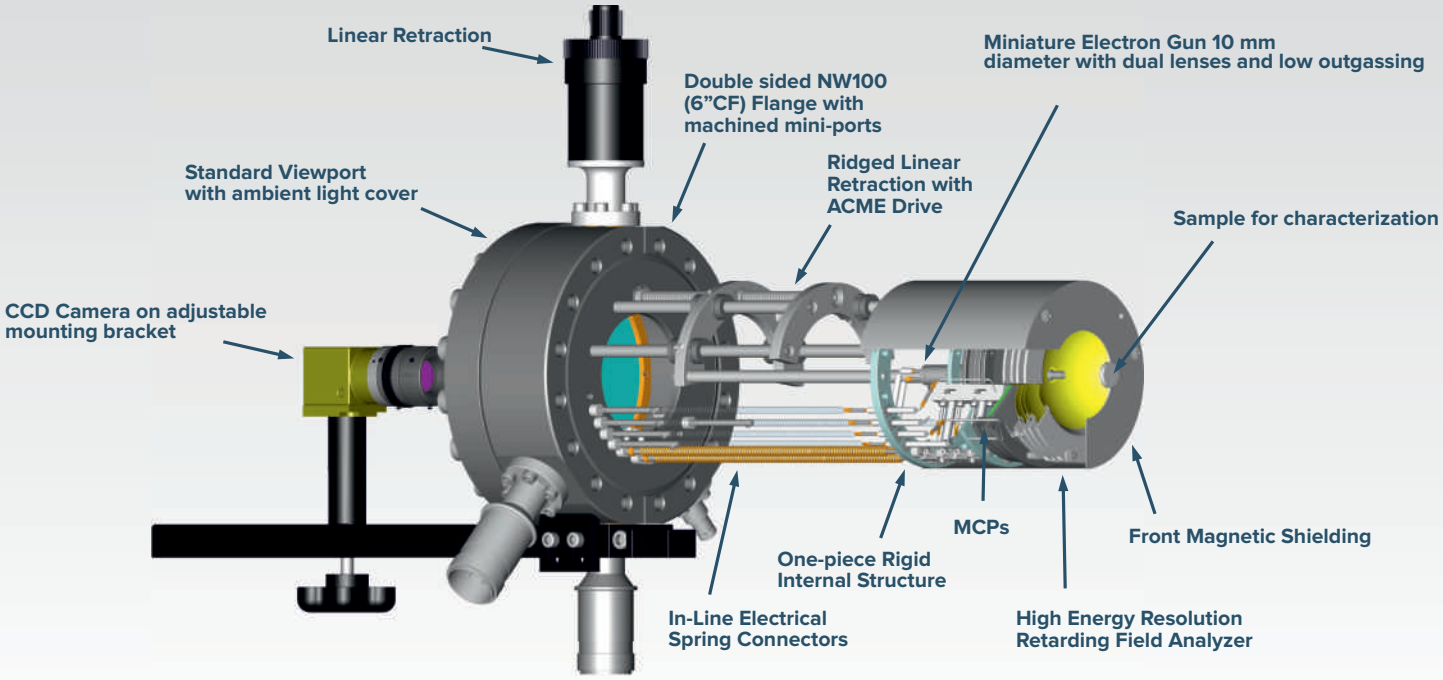
Surface Crystallography Spectrometer - IntegraLEED

based on Low Energy Electron Diffraction (LEED) and Auger Electron Spectroscopy (AES)
with gain power of Microchannel plates

MODEL LEED 600 (BDL600IR-MCP) with Integral Retraction



Features:

- High image sensitivity at the primary beam current - 50 pA
- Single/Dual 80 mm Microchannel Plates
- AES at beam current 50 uA - 10 uA
- Miniature Electron Gun with double focusing
- Superior magnetic shielding
- Integral Linear Motion
- Low Outgassing Rate
- Easy add-on AES

Applications

The LEED 600 MCP is especially good at providing LEED and AES data of organic samples.

