a wide range of sample sizes without the need for sample preparation.

Areas of application include electronics, jewelry, RoHS, automotive and many more.

## Analyze arbitrarily shaped samples without need for preparation

The M1 MISTRAL is a spectrometer for the accurate Micro-XRF analysis of bulk materials and layers. It allows to investigate a wide range of different materials, such as metals, alloys and metallic layers, including multi-layer systems.

Specimens up to a size of 100 x 100 x 100 mm can be placed directly on the sample stage and analyzed without further preparation. As the measurement is contactless and from above arbitrarily shaped specimens – like finely wrought jewelry or materials of varying thickness – can be analyzed easily.

## Measure exactly at the position you desire

The micro focus X-ray tubes of the M1 MISTRAL generate sufficient intensity for spot sizes even down to 100  $\mu\text{m}$ , depending on the collimator used. Together with the video microscope for exact sample positioning, this ensures that measurement takes place at the desired spot.

Additional functionality can be added with the optional computer-controlled stage motorization and auto focus function.



### State-of-the-art analytical software provides optimum analysis results

No matter whether you want to control the quality of a sample against a known standard or determine the composition of an unknown material, the XSpec Pro and XData analysis software provides the right tool for the purpose: standard-based or standardless (fundamental parameter) quantification for both bulk materials and layer systems. Complex analytical tasks can be automated with the programmable XYZ stage and started with a single mouse click.

### Ultra-fast detection systems for quick results

The M1 MISTRAL is available with a large area silicon drift detector with superior count rate performance and energy resolution to drive detection limits down to 0.01 wt.%. High performance detector, digital pulse processing and optimized geometrical conditions warrant maximum efficiency in X-ray detection and therefore fast and accurate analysis results.

### Easy-to-use and maintenance-free

The design of the M1 MISTRAL and the analytical software suite permit operation even by personnel who have received only introductory training.

Only a power outlet is needed to run the system. No consumables or gases are required. Sturdy construction ensures highest stability and maintenance-free operation.

## Selection of Applications

The range of possible applications for the M1 MISTRAL is very large. Three common examples are presented for illustration.

### Jewelry and alloy analysis

The M1 MISTRAL is ideally suited for the analysis of pieces of jewelry, coins or precious metal alloys in general. The exact composition of all jewelry alloys, platinum group metals or silver can be determined in a fraction of a minute. Results can be output either in weight% or in Karat.

### Determination of RoHS compliance

The M1 MISTRAL is well suited for restricted elements screening. It can analyze trace levels of heavy metals in electronic components, plastics, alloys and many other materials to ensure RoHS compliance.

### Characterization of coatings

The X-ray fluorescence technology employed by the M1 MISTRAL allows the efficient analysis of thin coatings, e.g. on PCBs, metals or plastics. The system supports investigation of single and multi-layer coatings. The software simultaneously calculates layer thickness as well as composition, using the standard-less fundamental parameter based method. Accuracy of quantification can be further improved by the use of standards.

### Testing of jewelry

- Yellow gold
- White gold
- Pt-alloys
- Ag-alloys

Accuracy: better than 0.2 wt% for main element content in the range of 40 - 100 %

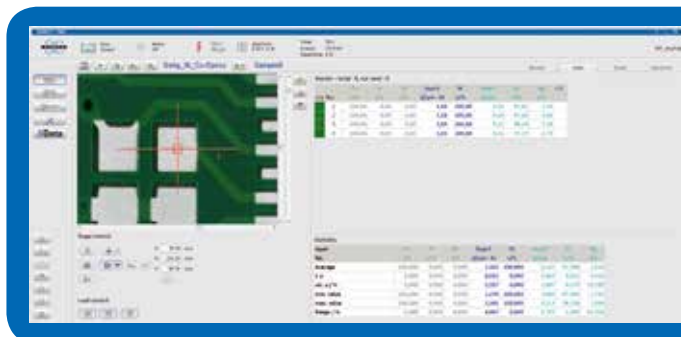
### RoHS compliance

- Concentration of Pb, Hg, Cr<sup>6+</sup>, Br (PBB & PBDE) has to be < 1000 ppm
- Concentration of Cd has to be < 100 ppm

### Analyzable multi-layers

Various layer systems can be analyzed with regard to thickness and composition, e.g.:

- Zn/Fe
- Au/Ni/Cu
- Au/Pd/Ni/Cu
- CuSn/Ni/Cu
- Cr/Ni/Cu
- Ni-P/Al.



## Technical Specifications

Parameter	M1 MISTRAL <sup>SDD</sup>
Excitation	High performance micro focus tube with W or Rh target
High voltage	50 kV, 50 W
Detector	Peltier cooled, 30 mm <sup>2</sup> high performance silicon drift detector, < 150 eV energy resolution at Mn K $\alpha$
Element range	Default: from Ti (Z=22) with W target, optional: from Al (Z=13) with Rh target
Spot size	Collimator changer for 0.1 mm and larger
Sample view	Color CCTV high resolution camera system, magnification ~ 30 x
Sample stage	1) Motorized Z stage with auto focus, max. travel 120 mm 2) Motorized XYZ stage with auto focus and EasyLoad function, max. travel 200 mm x 175 mm x 80 mm max. weight load of 1.8 kg (for both stages)
Quantification	Bulk analysis: standard-based empirical and standardless models Coatings: FP-based models
Power supply	110 to 230 V AC; 50/60 Hz, max. 150 W
Dimensions (W x D x H)	550 mm x 680 mm x 430 mm
Instrument weight	50 kg

## XSpect Pro Analytical Software Suite

The software provides the following functionality:

- Instrument control, data acquisition and management
- User selectable touch screen user interface
- Stage control and programming
- Analysis of metallic multi-layers regarding layer thickness and composition
- Quantitative composition analysis, standardless and standard-based empirical models
- Spectrum viewer with automatic peak identification
- Statistical process control (SPC) trendline and data
- Report generator
- Result archive

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