



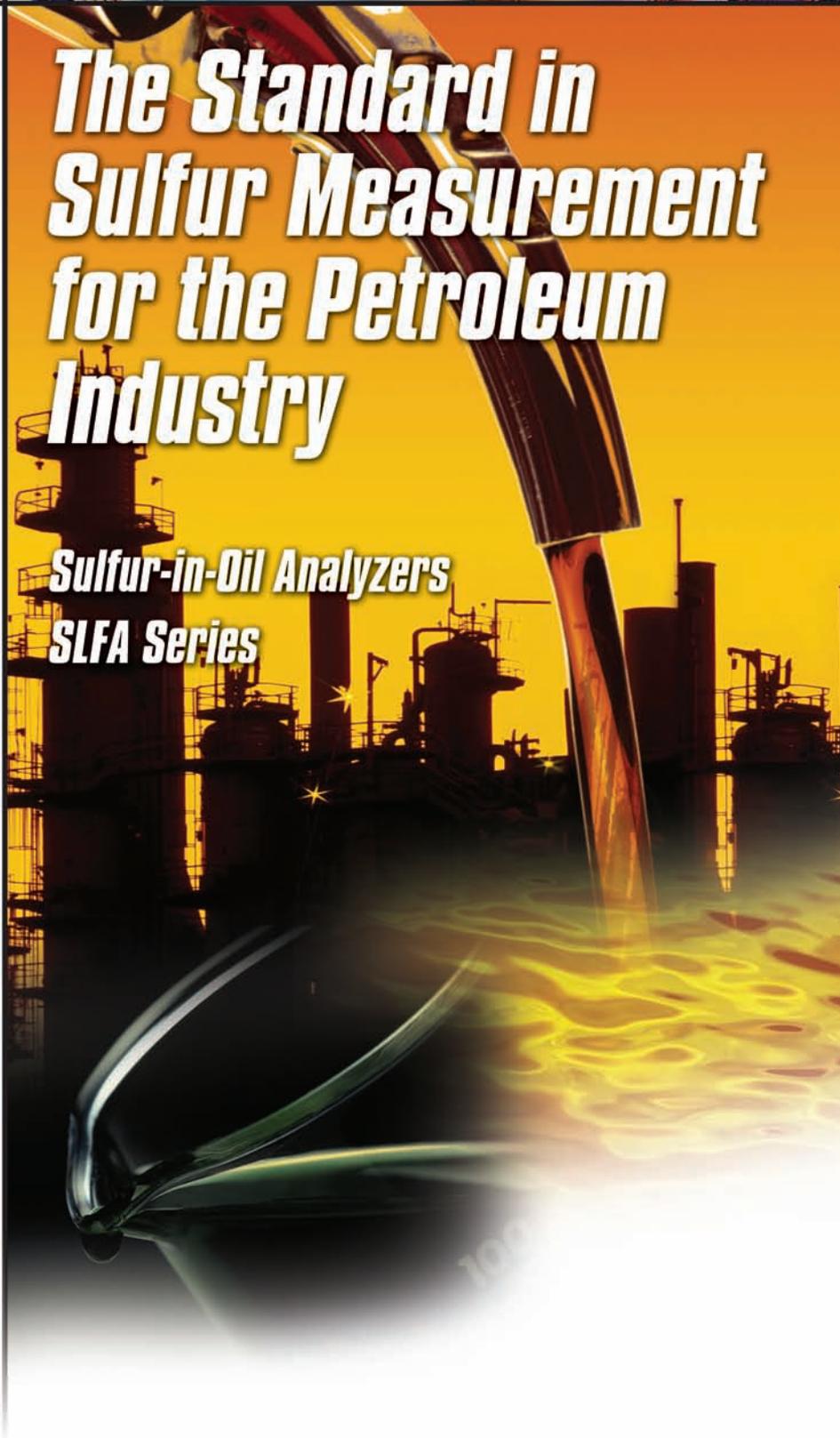
# *The Standard in Sulfur Measurement for the Petroleum Industry*

*Sulfur-in-Oil Analyzers  
SLFA Series*

Excellence in sulfur analysis

Over 186 years of Jobin Yvon optical experience

The expertise of HORIBA



SLFA SERIES SULFUR-IN-OIL ANALYZERS

# The Standard in Sulfur Measurement for the P

## SLFA-2800/2100

**Our new sulfur-in-oil analyzer combines the established functions with new functions to improve the ease of use and enlarge the application.**

Today's world is facing many environmental problems. In order to prevent harmful pollution high precision analysis technology with a high degree of sensitivity, precision and repeatability gains importance. The effort is to decrease the sulfur content in diesel fuel, light and heavy oil. This is due to present regulations concerning the sulfur content, which become even stricter in the future coupled with the rising environmental consciousness. HORIBA's SLFA-2800/2100 meets all demands for on innovative analytical technology.

