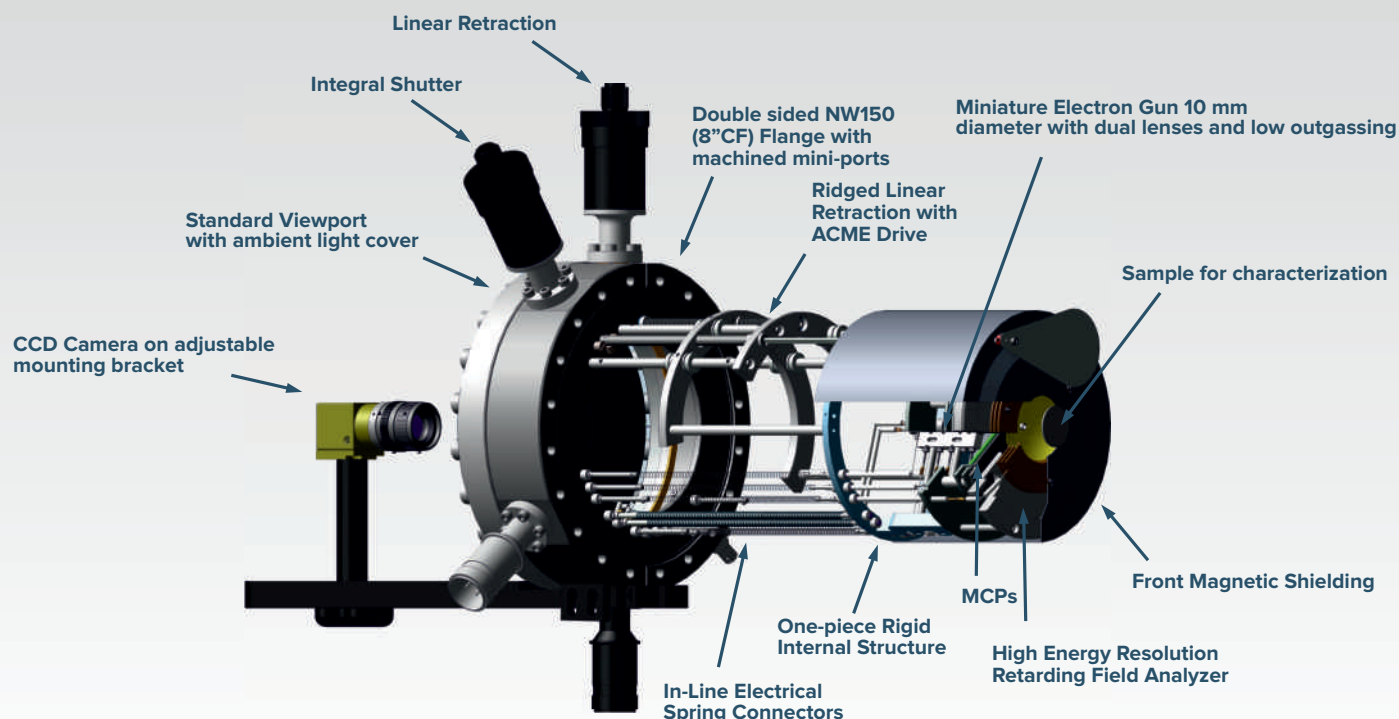


# Surface Crystallography Spectrometer - IntegraLEED

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

MODEL LEED 800 MCP (BDL800IR-MCP) with Integral Retraction and Shutter



## 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 and Shutter
- Suitable for ESDIAD
- Low Outgassing Rate
- Easy add-on AES

## Applications

The LEED 800 MCP is especially good at providing LEED and AES data of organic samples.

