

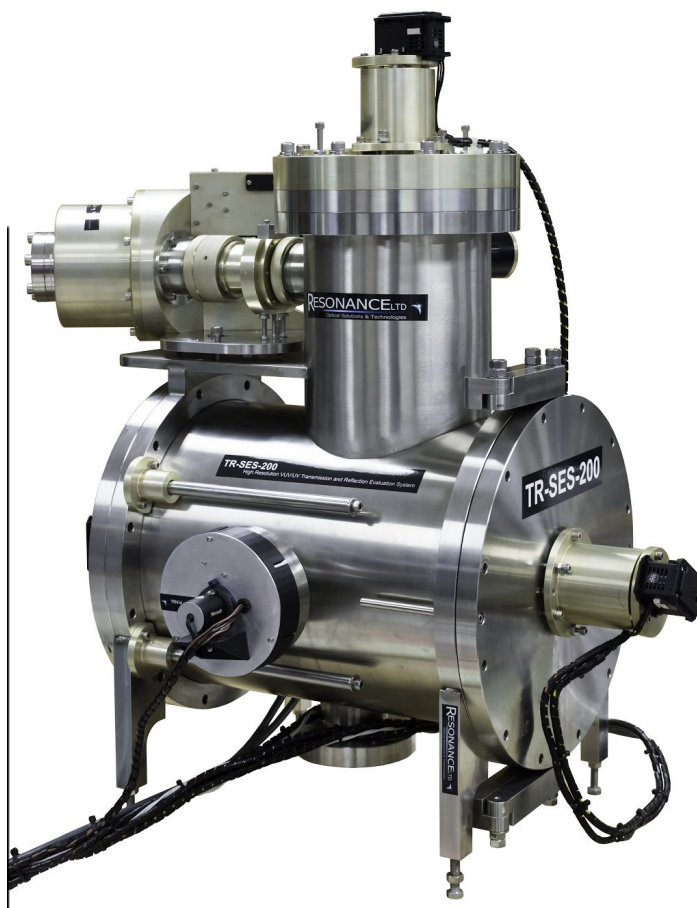


## TR-SES-200 High Resolution VUV/UV Transmission and Reflection Evaluation System

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The Resonance Ltd. Transmission and Reflection Evaluation System is designed to deliver vacuum-ultraviolet (VUV) to ultraviolet (UV) radiation to a target sample and measure the reflectance, transmission or fluorescence of the target. The system includes a deuterium lamp emitting from 115 nm to 400 nm, a 200 mm focal length vacuum monochromator with a PC controlled motor drive, a Hamamatsu R8486 photomultiplier tube (PMT) capable of detecting from 115 to 320 nm, Labview™ software and controlling electronics.

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## Features

**The TR-SES-200 is a spectrophotometer that has four main system elements:**

### **VUV, UV Tunable Light Source (TLS):**

Hydrogen light source with power module for 100 to 240 V operation

Servo controlled VM200 Monochromator with 200 nm and 285 nm order sorter filter switch (for continuous operation from 110 to 400 nm)

Collimating Assembly

### **Servo-driven sample wheel that can tilt and rotate:**

Tilt and rotate drive mechanism

Sample wheels for samples from 5 to 30 mm with clamps for non-circular samples

### **Rotating Detector:**

PMT plus HV power supply and Amplifier

Rotating PMT stage with servo drive.

### **Electronics/Computing System:**

Main Electronics for lamp power and servo control including an embedded PC

Complete software package:

Raw spectra, Transmission, Reflectance display acquisition/storage

Sample wheel and PMT control for angle scanning and sample selection

Macros for batch processing

## System Components

### Hydrogen Light Source

The system is provided with a Resonance Ltd. D2ArCM-L Hydrogen light source, supplying radiation ranging from 115 nm to 400 nm, with a photon flux of approximately  $2 \times 10^{15}$  photons/sec/str. The lamp is mounted using a SMA threaded adaptor and is located on the entrance slit arm of the monochromator.