The compact instrument size allows for easy installation to smaller UHV systems and the gain from the MCPs allows for better focusing of LEED imaging.

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

OCI Vacuum Microengineering Inc.

Canada: 200 Stronach Cres., London, Ontario, N5V3A1
USA: 6405 Inducon Drive West, Sanborn (Niagara County), NY, 14132
TEL. (519) 457-0878, FAX (519) 457-0837
E-mail: info@ocivm.com
Website: www.ocivm.com

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Specifications

LEED-AUGER OPTICS (Model BDL600IR-MCP)

Retarding Field Analyzer	Concentric assembly of hemispherical grids Working distance from sample 15 mm
Grid Material	Gold coated tungsten wire mesh (100 mesh, 81% transparency)
Energy Resolution	0.2% - 0.5% at low modulation volt.
Microchannel Plate	80 mm working area, 25 µm pore size
- single plate	electron gain – 10^4– $10,^5$ spatial resolution - 32 µm
- chevron	electron gain - 10^6- $10,^7$ spatial resolution - 70 µm
Glass-Display	Fused silica flat plate coated with indium-tin oxide conductive layer and P31 phosphor (ZnS:Ag:Cu-green, 525nm wavelength) 77° angle of acceptance from sample at a distance of 51mm
Monitoring	Standard viewport on NW100 (6"CF) Flange
Linear Motion	Up to 150mm retraction from sample (100mm standard); linear ball bearing and acme thread with all spring electrical connections
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	6"(CF100) double sided conflat flange with port length range 145mm - 500mm
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:

BDL600IR-MCP	LEED optics with integral electron gun and MCPs on 6” flange - 3 Grids
LMX	Linear motion (X=retraction distance)
LPS075-D	Digital power supply with voltage range 0 - 750 V
MCPS1/S2	Controller for microchannel plates with overvoltage and overcurrent protection
LIM12	LEED imaging software with CCD camera, full version (optional)
LIM12B	LEED imaging software with CCD camera, basic version (optional)

LEED and AES Application:

BDL600IR-MCP	LEED optics with integral electron gun and MCPs on 6” flange - 4 Grids
LMX	Linear motion (X=retraction distance)
LPS300-D	Digital power supply with voltage range 0 - 3 kV
MCPS1/S2	Controller for microchannel plates with overvoltage and overcurrent protection
LOA10-AES	Digital AES controller with ramp voltage, sinewave oscillator, lock-in and AES software
LIM12	LEED imaging software with CCD camera, full version (optional)
LIM12B	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.

MCPS1/S2
Electronics for one or two microchannel plates with digital displays of voltages and MCP load current measurments and protection.

LEED Software

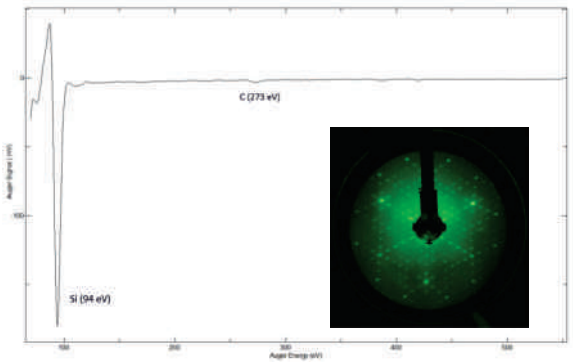
LIM12B
Basic LEED pattern measurements and analysis software and hardware for Windows 10 including:
- Automatic LEED pattern acquisition
- CCD camera
- Flange Mounting kit with ambient light cover and cables

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 um pixel size, CS-mount lenses
- Linear Full Well: 9000e-, Dynamic Range: 59 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

