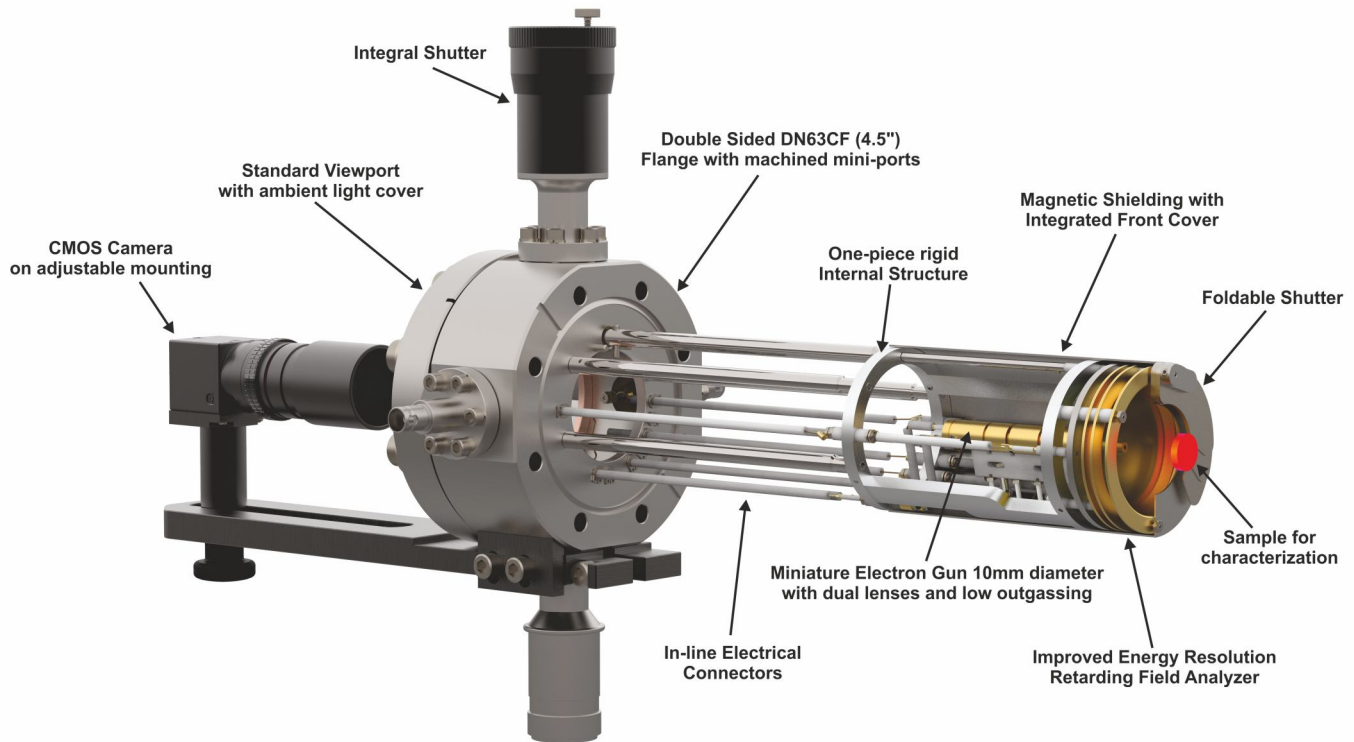


Surface Crystallography Spectrometer - IntegraLEED

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

MODEL LEED 450 (BDL450) with Integral Shutter



Features:

- High angular & energy resolution LEED & AES
- Miniature Electron Gun with double focusing
- Superior magnetic shielding
- Suitable for "in situ" epitaxial growth monitoring
- Integral Shutter
- External Linear Retraction
- Low Outgassing Rate
- Easy add-on AES

Applications

Miniature sized and high performance characterization tool for surface crystallography of single crystals and "in-situ" epitaxy.