### New features that enlarge the application and make the use of the analyzer easier.

The SLFA-2800/2100 includes several convenient new features without increasing its size. The software has been updated, measure range has been enhanced and the new sulfur-in-oil analyzer presents itself in the new Horiba design.

#### ■ Software

The new software does not only simplify the use of the analyzer; it also extends its application with new functions.

#### Measurement units

For the measurements it is possible to choose between the units % and ppm.

#### Sample identification

The new SLFA-2800/2100 makes the identification of the samples very easy. Sample IDs can include numbers (0-9) and alphabetic characters (A-Z) up to ten digits.

#### Calibration

In this new sulfur-in-oil analyzer the calibration graphs have been extended. The analyzer selects automatically out of seven scales (0.002 / 0.01 / 0.05 / ... / 10 %). The graphs are in available in both units, % and ppm. The curve format, linear or parabolic, can be either picked manually or set automatically. It is possible to store up to five calibration curves. You can choose if the analyzer should select the most suitable curve for you or if you want to do it manually.

#### ■ Measure Range

This new model can measure a wider range of sulfur content. It can measure between 0 – 9.999 % sulfur content in a sample. Consequently the equipment is applicable in more specific fields. Either a very small sulfur content as in diesel oil or a high sulfur content as in heavy oil can be determined.

#### ■ Design

The SLFA-2800/2100 shows the new design philosophy of HORIBA. Also the function keys have been rearranged. Now the keys are arranged like cell phone keys which makes the operation and the data input even easier.



Easy to operate function keys.



Concentration of Sulfur in Samples (ppm)	Average Value(ppm)	Standard Deviation( $\sigma$ ) (ppm)
0	5.1	1.1
200	198.3	1.1
500	500.6	1.5

Sample: light oil Measurement conditions: measurement time 600 sec. Ten measurements

# Petroleum Industry Technology

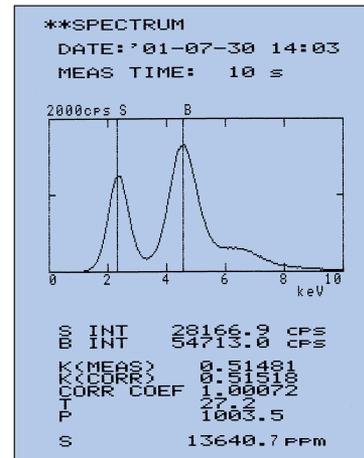


## Automatic compensation of C/H ratio

Problems caused by measuring different oil types are solved by this function. Thus highly accurate measurement results can be achieved regardless of the oil type.

## Spectrum measurement

The analyzer includes a spectrum measurement mode for assessments of the whole sample. In this mode you can print out a spectrum of the fluorescent X-rays, which is also useful for checking the state of the X-ray source or detector assembly.

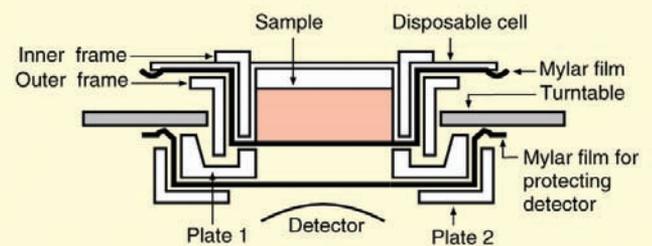


Spectrum

## Detector protection mechanism

The SLFA-2800/2100 includes a mylar film in order to protect the detector. Its design corresponds to the cell window's design and can be replaced easily. It is inserted between the detector and the sample cell. For that reason the detector is protected from sample drops in any case – even when sample cell breaks.