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

# IntegraLEED - MODEL LEED 800 MCP

## Specifications

### LEED-AUGER OPTICS (Model BDL800IR-MCP)

|                                        |                                                                                                                                                                                          |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Retarding Field Analyzer</b>        | Concentric assembly of hemispherical grids                                                                                                                                               |
|                                        | Working distance from sample 10 mm                                                                                                                                                       |
| <b>Grid Material</b>                   | Gold coated tungsten wire mesh<br>(100 mesh, 81% transparency)                                                                                                                           |
| <b>Energy Resolution</b>               | 0.2% - 0.5% at low modulation volt.                                                                                                                                                      |
| <b>Microchannel Plate</b>              | 80 mm working area, 25 $\mu$ m pore size                                                                                                                                                 |
| - single plate                         | electron gain – $10^4$ – $10^5$<br>spatial resolution - 32 $\mu$ m                                                                                                                       |
| - chevron                              | electron gain - $10^6$ - $10^7$<br>spatial resolution - 70 $\mu$ m                                                                                                                       |
| <b>Glass-Display</b>                   | Fused silica flat plate coated with indium-tin oxide conductive layer and P31 phosphor (ZnS:Ag:Cu-green, 525nm wavelength)<br>100° angle of acceptance from sample at a distance of 75mm |
| <b>Monitoring</b>                      | Standard viewport on NW150 (8"CF) Flange                                                                                                                                                 |
| <b>Linear Motion</b>                   | Up to 150mm retraction from sample (100mm standard);<br>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 145mm - 500mm                                                                                                               |
| <b>Bakeability</b>                     | Under vacuum, 250°C maximum                                                                                                                                                              |
| <b>Integral Miniature Electron Gun</b> |                                                                                                                                                                                          |
| <b>Beam Energy</b>                     | LEED 5 eV to 750 eV<br>AES 5 eV to 3000 eV                                                                                                                                               |
| <b>Beam Current</b>                    | LEED 2 $\mu$ A at 100 eV and 0.5 mm beam size<br>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,<br>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-MCP</b> | LEED optics with integral electron gun and MCPs<br>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>MCPS1/S2</b>     | Controller for microchannel plates with overvoltage and overcurrent protection |
| <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-MCP</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>MCPS1/S2</b>     | Controller for microchannel plates with overvoltage and overcurrent protection          |
| <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.

### MCPS1/S2

Electronics for one or two microchannel plates with digital displays of voltages and MCP load current measurements 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:

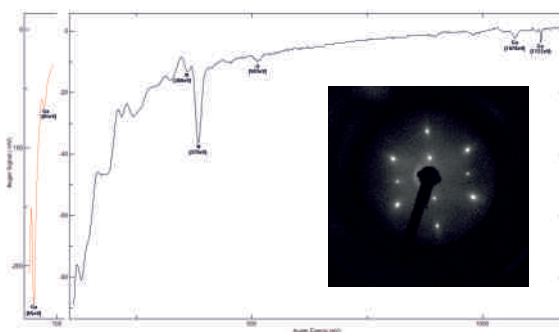
- CCD camera
- Flange mounting kit with ambient light cover and cables
- Software features:
  - o Automatic LEED pattern acquisition
  - o Automatic I-V analysis with spot tracking
  - o Automatic I-T analysis
  - o Automatic spot profile analysis

### 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  $\mu$ m pixel size, CS-mount lenses
- Linear Full Well: 9000e-, Dynamic Range: 59 dB

