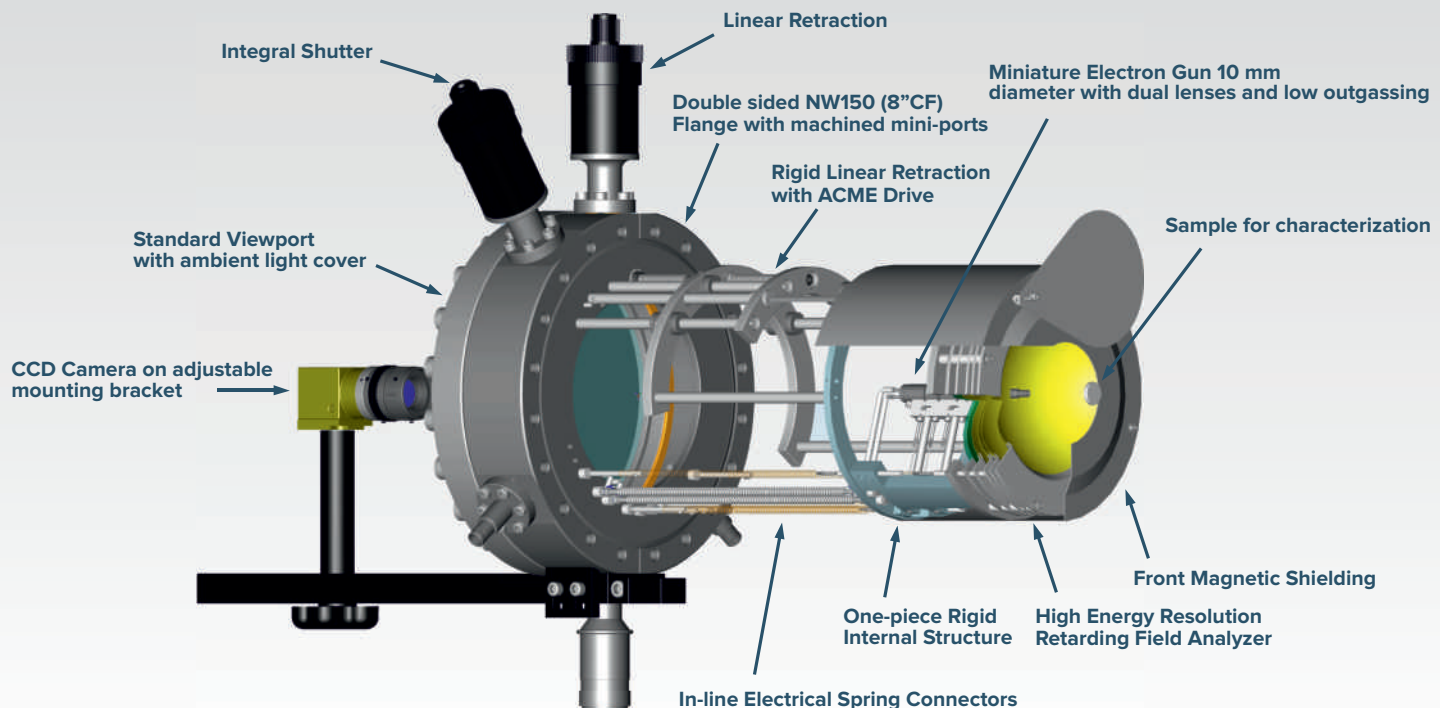


# Surface Crystallography Spectrometer - IntegraLEED

based on Low Energy Electron Diffraction (LEED) and Auger Electron Spectroscopy (AES)

MODEL LEED 800 (BDL800IR) with Integral Retraction and Shutter



## Features:

- High angular & energy resolution LEED & AES
- Miniature Electron Gun with double focusing
- Superior magnetic shielding
- Moiré pattern reduction
- Suitable for “in situ” epitaxial growth
- Integral Linear Motion and Shutter
- Low Outgassing Rate
- Easy add-on AES

## Applications

Full size and high performance characterization tool for surface crystallography of single crystals and “in-situ” epitaxy.

The LEED 800 is capable of providing LEED and AES data for a wide range of samples.

The larger instrument size allows for higher angular and energy resolution.