## Cross section of sample cell and detector

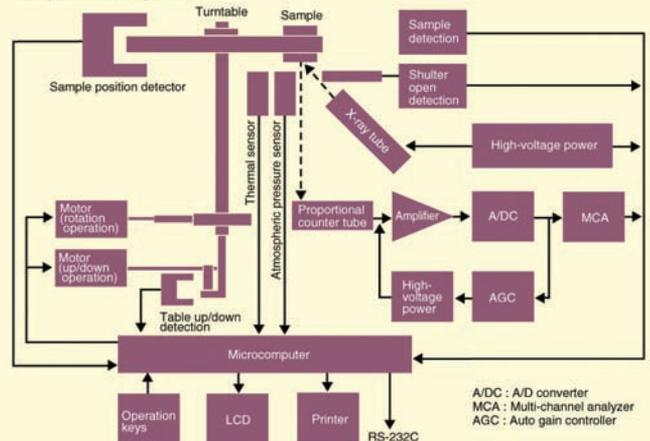


## Features to ensure exact and reliable data

### Precision and repeatability

The new SLFA-2800/2100 investigates measurement results with an amazing precision. Due to the established miniature X-ray tube, which makes the purging of helium or another gas redundant extremely precise results can be achieved. In addition sudden fluctuations in temperature or detector time-drift are prevented through an automatic pulse-height compensation function. This system does also include a correction function for temperature and atmospheric pressure eliminates need for helium purging. As a result the measurement of low-concentration samples is no problem. The repeatability for the samples with a low sulfur content (0 %S) shows good performance with 1.6 ppm. Also measurements of samples with heavy sulfur concentration can be undertaken fast.

## System Diagram



## Features for operator's convenience and safety

### ■ Easy-to-read large screen

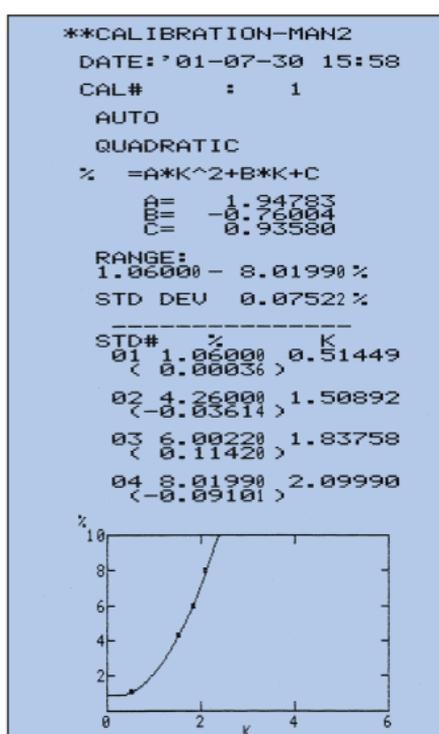
Due to the large backlit LCD of the display the results of the measurements can be read well. Operations can be also easily monitored.

### ■ Coherent large printouts

The printouts are understandable and the size (80 mm wide) enables modest reading. All important information such as for example the sample ID, X-ray spectrum, date and time of the measurement, measuring time, number of accomplished measurements, average value, standard deviation and calibration curve graph are shown on

```
**MEASURE
DATE: '01-07-30 14:27
CAL#      :    1
MEAS TIME: 120 s
REPEAT    :    3 TIMES
-----
SEQ# 1 POS#1
          ID#HEAVY OIL1
1/ 3     10341.5 PPM
2/ 3     10338.0 PPM
3/ 3     10314.2 PPM
AVERAGE 10331.2 PPM
          (K 0.51819)
STD DEV  14.9 PPM
          (K 0.00053)
-----
SEQ# 2 POS#2
          ID#LIGHT OIL1
1/ 3      98.0 PPM
2/ 3     101.1 PPM
3/ 3     103.1 PPM
AVERAGE 100.7 PPM
          (K 0.10923)
STD DEV   2.6 PPM
          (K 0.00012)
```

Measurement result



Auto-calibration

the printouts.

### ■ Digital data output (RS-232C interface)

If storing of many results or further statistical processing of results is wished the measurement results can be put out to an external computer. Thus the analyzer can be used in laboratory or factory automation.

### ■ Safety mechanism

The operating and maintenance of our sulfur-in-oil analyzers is without any risks because no radioactive source is used. The exposure of X-rays is not possible due to a two-stage-fail-safe mechanism.

### ■ Turntable for sequential analysis and priority measurements (SLFA-2800)

The SLFA-2800 is equipped with a turntable, which makes sequential measuring of up to eight samples possible. With this feature the effort concerning each analysis decreases significantly. With the SLFA-2800 it is also possible to do priority measurements at any time. It does not matter if the SLFA-2800 is analyzing a single sample or a group of samples, it can always be paused to do measurements of higher priority.

## SULFUR-IN-OIL ANALYZERS

# SLFA-20

### Lightweight and ultra-compact

**-Ultra-compact: 250(W) x 407(D) x 138(H)mm**

**-Lightweight: 8kg**

This small unit provides all of the necessary functions, even printing. The unit is easy to carry and ideally suited for on-site analysis.