## Data

### LEED pattern and AES spectrum GaN (0001) - After thermal annealing in UHV



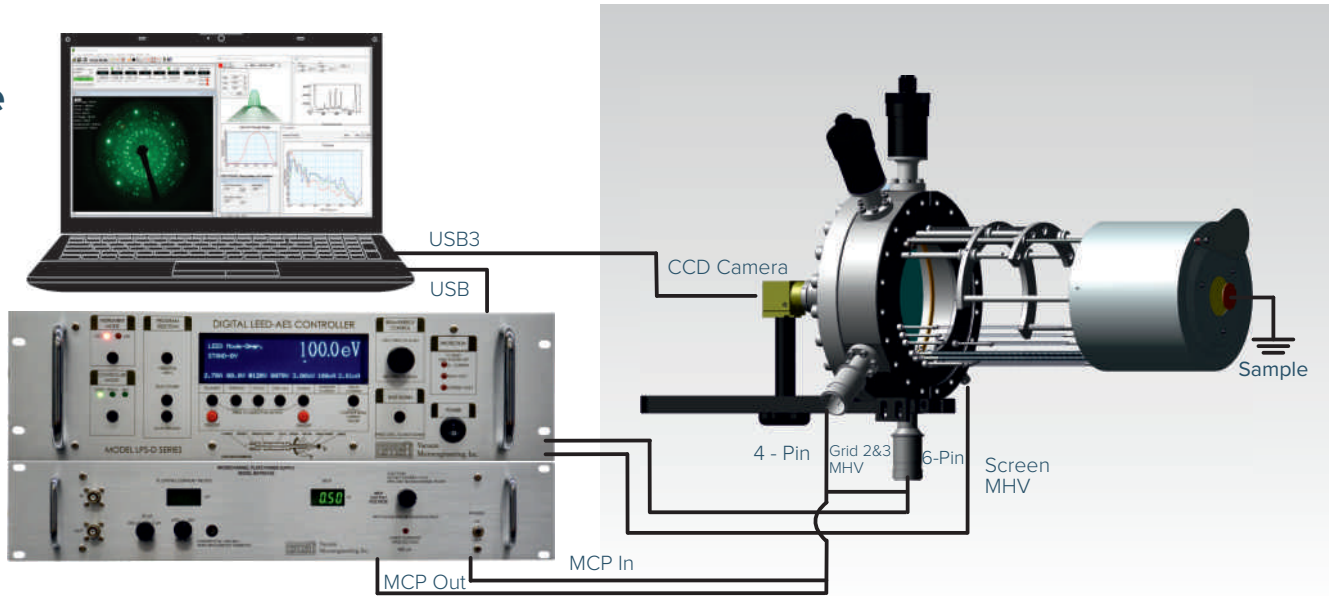
### Link for more data:

<http://www.ocivm.com/leedaesdata.html>

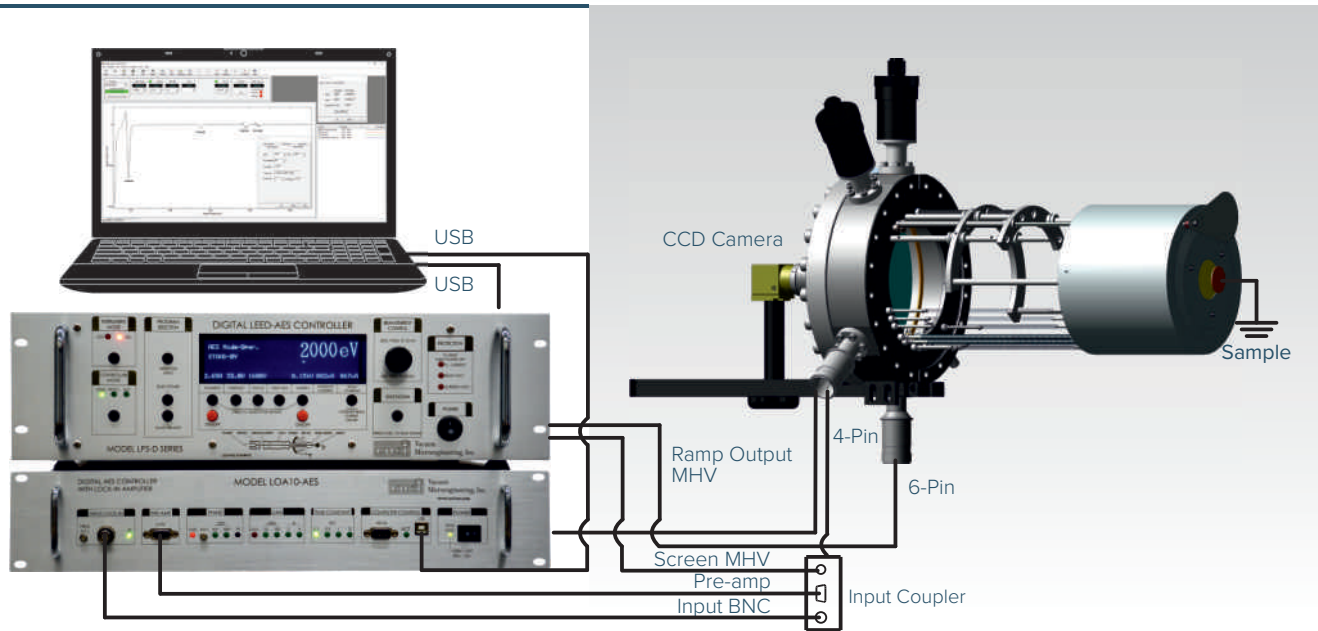
# IntegraLEED - MODEL LEED 800 MCP

## Connection Diagrams

### LEED Mode

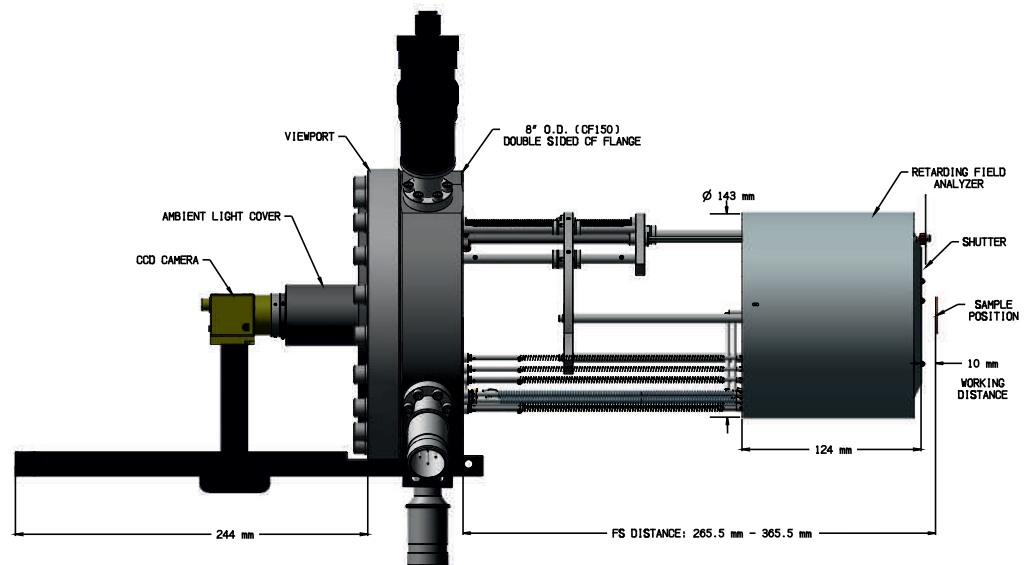


### AES Mode



## Schematic Drawings

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



# IntegraLEED - MODEL LEED 800 MCP

## LEED Optics and UHV Chamber Configuration

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

$$FS = 165.5 \text{ mm} + 2 \text{ LMX} - OV$$

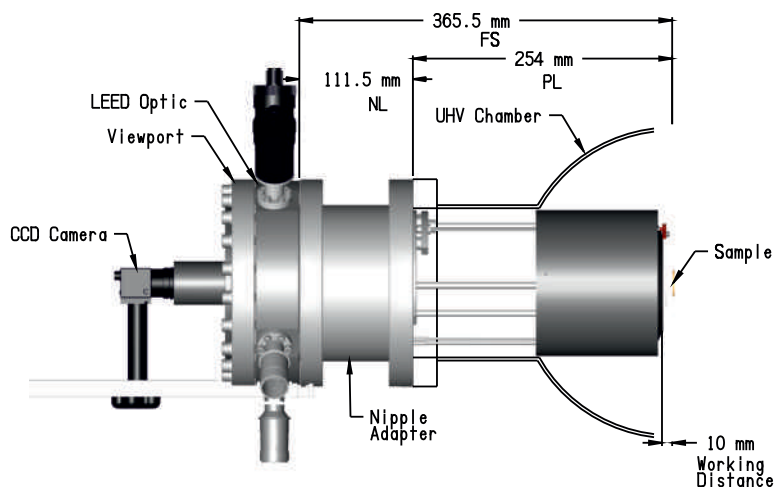