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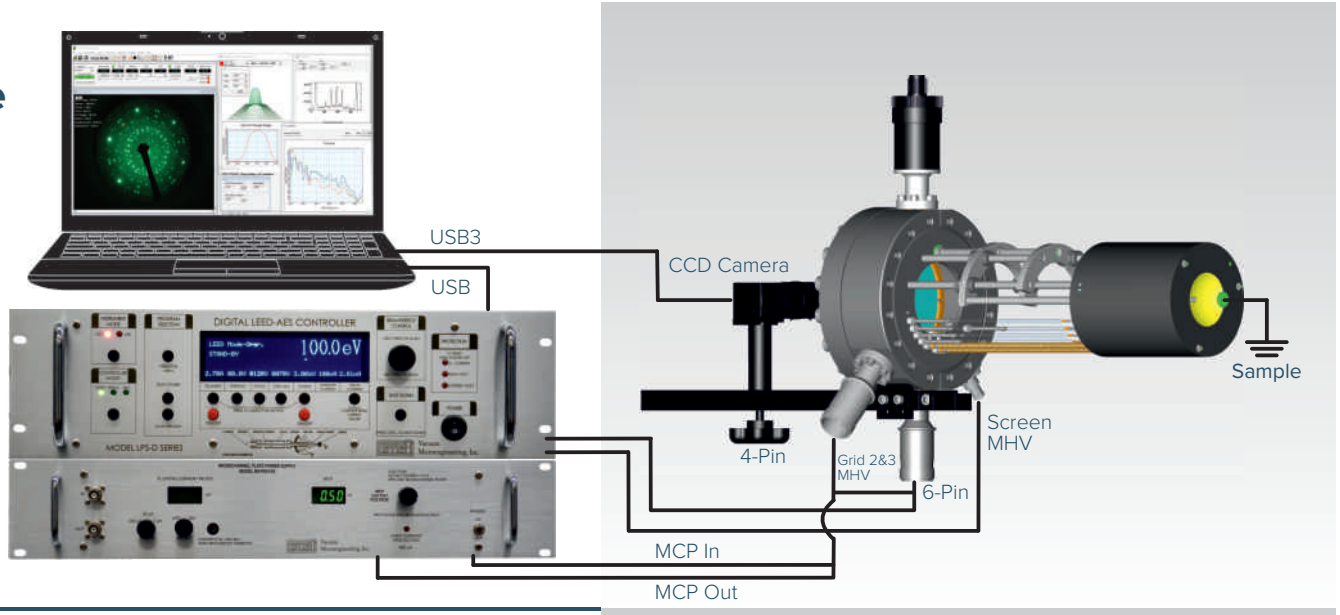
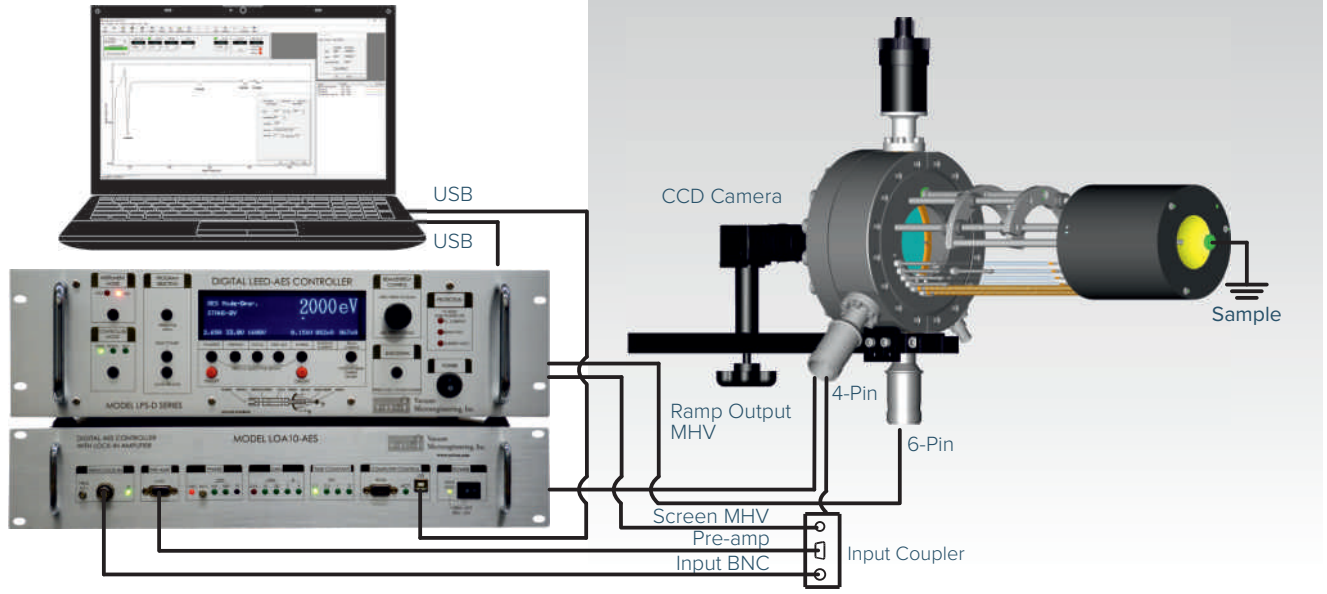
Connection Diagrams