### High-precision measurements

**-Repeat accuracy: 15 ppm**

**-Lower detection limit: 20 ppm**

■ **The SLFA series provides high precision and multiple functions**

The SLFA Series is equipped with a multi-channel spectral analyzer for high-precision analysis and functions for multidimensional data processing. The SLFA Series can also perform calibrations for device drift caused by temperature fluctuations and atmospheric pressure fluctuations. Furthermore, there is no need to perform a helium purge.

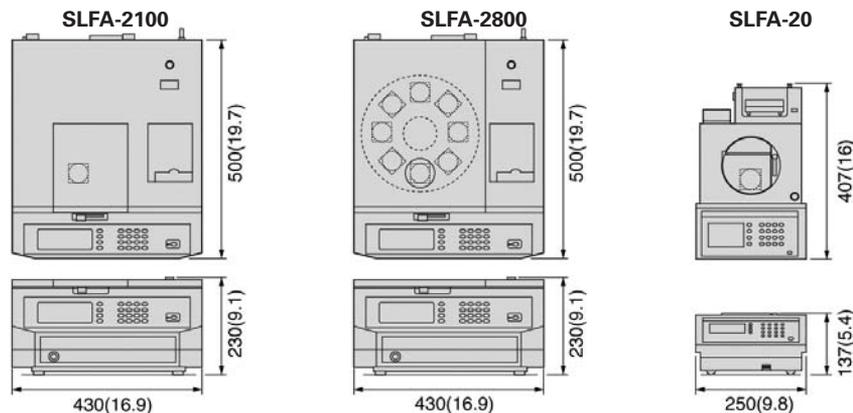


# Specifications

	SLFA-2100	SLFA-2800	SLFA-20
<b>Measurement Principle</b>	Fluorescence X-ray Analysis Method		
<b>Samples Measured</b>	Sulfur in petroleum products such as heavy oil, naphtha and crude oil.		
<b>Measurement Range</b>	0 to 9.999%		0 to 5%
<b>Repeat Accuracy</b>	5 ppm or less (with a 1% sample), 1.6 ppm or less (with a 0% sample)		15 ppm or less (with a 1% sample)
<b>C/H Error</b>	±50 ppm or less per C/H (with a 1% sample)		
<b>Lower Detection Limit</b>	5 ppm or less		20 ppm or less (3 times the standard deviation)
<b>No. of Analytical Curves</b>	5 (both automatic selection and manual setting are possible)		
<b>Analytical Curve Order</b>	Primary or Secondary (both automatic selection and manual setting are possible)		
<b>Calibration</b>	Calibration made using any standard sample (2 to 20 calibration points)		
<b>Sample Cell</b>	Dedicated Liquid Sample Cell		
<b>Sample Volume</b>	4 to 10 ml		
<b>Measurement Time</b>	User-set from 10 to 600 seconds		10, 30, 100, 300, 600 seconds
<b>Max. No. of Samples</b>	1	8	1
<b>Ambient Temperature</b>	5 to 35°C		5 to 40°C
<b>Ambient Humidity</b>	30% to 85% (Relative Humidity)		80% maximum relative humidity at temperatures from 5°C to 31°C.  Linear decrease to 50% relative humidity at temperatures from 31°C to 40°C.
<b>Spectrum Measurement</b>	Includes spectrum measurement functions, Energy Axis: 0-10 keV, Strength Value Axis: set automatically		
<b>External Output</b>	RS-232C output, output during measurement, automatic calibration, and spectrum measurement		
<b>Electric Power Supply</b>	AC 100 to 240 V ±10% 50/60 Hz (option power converter for 12v car operation)		
<b>Electric Power Consumption</b>	150 VA		80 VA
<b>External Dimensions</b>	430(W) x 500(D) x 230(H) mm 16.9(W) x 19.7(D) x 9.1(H) in		250(W) x 407(D) x 137(H) mm 9.8(W) x 16(D) x 5.4(H) in
<b>Weight</b>	approx 21 kg	approx 24 kg	8 kg

\*Standards Applied to Device Measurement Functions: JIS K2541, JIS B7995 (Japan), ASTM D4294 (USA), ISO 8754

Dimensional Outlines Unit: mm(in)



Specifications subject to change without notice.

**HORIBA** JOBIN YVON

(All HORIBA Jobin Yvon companies were formerly known as Jobin Yvon)

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