**FS** - flange to sample distance

**LMX** - retraction length

**OV** - overlapping length

**PL** - port length

**NL** - nipple length



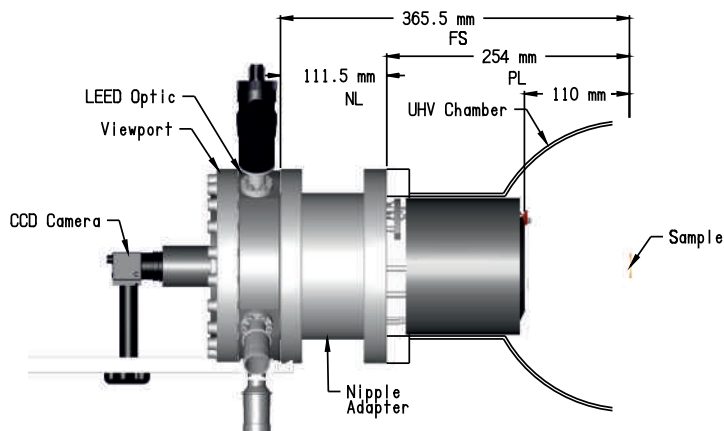
#### Example:

#### Operating (working) Position

FS: 365.5 mm PL: 254 mm

LMX: 100 mm NL: 111.5 mm

OV: 0 mm

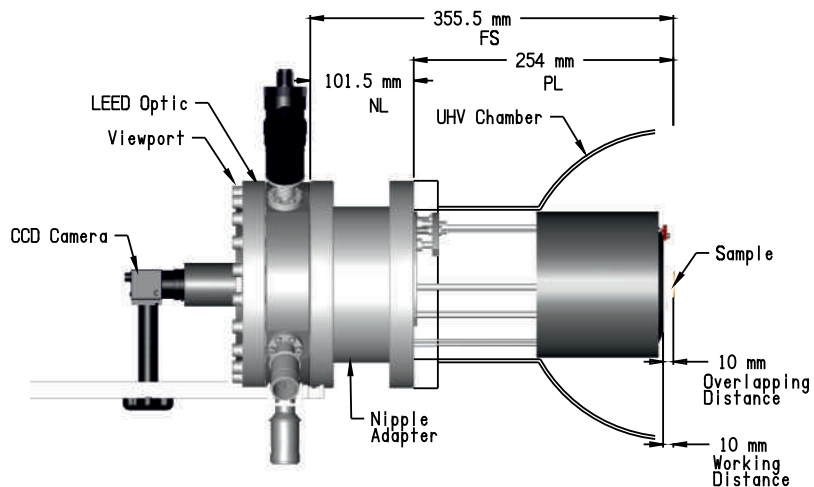


#### Retracted (parking) Position

FS : 365.5 mm PL: 254 mm

LMX: 100 mm NL: 111.5 mm

OV: 0 mm



#### Operating (working) Position with Overlap

FS : 355.5 mm PL: 254 mm

LMX: 100 mm NL: 101.5 mm

OV: 10 mm