INDUSTRIAL INSTRUMENTS

Industrial Instruments
General Brochure
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**Stereo Microscopes**

**SMZ Series**

The highly cost-effective SMZ series offer outstanding optical performance, flexible system expandability, and superb operability.

<table>
<thead>
<tr>
<th>Model</th>
<th>Zoom Ratio</th>
<th>Zoom Range</th>
<th>Total Magnification&lt;sup&gt;1&lt;/sup&gt;</th>
<th>WD&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Camera</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMZ25</td>
<td>25 : 1</td>
<td>0.63–15.75×</td>
<td>3.15–445× (6.3–157.5×)</td>
<td>60 mm</td>
<td>✔</td>
</tr>
<tr>
<td>SMZ18</td>
<td>18 : 1</td>
<td>0.75–13.5×</td>
<td>3.76–810× (7.5–130×)</td>
<td>60 mm</td>
<td>✔</td>
</tr>
<tr>
<td>SMZ1270</td>
<td>12.7 : 1</td>
<td>0.63–8×</td>
<td>3.15–480× (6.3–80×)</td>
<td>70 mm</td>
<td>✔</td>
</tr>
<tr>
<td>SMZ1270i</td>
<td>8 : 1</td>
<td>1–8×</td>
<td>5–480× (10–80×)</td>
<td>70 mm</td>
<td>✔</td>
</tr>
</tbody>
</table>

<sup>1</sup> Depending on combination of Eyepiece and Objective lens
<sup>2</sup> Combination of Eyepiece 10× and Objective lens 10×
<sup>3</sup> Objective lens 1× or no Auxiliary lens

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Please refer to individual product brochures for further details.
Industrial Microscopes

ECLIPSE Series

Nikon’s Industrial Microscopes utilize the CF60i-2 optical system, highly evaluated for providing a high NA combined with long WD.

Upright Microscopes (General model)

<table>
<thead>
<tr>
<th>Model</th>
<th>Observation Method</th>
<th>BF</th>
<th>DF</th>
<th>DIC</th>
<th>FL</th>
<th>POL</th>
<th>2-Beam</th>
<th>P-Ch</th>
<th>S-POL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV100ND</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>LV100NDA</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

LV150N
LV150NA
Stand and illumination units are selectable according to observation methods and purpose of use.

Inverted Metallurgical Microscopes

<table>
<thead>
<tr>
<th>Model</th>
<th>Observation Method</th>
<th>BF</th>
<th>DF</th>
<th>DIC</th>
<th>FL</th>
<th>POL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA100N</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MA200</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

LV100NPOL

Outstanding optical performance, perfect for a wide variety of imaging applications and polarizing observations.

Ci POL

Compact polarizing microscope that balances optical performance and ease of use.

Polarizing Microscopes

LV100NPOL

Handling Polarizing Episcopic/Diascopic

<table>
<thead>
<tr>
<th>Model</th>
<th>Observation Method</th>
<th>BF</th>
<th>POL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV100NPOL</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Ci POL

Handling Polarizing Episcopic/Diascopic

<table>
<thead>
<tr>
<th>Model</th>
<th>Observation Method</th>
<th>BF</th>
<th>POL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ci POL</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Please refer to individual product brochures for further details.
Digital Cameras for Microscopes

Digital Sight 1000
Equipped with a 2 megapixel CMOS image sensor, it can capture full HD microscope images. By connecting a computer to this camera and HDMI monitor, movies and images can be captured and saved onto a pre-inserted SD card in the camera.

DS-Fi3
Three main features of the previous models, high-resolution, high sensitivity and low noise, and high-speed live display are offered in 1 camera.

Digital Sight 10
This high-resolution camera captures both color and monochromatic images at up to 6,000 x 3,984 pixels. This enables the wide range of images to be captured and then many of them to be stitched together making a single and large combined image.

Frame Rate
<table>
<thead>
<tr>
<th>Max Recordable Pixels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920×1080</td>
</tr>
<tr>
<td>2880×2048</td>
</tr>
<tr>
<td>6000×3984</td>
</tr>
</tbody>
</table>

Max Recordable Pixels

- Color/mono: High-resolution
- 2.0 megapixel
- Color
- 5.9 megapixel
- High-resolution
- 23.9 megapixel
- High-resolution

Intuitive control of microscope cameras from tablet PCs
Easily view images and control image acquisition settings for the Digital Sight 1000/DS-Fi3/Digital Sight 10 camera on a tablet PC using NIS-Elements L.