Materials suitable for characterization should be single crystals and epitaxial films in categories such as: 2D materials, semiconductors, metals, oxides and magnetic films.

# IntegraLEED - MODEL LEED 800

## Specifications

### LEED-AUGER OPTICS (Model BDL800IR)

<b>Retarding Field Analyzer</b> Concentric assembly of hemispherical grids	
Working distance from sample 18 mm	
<b>Grid Material</b>	Gold coated tungsten wire mesh (100 mesh, 81% transparency)
<b>Energy Resolution</b>	0.2% - 0.5% at low modulation volt.
<b>Glass-Display</b>	Fused silica glass coated with indium-tin oxide
	conductive layer and P31 phosphor
	(ZnS:Ag:Cu-green, 525 nm wavelength)
100° angle of acceptance from sample at a distance of 75 mm	
<b>Monitoring</b>	
Standard viewport on NW150 (8" CF) Flange	
<b>Linear Motion</b>	Up to 150 mm retraction from sample (100 mm standard); linear ball bearing and acme thread with all spring electrical connections
<b>Integral Shutter</b>	
Open and close at any position of the linear motion	
<b>Magnetic Shielding</b>	Mu-metal cylinder with front cover for maximum magnetic field attenuation
<b>Assembly</b>	
Extreme-high-vacuum compatibility with stainless steel, high alumina and gold-plated copper alloy materials	
<b>Mounting</b>	8" (CF150) double sided conflat flange with port length range 145 mm - 500 mm
<b>Bakeability</b>	
Under vacuum, 250°C maximum	

### Integral Miniature Electron Gun

<b>Beam Energy</b>	LEED 5 eV to 750 eV
	AES 5 eV to 3000 eV
<b>Beam Current</b>	LEED 2 $\mu$ A at 100 eV and 0.5 mm beam size
	AES up to 100 $\mu$ A at 3 keV
<b>Beam Size</b>	from 1 mm to 250 $\mu$ m - adjusted by wehnelt voltage
<b>Electron Source</b>	Tungsten-2%Thoriated filament standard,
	single crystal LaB6 filament optional
<b>Energy Spread</b>	0.45 eV (thoriated-tungsten filament)
<b>Overall Size</b>	10 mm lens diameter and 80 mm length

## Ordering Guide

### LEED Application:

<b>BDL800IR</b>	LEED optics with integral electron gun on 8" flange - 3 Grids
<b>LMX</b>	Linear motion (X=retraction distance)
<b>ISH</b>	Integral shutter
<b>LPS075-D</b>	Digital power supply with voltage range 0 - 750 V
<b>LIM12</b>	LEED imaging software with CCD camera, full version (optional)
<b>LIM12B</b>	LEED imaging software with CCD camera, basic version (optional)

### LEED and AES Application:

<b>BDL800IR</b>	LEED optics with integral electron gun on 8" flange - 4 Grids
<b>LMX</b>	Linear motion (X=retraction distance)
<b>ISH</b>	Integral shutter
<b>LPS300-D</b>	Digital power supply with voltage range 0 - 3 kV
<b>LOA10-AES</b>	Digital AES controller with ramp voltage, sinewave oscillator, lock-in and AES software
<b>LIM12</b>	LEED imaging software with CCD camera, full version (optional)
<b>LIM12B</b>	LEED imaging software with CCD camera, basic version (optional)

## Control Electronics

### LPS075-D Digital LEED

Power supply (0-750 V) with USB interface and PC control software for Windows 10. True primary beam current and total emission measurements. Automatic start-up and shut down, 10 memory settings including standby and outgassing mode with timer, constant beam current mode.

### LPS300-D Digital LEED-AES

Power supply (0-3.2 kV) with USB interface and PC control software for Windows 10. True primary beam current and total emission measurements. Automatic start-up and shut down, 10 memory settings including outgassing with timer, automatic switch from LEED to AES, constant beam current mode.

### LOA10-AES

Digital AES controller with lock-in amplifier, AES high voltage ramp board 0-2.0 kV with precision sinewave oscillator (0.5-20 Vpk-pk) and AES software for Windows 10. USB communication to PC.