### Monochromator

Resonance VM200 scanning monochromator

The VM200 monochromator (Vacuum Monochromator 200mm focal length) contains a concave holographic grating with a VUV/UV enhanced Al/MgF<sub>2</sub> coating. This grating has the following specifications:

**No. of lines/mm:** 1200 l/mm

**Size:** 40 x 45 mm

**F #:** 4.2

**Input focal distance:** 200 mm

**Output focal distance:** 187.9 mm

**Deviation angle:** 64 degrees

**Coating:** Al/MgF<sub>2</sub> optimized for 100 to 300 nm

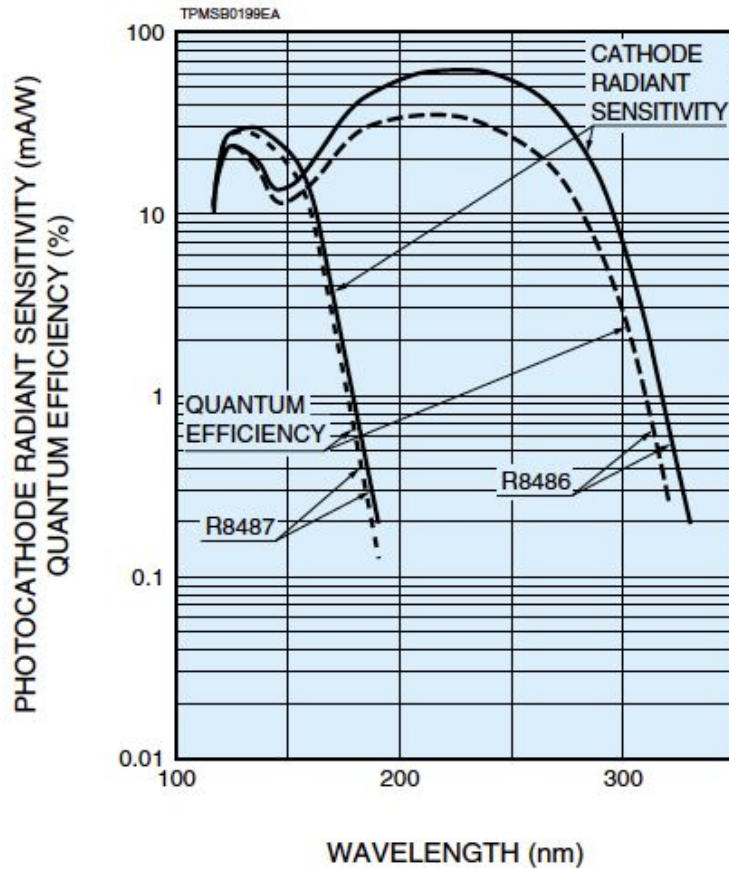
**Spectral range of best operation:** 115 – 300

**Total spectral Range:** 25 to 1000 (gold coating recommended below 100 nm)

The grating is rotated with an absolute encoded grading drive (AEGD). It is installed in a bucket (gratings are user interchangeable) and the spectrometer has two long arms at the end of which the entrance and the exit adjustable slits are installed.

### PMT Stage

The TR-SES-200 uses a Hamamatsu R8486 28 mm, side-on PMT. This PMT is sensitive from 115 to 320 nm with a typical quantum efficiency of 22.5% at 122 nm. It is powered using a Hamamatsu C6271 high voltage power supply socket assembly. High Voltage is controlled with the system software.



## GENERAL

Parameter		R8486	R8487	Unit
Spectral Response		115 to 320	115 to 195	nm
Wavelength of Maximum Response		200	130	nm
Photocathode Material		Cs-Te	Cs-I	—
Window Material		MgF <sub>2</sub>		—
Minimum Effective Area		8 × 12		mm
Dynode	Structure	Circular-cage		—
	Number of Stage	9		—
	Material	Sb-Cs		—
Direct Interelectrode Capacitances	Anode to Dynode No.9	Approx. 4		pF
	All Other Electrodes	Approx. 6		pF
Base		11-pin base JEDEC No. B11-88		
Weight		45		g
Suitable Socket		E678-11A (sold separately)		
Operating Ambient Temperature		-30 to +50		°C
Storage Temperature		-30 to +50		°C



## Order Sorter

As higher wavelength ranges are scanned, 2<sup>nd</sup> and 3<sup>rd</sup> order features can appear, making it difficult to obtain accurate spectral measurements. To prevent this, the system is equipped with order sorter filters which filter out lower wavelengths before their 2<sup>nd</sup> order signal is reached. The filters are part of the aperture wheel and are software selectable. Quartz filters (transmission drops off around 180 nm) and Pyrex filters (drops off around 290 nm) to block off lower wavelength light are installed.

## Sample Wheel

The system is provided with wheels to accommodate samples of varying sizes and shapes. The samples are mounted on the back side of the wheel so that the light is incident at the surface of the sample coincident with the center of rotation of the pmt. This design only requires samples to be larger than its apertures which range from 3 mm to 25 mm in the standard wheels. Custom wheels for up to 75 mm samples are available.

## Software

The TR-SES-200 uses a LabView 8.2 based executable program that is compatible with Windows XP, Vista and Windows 7.