NIS-Elements L displays various menus for image capture, saving, display, measurement and annotations using intuitive icons. It also supports touch screen operation.

Users Interface for naturally simple operation
NIS-Elements L enables the conducting of simple measurements on images, with input of lines and comments. These can also be written onto and saved with the image, and measurement data can be output.

A wide variety of tools
- Measurement function
  - Line distance
  - Area
  - Circle
  - Circle distance
  - Pitch distance
  - Angle
- Annotate function
  - Line
  - Arrow
  - Text
  - Marker
  - Polyline
- Gratitude/scale function
  - Grid
  - Horizontal scale
  - Vertical scale

Scene mode
Ten camera setting patterns for optimal color reproduction and contrast for each microscope light source, observation method and type of sample, as well as custom settings, can be selected.

Industrial Scene Mode
- Wafer/IC
- Metal
- Circuit board
- Flat Panel Display

Manual measurement and image annotation
Manual Measurement allows easy measurement of length and area by drawing lines or an object directly on the image. The results can be attached to the image, and also exported as text or to an Excel spreadsheet.

HDR (High Dynamic Range) image acquisition
HDR creates an image with appropriate brightness in both the dark and bright regions in a sample by combining multiple images acquired with different exposure settings. It is also possible to create HDR image using multiple captured images.

EDF (Extended Depth of Focus)
Selects the in-focus area and produces one all-in-focus image

Auto measurement (Object Counting)
Performs binarization on images using previously set thresholds to measure the number, area, brightness, etc. of identified objects.

Integration with Nikon’s Software Imaging Platform
Nikon’s universal software platform, NIS-Elements combines powerful image acquisition, analysis, visualization and data sharing tools. With fully customizable user interfaces and seamless integration of Nikon microscopes, cameras and a wide variety of peripheral devices, NIS-Elements can serve as a simple interface for photo-documentation or power complex, conditional workflows with automated imaging and analysis routines. The NIS-Elements platform features various packages and software modules to meet the needs of even the most challenging applications.

Please refer to individual product brochures for further details.
**Objective Lenses**

Nikon’s CFI60-2/CFI60 optical systems are highly evaluated for their unique concept of high NA combined with a long working distance. These lenses have been developed further and evolved achieving the apex in long working distance specifications, correct chromatic aberration, and an optimized lens weight.

<table>
<thead>
<tr>
<th>Objective Lenses</th>
<th>WF</th>
<th>Magnification</th>
<th>NA</th>
<th>Dimensions (W×D×H)</th>
<th>Weight (approx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T Plan EPI Plan (Achromatic)</td>
<td>40×</td>
<td>0.65</td>
<td>1.0</td>
<td>40×40×89.2 mm</td>
<td>410 g</td>
</tr>
<tr>
<td>T Plan EPI Universal Plan Fluor (Semi-apochromat)</td>
<td>10×</td>
<td>0.3</td>
<td>0.3</td>
<td>40×40×156.1 mm</td>
<td>690 g</td>
</tr>
<tr>
<td>CM-10A/CM-10L</td>
<td>4×</td>
<td>0.2</td>
<td>0.2</td>
<td>4×40×117 mm</td>
<td>340 g</td>
</tr>
<tr>
<td>CM-20A/CM-20L</td>
<td>10×</td>
<td>0.7</td>
<td>0.3</td>
<td>10×40×214.2 mm</td>
<td>340 g</td>
</tr>
<tr>
<td>CM-30A/CM-30L</td>
<td>20×</td>
<td>0.4</td>
<td>0.3</td>
<td>20×40×299.4 mm</td>
<td>340 g</td>
</tr>
<tr>
<td>CM-70L</td>
<td>50×</td>
<td>0.2</td>
<td>0.2</td>
<td>50×40×228.6 mm</td>
<td>340 g</td>
</tr>
<tr>
<td>CM-5A</td>
<td>100×</td>
<td>0.1</td>
<td>0.1</td>
<td>100×40×292.5 mm</td>
<td>340 g</td>
</tr>
</tbody>
</table>

**For Incorporation into Microscopes**

**Modular Focusing Units**

**CM Series**

Ultra-compact reflected microscopes designed for integration into production lines to observe monitors.