The LEED 450 is capable of providing LEED and AES data for a wide range of samples.

The miniature instrument size allows for integration into any UHV system.

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 450

Specifications

LEED-AUGER OPTICS (Model BDL450)

Retarding Field Analyzer	Concentric assembly of hemispherical grids Working distance from sample 10 mm
Grid Material	Gold coated St-Steel wire mesh (100 mesh, 81% transparency)
Energy Resolution	0.2% - 0.5% at low modulation volt.
Glass-Display	Fused silica glass coated with indium-tin oxide conductive layer and P31 phosphor (ZnS:Ag:Cu-green, 525 nm wavelength) 83° angle of acceptance from sample at a distance of 34 mm
Monitoring	Standard viewport on DN63CF (4.5" CF) Flange
Linear Motion	External nipple with bellow up to 150mm retraction
Integral Shutter	Open and close at any position of the linear motion
Magnetic Shielding	Mu-metal cylinder with front cover for maximum magnetic field attenuation
Assembly	Extreme-high-vacuum compatibility with stainless steel, high alumina and gold-plated copper alloy materials
Mounting	DN63CF(4.5"CF) double sided conflat flange with port length range 145 mm - 580 mm
Bakeability	Under vacuum, 250°C maximum

Integral Miniature Electron Gun

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

Ordering Guide

LEED Application:

BDL450	LEED optics with integral electron gun on 4.5" flange - 3 Grids
LMX-EXT	External linear motion (nipple-bellow) (X=retraction distance)
ISH	Integral shutter
LPS075-D	Digital power supply with voltage range 0 - 750 V
LIM12	LEED imaging software with CMOS camera, full version (optional)
LIM12B	LEED imaging software with CMOS camera, basic version (optional)

LEED and AES Application:

BDL450	LEED optics with integral electron gun on 4.5" flange - 4 Grids
LMX-EXT	External linear motion (nipple-bellow) (X=retraction distance)
ISH	Integral shutter
LPS300-D	Digital power supply with voltage range 0 - 3 kV
LOA10-AES	Digital AES controller with ramp voltage, sinewave oscillator, lock-in and AES software
LIM12	LEED imaging software with CMOS camera, full version (optional)
LIM12B	LEED imaging software with CMOS camera, basic version (optional)

Control Electronics

LPS075-D Digital LEED

Power supply (0-750 V) with USB interface and PC control software for Windows 10/11. 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 10/11. 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 10/11. USB communication to PC.

LEED Software

LIM12B

Basic LEED pattern measurements and analysis software and hardware for Windows 10/11 including:

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

LIM12

Full version LEED pattern measurements and analysis software and hardware for Windows 10/11 including:

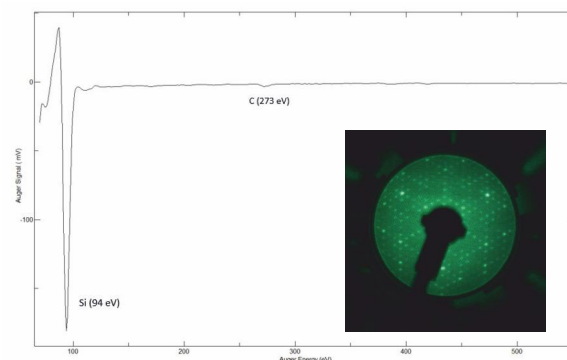
- CMOS camera
- Flange mounting kit with ambient light cover and cables
- Software features:
 - o Automatic LEED pattern acquisition
 - o Automatic I-V analysis with spot tracking
 - o Automatic I-T analysis
 - o Automatic spot profile analysis

CMOS Camera Specifications

- 12-bit color high-performance video CMOS camera with sensitivity control
- 1/3" CMOS sensor size, 1.6 MP (1440x1080) - sized images, 3.45 μ m pixel size, CS-mount lenses
- Linear Full Well: 9000e-, Dynamic Range: 47 dB

