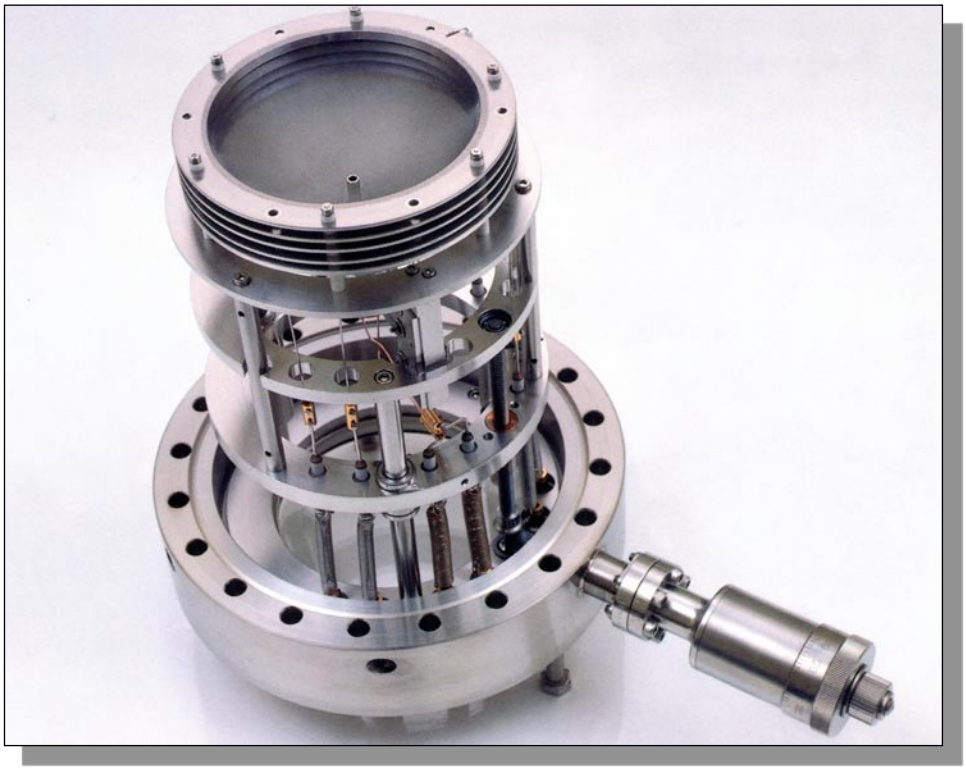
# Series RVL2000

## *Reverse View LEED/Auger*



## Performance features

- Precision construction with 4-grid tungsten optics
- Miniature 1.59 cm diameter electron gun
- 103° usable viewing angle
- 0.5% energy resolution
- Available with retractable optics
- Mounting flange has integral viewport and electrical feedthroughs
- Fully HUV compatible and bakeable
- Low noise, high performance Auger electronics with integral lock-in amplifier

The LK Technologies Model RVL2000 Reverse View LEED System consists of 4-grid LEED optics, phosphor viewing screen and low-profile electron gun. The optics feature precision alignment with tungsten grids of high transmission (83% per grid) and a viewing angle of 103°. The 1.59 cm diameter electron gun and gun support are designed to minimize interference with LEED observations. Nevertheless, the gun delivers up to 2 μA beam current at 100 eV and up to 50 μA for Auger operation.

The optics may be selected in either fixed or retractable geometry. Fixed optics are available on 8.0 in. or 6.0 in. O.D. CF flanges at standard flange to sample distances of 8.0 or 10.0 in. Retractable optics are available on the 8.0 in. CF flange in two standard versions: a 10 in. sample-to-flange working distance with 2.0 in. travel and an 8.0 in. sample-to-flange working distance with 1.8 in. travel. The optics are translated by a single lead screw on three precision linear bearings internal to the vacuum. The lead screw is in turn driven by a UHV rotary feedthru mounted perpendicular to the optic axis to allow unobstructed viewing of the LEED pattern.