### LEED Software

#### LIM12B

Basic LEED pattern measurements and analysis software and hardware for Windows 10 including:

- Automatic LEED pattern acquisition
- CCD camera
- Flange Mounting kit with ambient light cover and cables

#### LIM12

Full version LEED pattern measurements and analysis software and hardware for Windows 10 including:

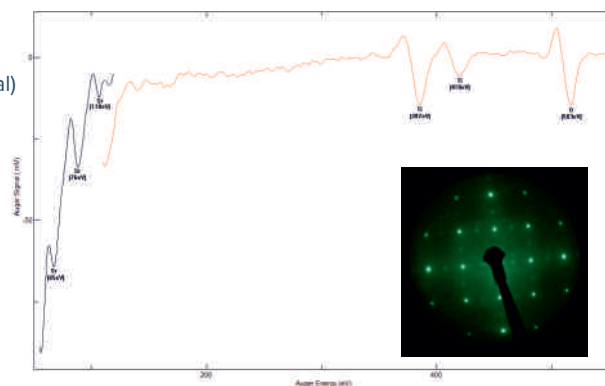
- CCD camera
- Flange mounting kit with ambient light cover and cables
- Software features:
  - o Automatic LEED pattern acquisition
  - o Automatic I-V analysis with spot tracking
  - o Automatic I-T analysis
  - o Automatic spot profile analysis

### CCD Camera Specifications

- 12-bit colour high performance video CCD camera with sensitivity control and USB3.1 interface
- 1/3" CCD sensor size, image size: 1.3 MP (1288x964), 3.75  $\mu$ m pixel size, CS-mount lenses
- Linear Full Well: 9000e<sup>-</sup>, Dynamic Range: 59 dB

## Data

### LEED pattern and AES spectrum SrTiO<sub>3</sub> (100) - single crystal wafer after thermal annealing at 850°C in UHV



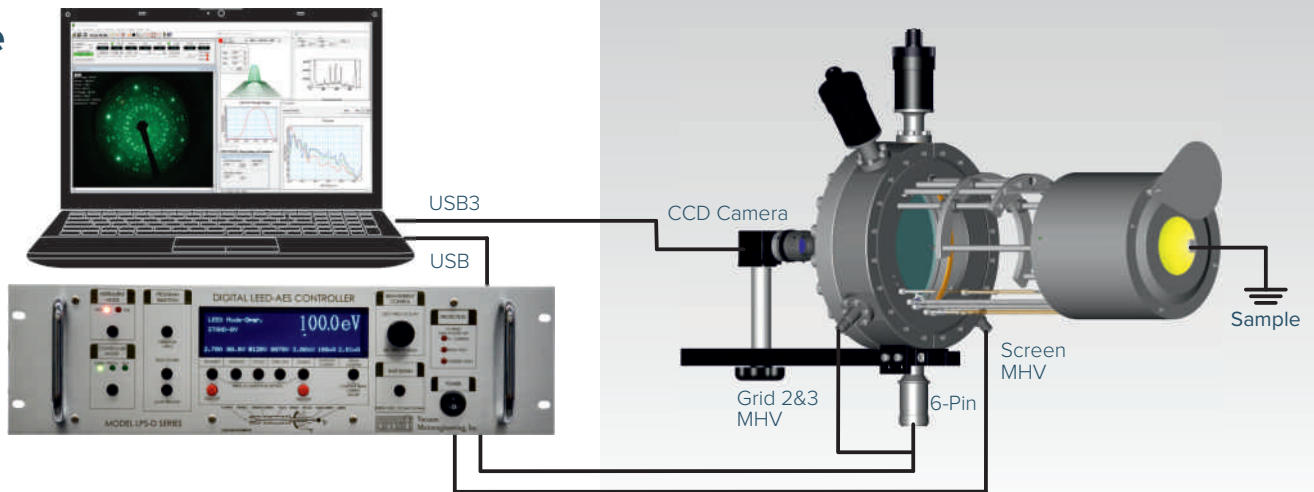
### Link for more data:

<http://www.ocivm.com/leed-aes-data.html>

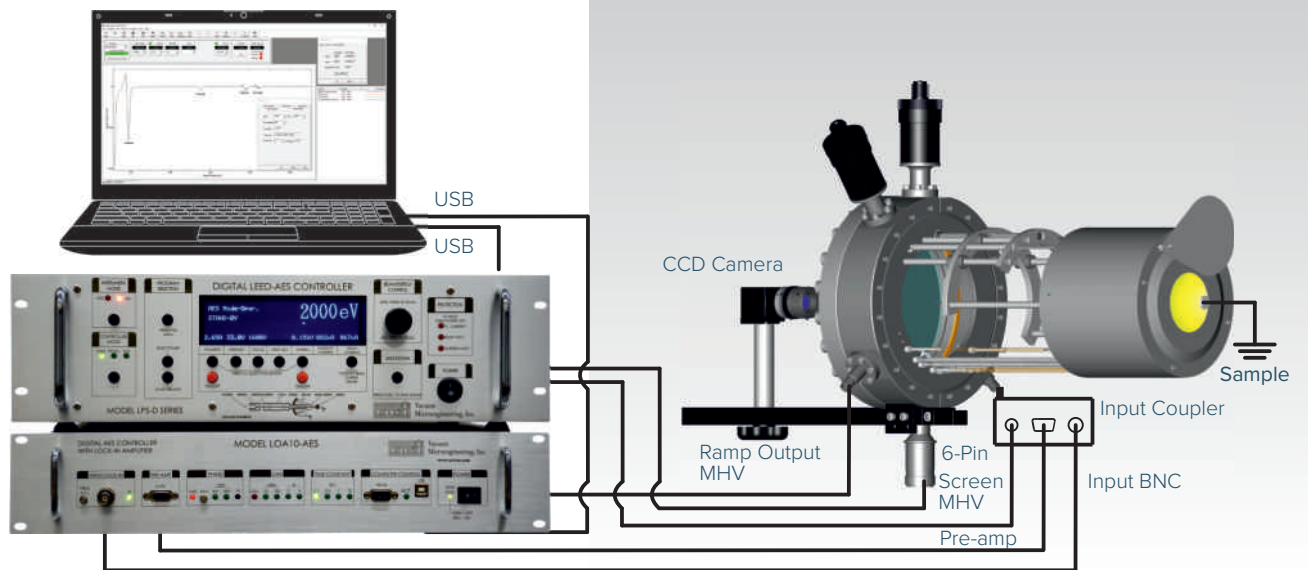
# IntegraLEED - MODEL LEED 800

## Connection Diagrams

### LEED Mode

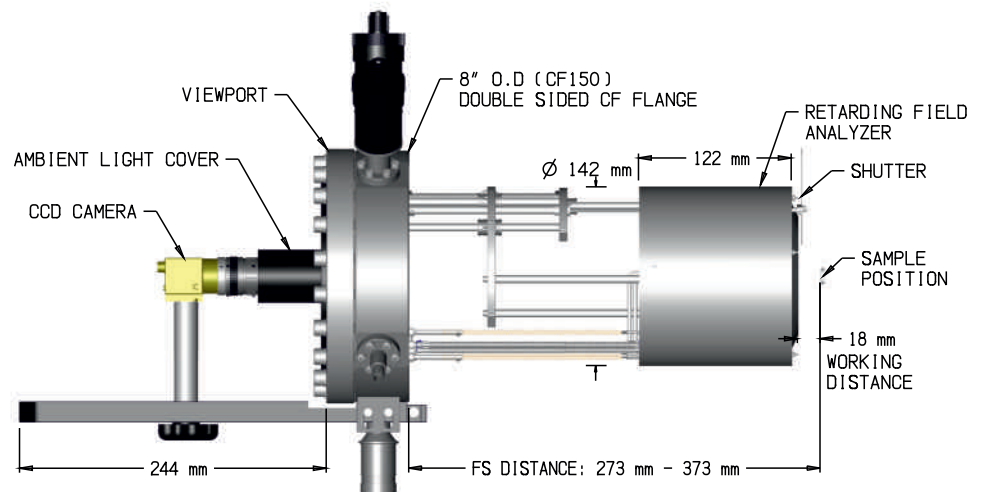


### AES Mode



## Schematic Drawings

### BDL800IR-LMX-ISH SIDE VIEW WITH 100mm RETRACTION



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## LEED Optics and UHV Chamber Configuration