Data

LEED pattern and AES spectrum Si (111) - single crystal wafer at 80 eV beam energy after thermal annealing in UHV



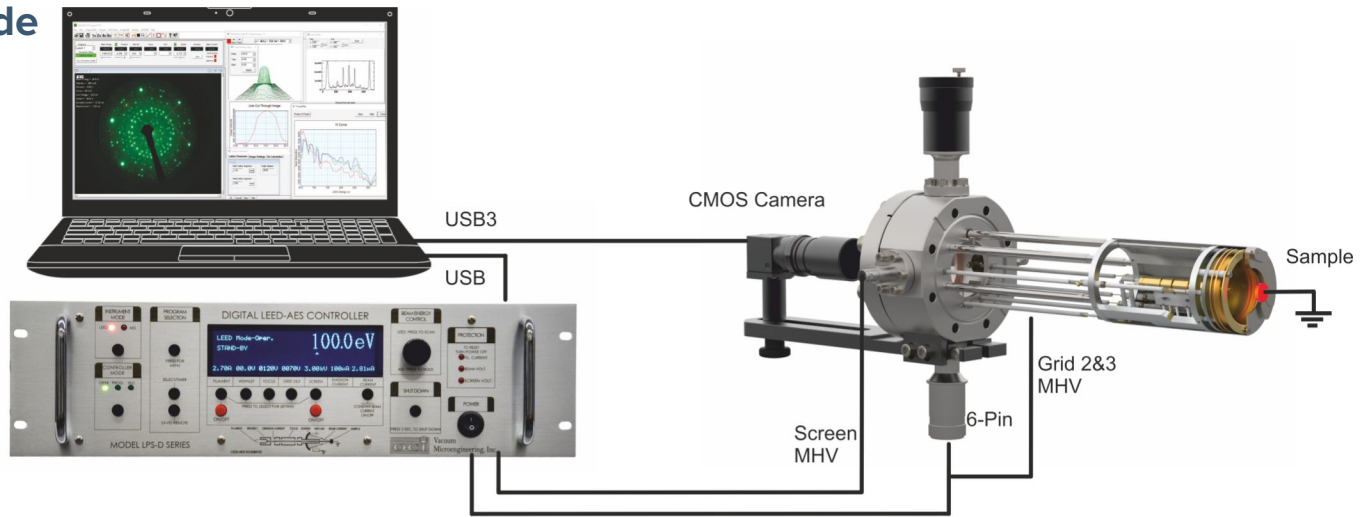
Link for more data:

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

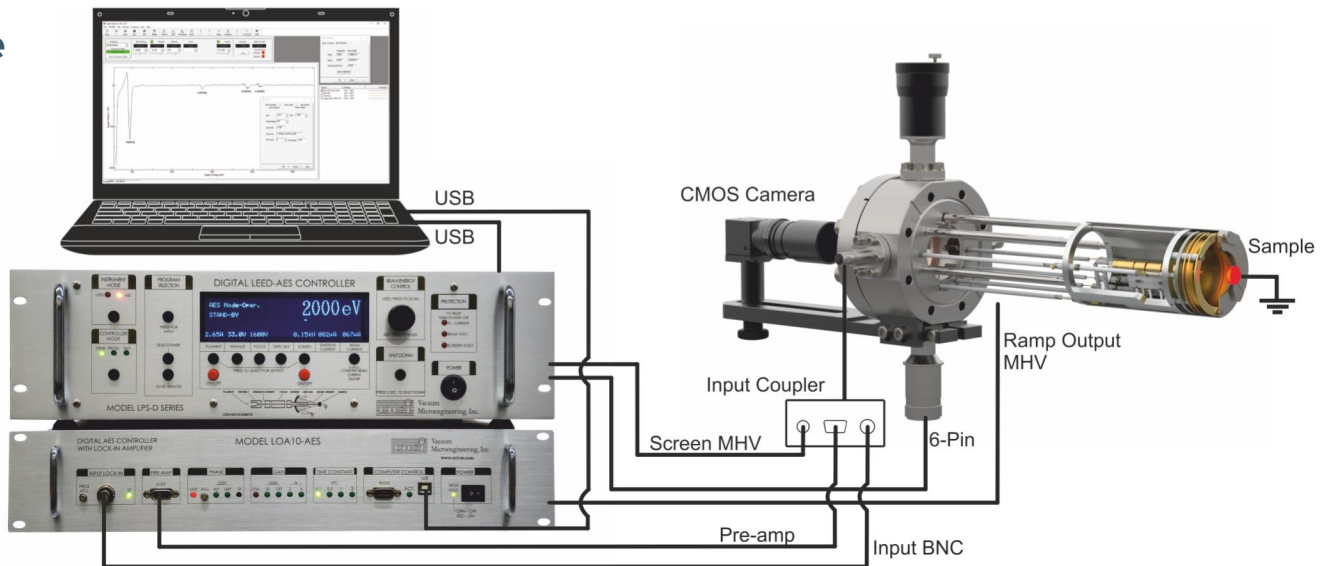
IntegraLEED - MODEL LEED 450

Connection Diagrams

LEED Mode

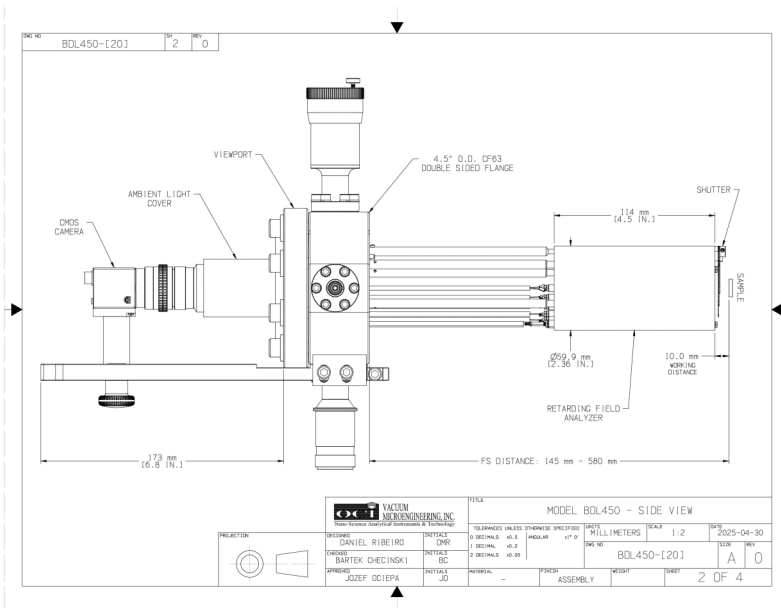


AES Mode



Schematic Drawings

BDL450-ISH SIDE VIEW WITH 100mm RETRACTION



IntegraLEED - MODEL LEED 450

LEED Optics and UHV Chamber Configuration

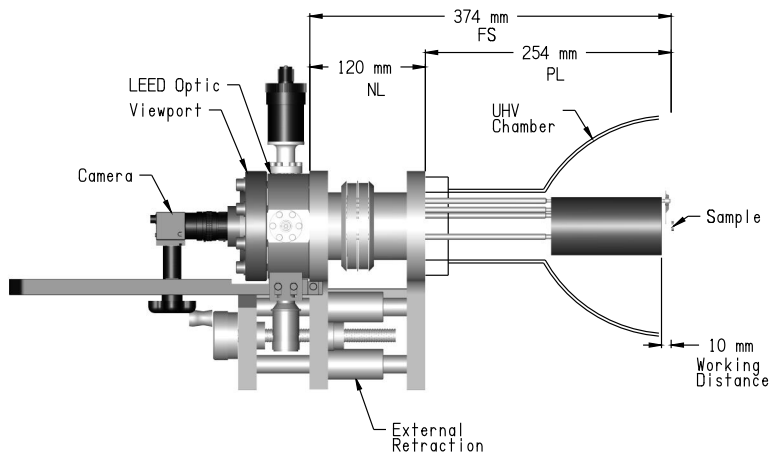
Calculation formula for Flange-Sample distance and Retraction length:

$$FS_w = OL + WD = PL + B + OV$$

$$FS_p = FS_w + LMX$$

FS_w - flange to sample distance in working position
 FS_p - flange to sample distance in parking position
 LMX - retraction length
 B - minimum bellow length
 OV - overlapping length

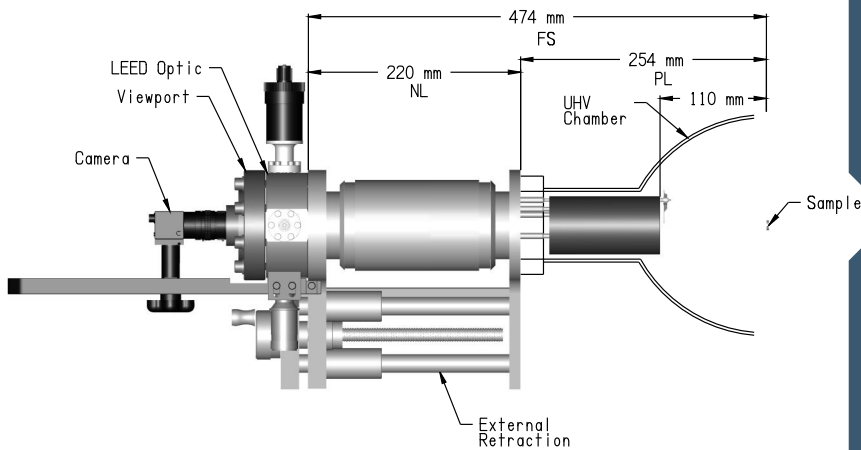
OL - fixed optic length
 WD - working distance
 PL - port length
 NL - current bellow length



Example:

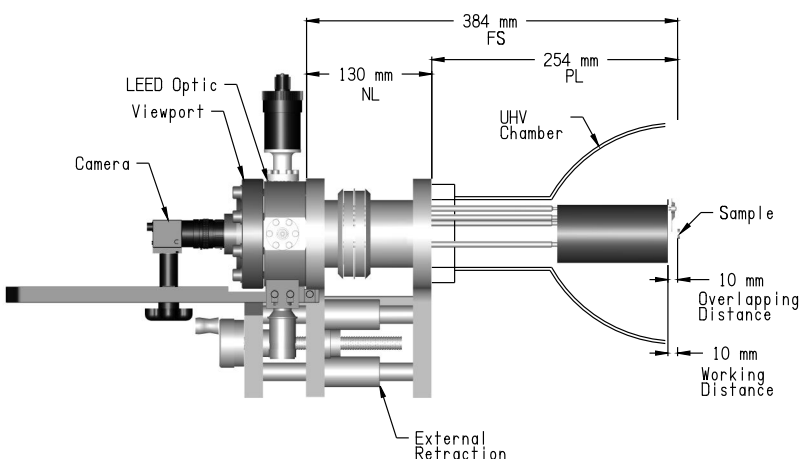
Operating (working) Position

FS_w : 374 mm PL: 254 mm
 LMX : 100 mm NL: 120 mm
 OV : 0 mm



Retracted (parking) Position

FS_p : 474 mm PL: 254 mm
 LMX : 100 mm NL: 220 mm
 OV : 0 mm



Operating (working) Position with Overlap

FS_w : 384 mm PL: 254 mm
 LMX : 100 mm NL: 130 mm
 OV : 10 mm