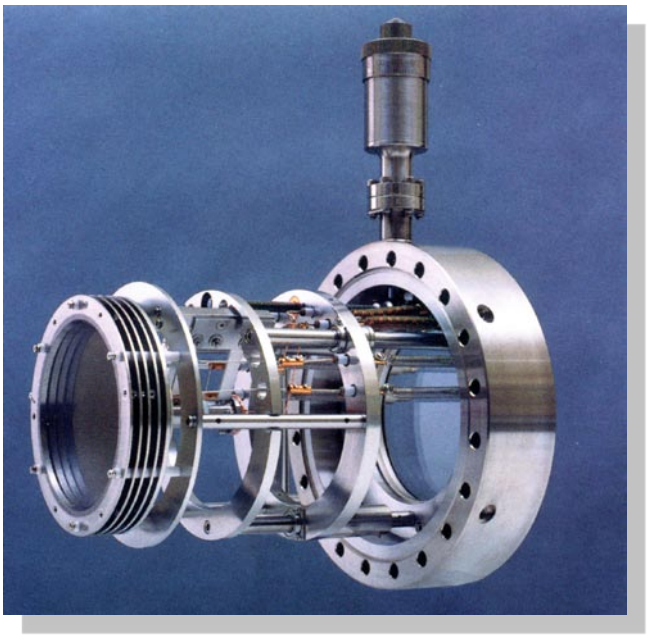
LK TECHNOLOGIES

**Manufacturer of precision instrumentation for surface analysis including electron spectrometers, ion and electron guns, and LEED/Auger systems.**

# Reverse View LEED

The standard LEED control electronics (Model RVL/SE) provides power for the electron gun filament, energy and focus controls. It also provides power for secondary electron suppression and screen high voltage. The gun energy and focus can be ramped manually or by an analog voltage supplied by computer. A separate internal power supply for the suppression grid controls the pattern contrast. Ten turn potentiometers control the gun energy, suppression voltage, gun focus and filament emission. A digital read-out allows all gun and grid voltages and currents to be read from the front panel. Low-energy operation (<100 eV) of the electron gun employs a retarding voltage on the electron gun, thereby providing higher currents at low voltages when compared to a unipotential gun.

For special low-current applications the LEED optics is available with a dual micro-channel plate detection system (Model RVL2000/8/MCP).



# LEED Specifications (Model RVL2000/8/R)

## Optics

- 4-Grid Design: Allows for higher resolution (<0.5%) during Auger operation.
- Grid Construction: 3.94 lines per mm (0.025 mm diam.). Tungsten wire-aligned to minimize Moiré effects.
- Transmission: 83% per grid, 47% total.
- Geometry: 120° steradian acceptance.
- Collector: Ground optical quality Pyrex glass screen with 103° of viewing area. Transparent $SnO_2$ coating with uniform standard P20 phosphor.

## Electron Gun

- Beam Diameter: <1 mm at sample position.
- Beam Current: 5 μA at 500 eV, with Tungsten filament (optional $LaB_6$ filament).
- Geometry: Concentric mounting. Small 1.59 cm gun diam. and gun support design provides minimum screen interference.

## Optics Assembly

- Mounting: Completely contained on a standard 203.2 mm (8.0 in.) CF flange with 10 cm viewport. Flange face to optics focus is 203.2 mm.
- Shield: Mu-metal shield.
- Electrical: All connections are UHV bakeable feedthrus.
- Retraction: Nominal 50.8 mm (2.0 in.) via rotary feedthru.

# LEED Control Electronics (Model RVL/SE)

- Beam Voltage: 0 to 1500 V, manual or remote operation.
- Focus Voltage: 0 to 100% of beam voltage.
- Filament Supply: 0 to 3 amps.
- Suppressor Grid: 0 to 100 V with respect to the gun energy.
- Retarding Voltage: 0 to 100 V.
- Screen Voltage: 1 to 5 kV.

# Reverse View LEED/Auger Combination

Retarding-field analysis (RFA) Auger electron spectroscopy (AES) may be routinely performed with the LK Technologies LEED Optics in combination with the Model RVL/AES controller. This single unit combines all the necessary electronics to obtain high-quality AES data as shown in the illustrations for silicon. The working energy resolution for Auger spectra is better than 0.5%.

Unlike other units, the RVL/AES controller has a built-in lock-in amplifier for Auger mode. This eliminates the considerable expense, as well as the cumbersome integration, of as many as five modules on other commercial systems. Furthermore, by means of a special filtering system and sensitive preamplifier, the RVL/AES achieves the best signal-to-noise performance available in RFA.


RVL2000 Silicon Auger Spectrum

| | |
|---|---|
| Primary Beam Energy: | 2.5 keV |
| Target Current: | 25 μA |
| Modulation Voltage: | 4V p-p |
| Time Constant: | 1s |