LEED Mode



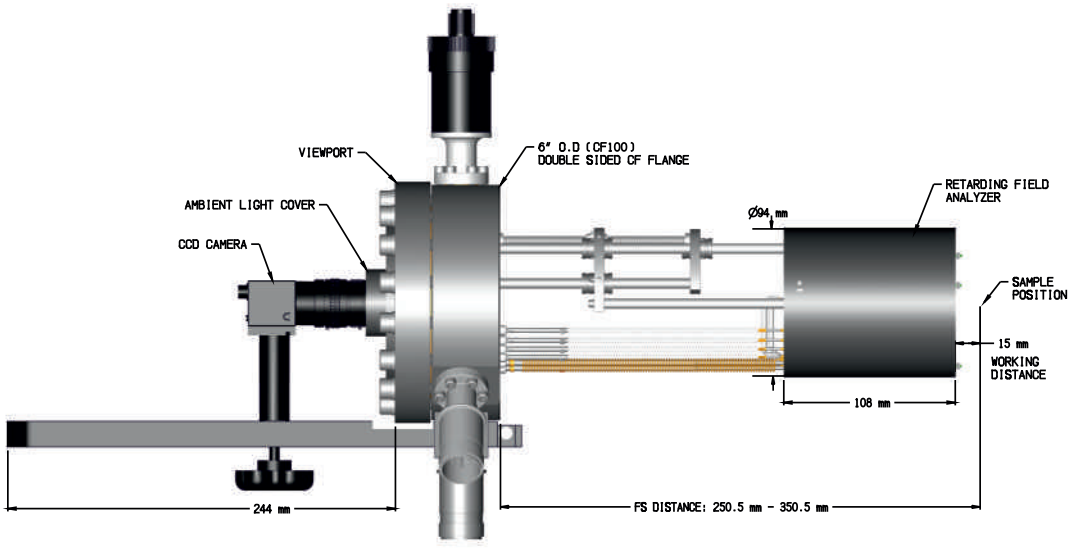
AES Mode



Schematic Drawings

BDL600-MCP-LMX

SIDE VIEW
WITH 100mm RETRACTION



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LEED Optics and UHV Chamber Configuration

