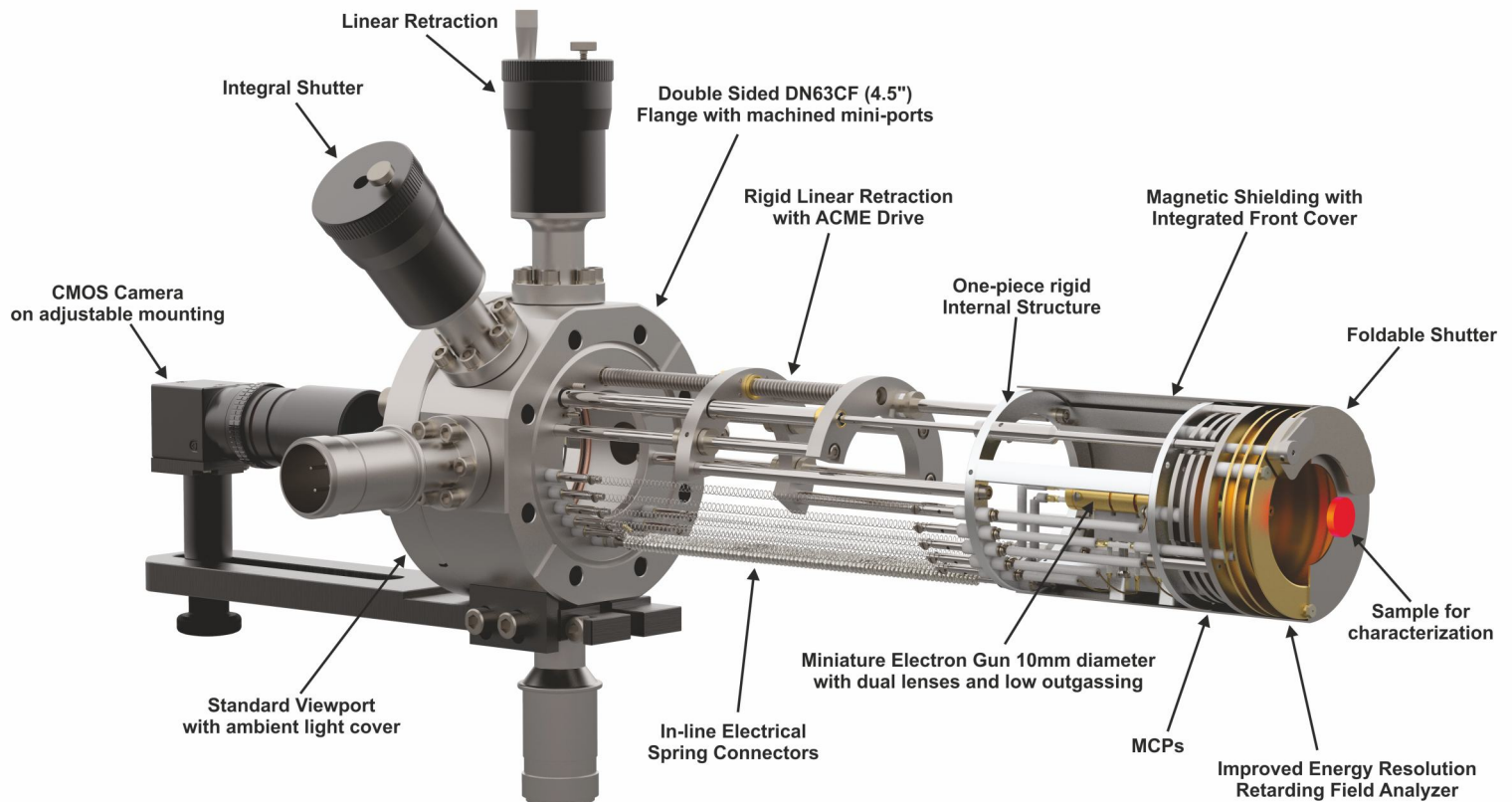


Surface Crystallography Spectrometer - IntegraLEED

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

Model LEED 450-MAX-MCP (BDL450-MAX-MCP) with Integral Retraction and Shutter



Mounting flange: 4.5" CF (DN63CF) with oversized tubing: 76mm (3") O.D.

Features:

- Mini MCP-LEED to fit any vacuum system
- High image sensitivity at the primary beam current 50 pA
- Single Microchannel Plates
- AES at beam current 50 uA - 10 uA
- Miniature Electron Gun with double focusing
- Superior magnetic shielding
- Integral Linear Motion and Shutter
- Low Outgassing Rate
- Easy add-on AES

Applications

The LEED 600 MCP is designed for high-sensitivity surface crystallographic and elemental analysis in a very compact size and at a low cost.