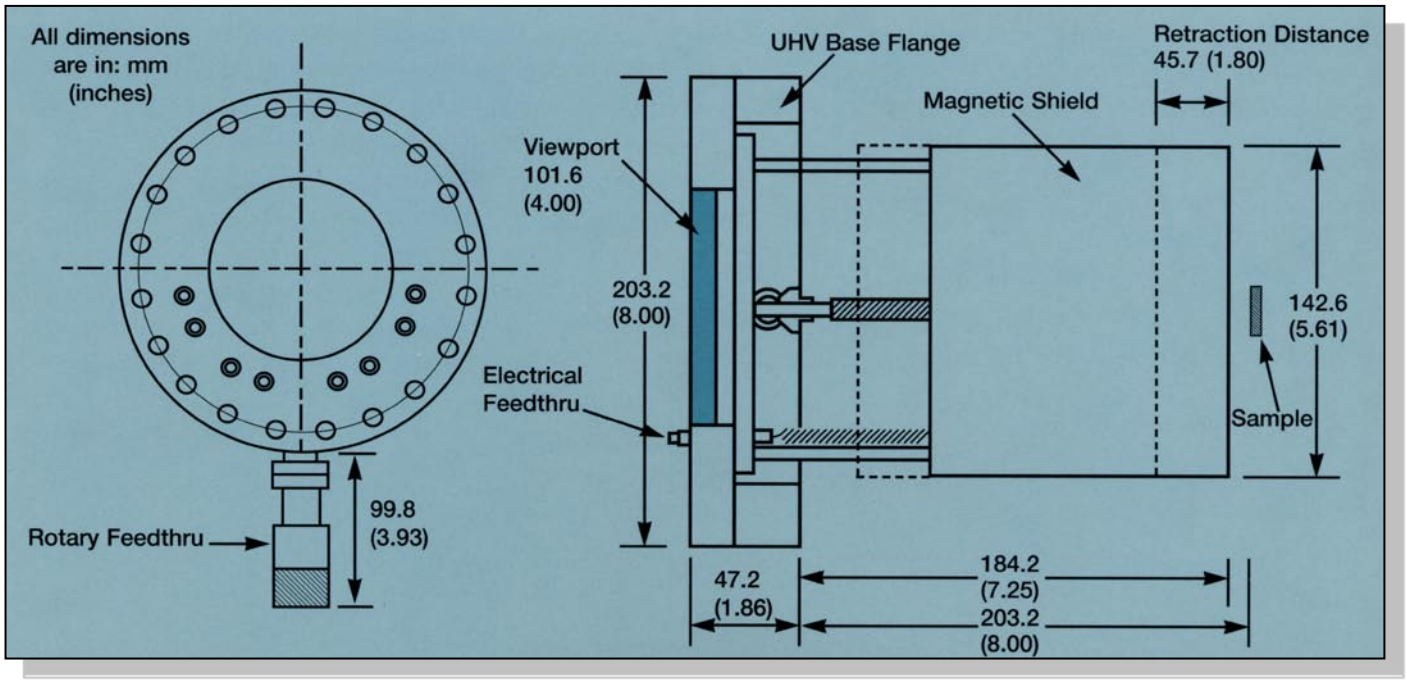

RVL2000 Auger spectra of contaminated silicon surface showing sulfur, carbon and oxygen impurities.

| | |
|---|---|
| Primary Beam Energy: | 2.5 keV |
| Target Current: | 45 μA |
| Modulation Voltage: | 10Vp-p |
| Time Constants: | (a) 1s, (b) 3s |

# LEED/Auger Control Electronics (Model RVL/AES)

- Beam Voltage: 0 to 3000 V, manual or remote operation.
- Focus Voltage: 0 to 100% of beam voltage.
- Filament Supply: 0 to 3 amps.
- Suppressor Grid: 0 to 100 V with respect to the gun energy LEED mode.
- Auger Pass Energy: 0 to 2500 V rampable in Auger mode.
- Modulation Voltage: 0 to 12 V peak to peak sine wave.
- Retarding Voltage: 1 to 100 V.
- Screen Voltage: 1 to 5 kV.
- Lock-in Amplifier: Integral to system.

# Retractable Reverse View LEED Model RVL2000/8/R




# Ordering Information

## Optics

- 4RVL2000/8: Fixed 4-grid optics on 203 mm (8.0 in.) CF flange.
- RVL2000/6: Fixed 4-grid optics on 152 mm (6.0 in.) CF flange.
- RVL2000/8/R: Retractable 4-grid optics on 203 mm (8.0 in.) CF flange.
- RVL2000/8/MCP: Retractable 4-grid optics with dual micro-channel plate detector on 203 mm (8.0 in.) CF flange.

Note: Standard sample-to-flange working distances are 254 mm (10.0 in.) and 203.2 mm (8.0 in.). Standard retraction distances are 45.7 mm (1.8 in.) and 50.8 mm (2.0 in.). Custom lengths on request.

## Electronics

- RVL/SE: Standard LEED control electronics.
- RVL/AES: Combination LEED and Auger control electronics with integral lock-in amplifier.
- RVL/MCP: Micro-channel plate control electronics.

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