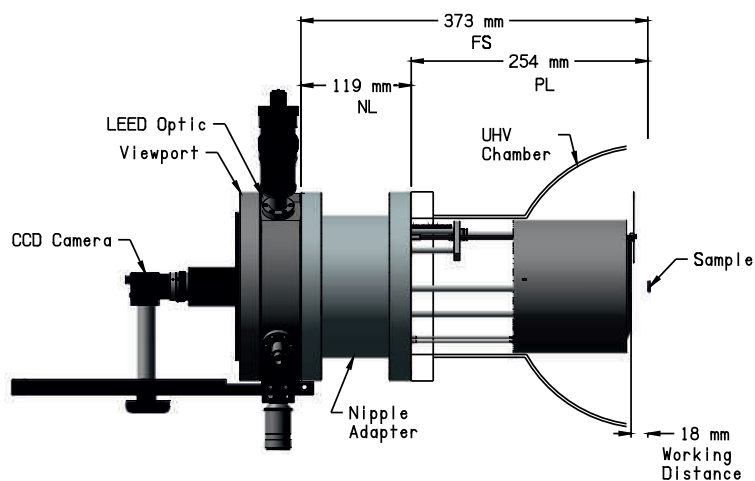
### Calculation formula for Flange-Sample distance and Retraction length:

$$FS = 173 \text{ mm} + 2 \text{ LMX} - OV$$

**FS** - flange to sample distance  
**LMX** - retraction length  
**OV** - overlapping length

**PL** - port length  
**NL** - nipple length

Schematic Diagrams for 100 mm Retraction



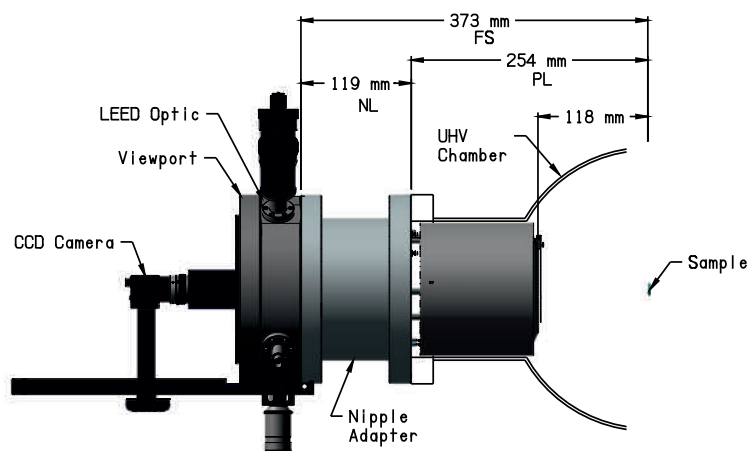
#### Example:

#### Operating (working) Position

FS: 373 mm PL: 254 mm

LMX: 100 mm NL: 119 mm

OV: 0 mm

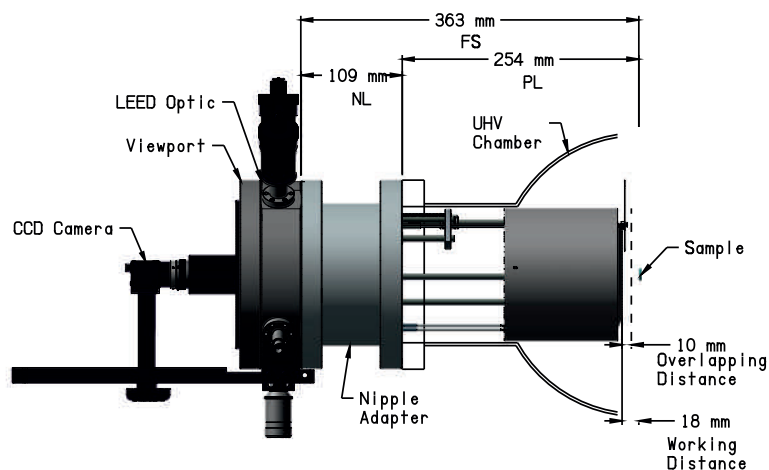


#### Retracted (parking) Position

FS: 373 mm PL: 254 mm

LMX: 100 mm NL: 119 mm

OV: 0 mm



#### Operating (working) Position with Overlap

FS: 363 mm PL: 254 mm

LMX: 100 mm NL: 109 mm

OV: 10 mm