Provides precise LEED and AES characterization of delicate epitaxial films, including organic layers, while reducing electron beam damage and preserving structural integrity.

LEED and AES characterization is most effective on well-defined single crystals and epitaxial films. Typical application areas include 2D materials, semiconductor surfaces, metallic and oxide systems, and superconducting and magnetic films.

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

IntegraLEED - Model LEED 450-MAX-MCP

Specifications

LEED-AUGER OPTICS (Model BDL450-MAX)

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.
Microchannel Plate -Single plate	41mm working area, 12 μm pore size electron gain 10^4 spatial resolution 20 μm
Glass-Display	Fused silica glass coated with indium-tin oxide conductive layer and P31 phosphor (ZnS:Ag:Cu-green, 525 nm wavelength) 60° angle of acceptance from sample at a distance of 37 mm
Monitoring	Standard viewport on DN63CF (4.5" CF) Flange
Linear Motion	Up to 150 mm retraction from sample (100 mm standard); linear ball bearing and acme thread with all spring electrical connections
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) with oversized tubing: 76mm(3") O.D.
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 μA at 100 eV and 0.5 mm beam size AES - up to 100 μA at 3 keV
Beam Size	from 1 mm to 250 μm - 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-MAX-MCP	LEED optics with integral electron gun on 4.5" flange - 3 Grids
LMX	Linear motion (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-MAX-MCP	LEED optics with integral electron gun on 4.5" flange - 4 Grids
LMX	Linear motion (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, shut down, 10 memory settings including standby and outgassing mode with timer and 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 and 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

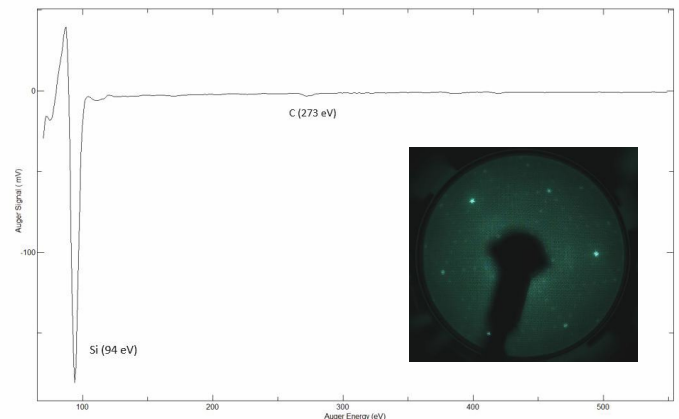
LIM12B	Basic LEED pattern measurements and analysis software and hardware for Windows 10/11 including: <ul style="list-style-type: none">·Automatic LEED pattern acquisition·CMOS camera·Flange Mounting kit with ambient light cover and cables
LIM12	Full version LEED pattern measurements and analysis software and hardware for Windows 10/11 including: <ul style="list-style-type: none">·CMOS camera·Flange mounting kit with ambient light cover and cables·Software features:<ul style="list-style-type: none">• Automatic LEED pattern acquisition• Automatic I-V analysis with spot tracking• Automatic I-T analysis• 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 μm pixel size, CS-mount lenses
- Linear Full Well: 9000e⁻, Dynamic Range: 47 dB

Data

LEED pattern and AES spectrum Si (111) - single crystal wafer after thermal annealing in UHV