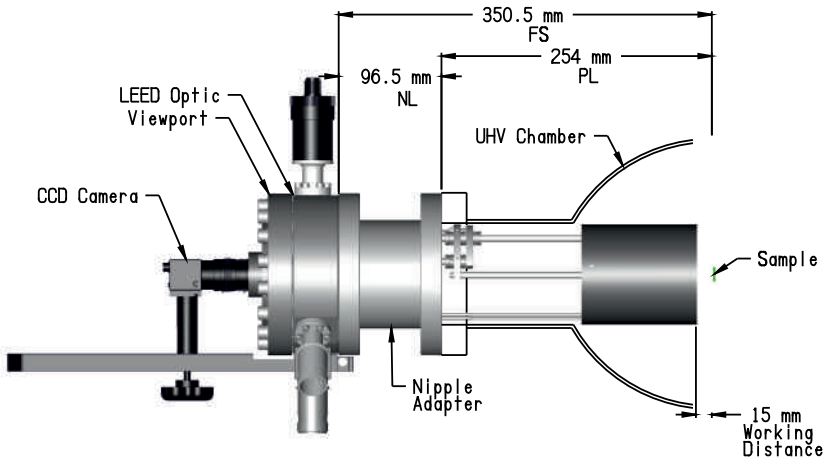
Calculation formula for Flange-Sample distance and Retraction length:

FS = 150.5 mm + 2 **LMX** - **OV**

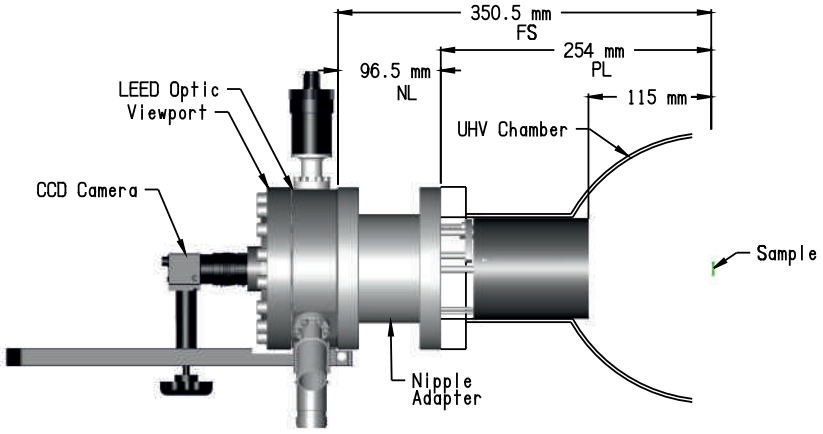
FS - flange to sample distance
LMX - retraction length
OV - overlapping length

PL - port length
NL - nipple length

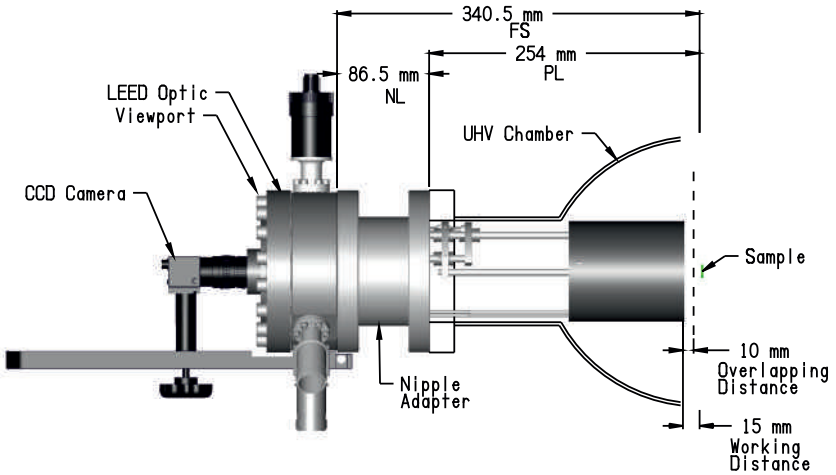
Schematic Diagrams for 100 mm Retraction



Example:
Operating (working) Position
FS: 350.5 mm PL: 254 mm
LMX: 100 mm NL: 96.5 mm
OV: 0 mm



Retracted (parking) Position
FS : 350.5 mm PL: 254 mm
LMX: 100 mm NL: 96.5 mm
OV: 0 mm



Operating (working) Position with Overlap
FS : 340.5 mm PL: 254 mm
LMX: 100 mm NL: 86.5 mm
OV: 10 mm