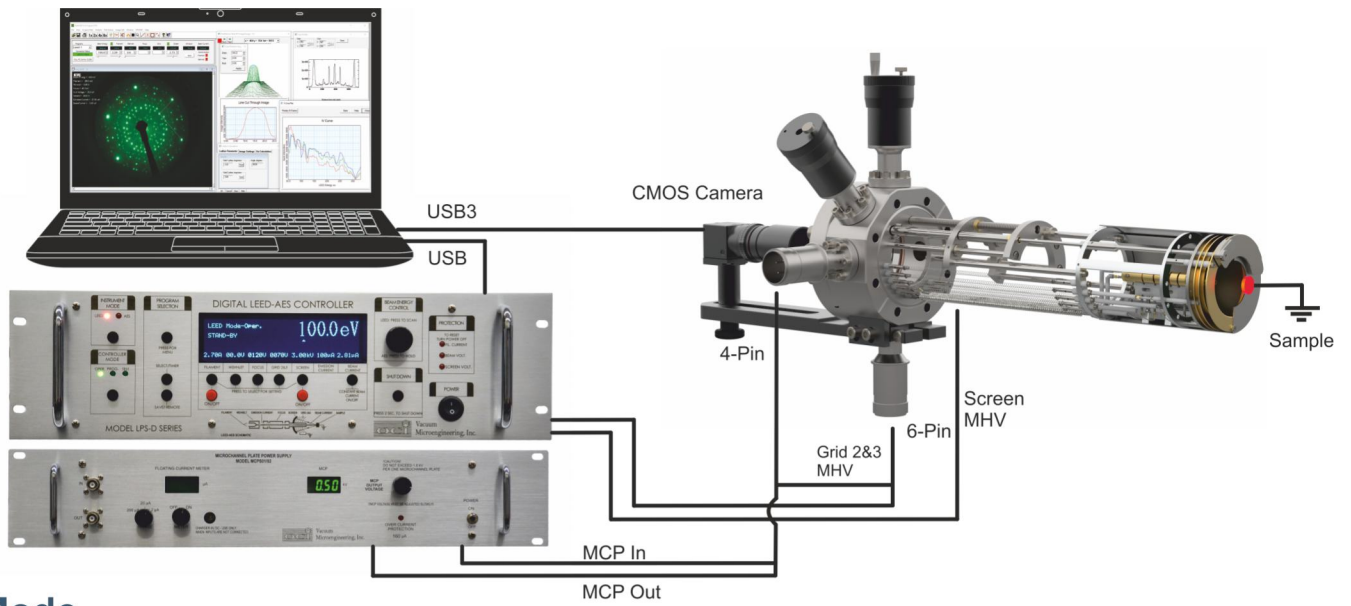
Link for more data:

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

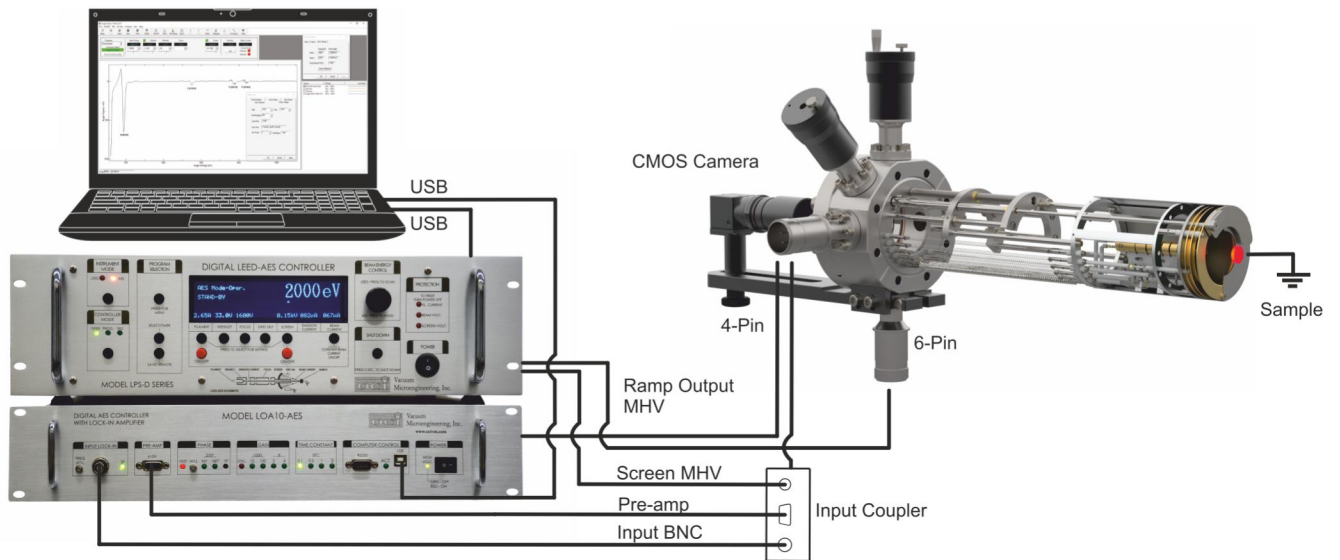
IntegraLEED - Model LEED 450-MAX-MCP

Connection Diagrams

LEED Mode



AES Mode



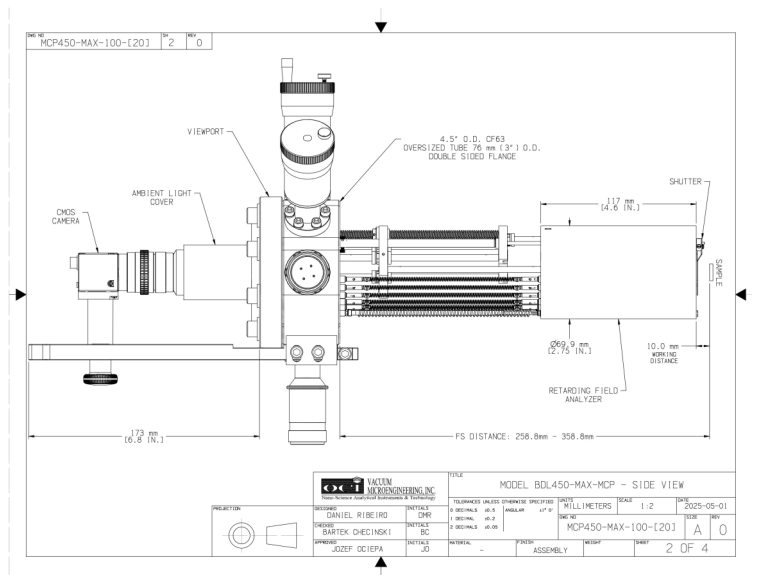
Schematic Drawings

BDL450MAX-MCP

Side view

With 100mm

RETRACTION



IntegraLEED - Model LEED 450-MAX-MCP

LEED Optics and UHV Chamber Configuration

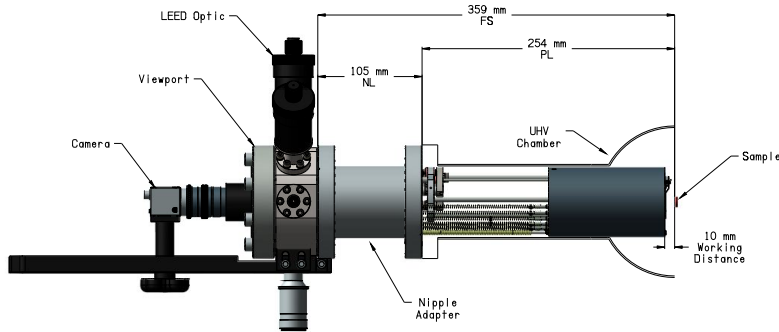
Calculation formula for Flange-Sample distance and Retraction length:

$$FS = 159 \text{ mm} + 2 \text{ LMX} - \text{OV}$$

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

PL - port length
NL - nipple length

Schematic Diagrams for 100 mm Retraction



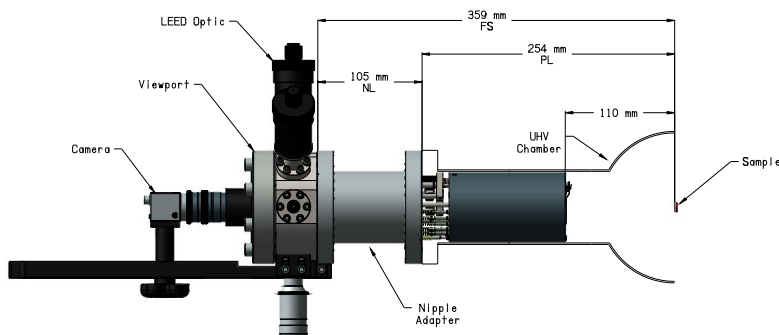
Example:

Operating (working) Position

FS: 359 mm PL: 254 mm

LMX: 100 mm NL: 105 mm

OV: 0 mm

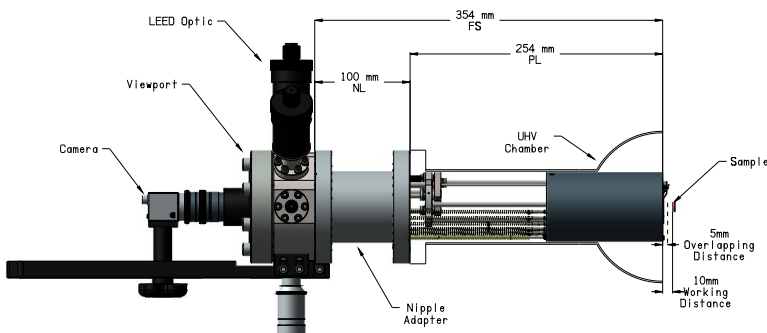


Retracted (parking) Position

FS: 359 mm PL: 254 mm

LMX: 100 mm NL: 105 mm

OV: 0 mm



Operating (working) Position with Overlap

FS: 354 mm PL: 254 mm

LMX: 100 mm NL: 100 mm

OV: 5 mm