<table>
<thead>
<tr>
<th>IM-4</th>
<th>LV-IM/LV-IMA</th>
<th>LV-FM/LV-FMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Manual / Motorized</td>
<td>Manual / Motorized</td>
</tr>
<tr>
<td>Mounting assembly</td>
<td>30 mm</td>
<td>300/20 mm</td>
</tr>
</tbody>
</table>

**Wafer Loaders**

Nikon’s proprietary technology ensures reliable loading of ultra-thin 100 µm wafers. The NWL 200 series achieve highly reliable loading, suitable for inspection of next-generation semiconductors.

<table>
<thead>
<tr>
<th>NWL200 Series</th>
<th>( \text{Diameter} )</th>
<th>Minimum thickness (standard)</th>
<th>Minimum thickness (option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{Diameter} )</td>
<td>400 mm</td>
<td>150 mm</td>
<td>300 um</td>
</tr>
<tr>
<td>( \text{Weight} )</td>
<td>440 g</td>
<td>290 g</td>
<td>400 g</td>
</tr>
</tbody>
</table>

Re: refer to individual product brochures for further details.
Wide variety of stage measurements and magnifications are available for various customer requirements.

### Main Body (Type / Stage Stroke)

<table>
<thead>
<tr>
<th>Model</th>
<th>Wide FOV</th>
<th>Standard</th>
<th>High-precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMA</td>
<td>250×200 mm</td>
<td>300×200 mm</td>
<td>300×200 mm</td>
</tr>
<tr>
<td>VMZ-S</td>
<td>300×200 mm</td>
<td>300×200 mm</td>
<td>300×200 mm</td>
</tr>
<tr>
<td>VMZ-H</td>
<td>300×200 mm</td>
<td>300×200 mm</td>
<td>300×200 mm</td>
</tr>
</tbody>
</table>

### Zoom Heads

<table>
<thead>
<tr>
<th>Type</th>
<th>Wide FOV</th>
<th>Standard</th>
<th>High-precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>W/40×100 mm</td>
<td>W/40×100 mm</td>
<td>W/40×100 mm</td>
</tr>
<tr>
<td>Type 1-4</td>
<td>W/40×100 mm</td>
<td>W/40×100 mm</td>
<td>W/40×100 mm</td>
</tr>
<tr>
<td>Type TZ</td>
<td>W/40×100 mm</td>
<td>W/40×100 mm</td>
<td>W/40×100 mm</td>
</tr>
</tbody>
</table>

### High-precision Model VMZ-H

- **Micro boards** (line width, thickness), next-generation semiconductor packages (WLP, bump height), precision molds, rewiring masks, MEMS masks, etc.
- **Thin Transparent Samples (mm)**
- **Please refer to individual product brochures for further details.**
- **Confocal NEXIV Series**
  - **Simultaneous wide-area height measurements with confocal optics and 2D measurement with 15× brightfield zoom optics.**

### Confocal NEXIV Series

<table>
<thead>
<tr>
<th>Model</th>
<th>X Y Stroke</th>
<th>Width</th>
<th>Length</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMZ-K3040</td>
<td>300×400 mm</td>
<td>650×550 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMZ-K6555</td>
<td>650×550 mm</td>
<td>650×550 mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Zoom Heads

- **Type A**
- **Type 1-4**
- **Type TZ**

### High Contrast and Multi-leveled Sample (PLCs)

Brightfield observation can sometimes be difficult due to blurred lines along sample structure. These lines can be clearly observed and measured using Confocal optics.

### Thin Transparent Samples (Metal Surface Film / Semiconductor Array)

Top layers of both thin transparent film and metal surface can be easily detected using Confocal optics.
Data Processing Systems for Measuring Microscopes and Profile Projectors

Measuring Microscopes

Focused on high-precision and easy operability, a wide range of MM-products are available.

<table>
<thead>
<tr>
<th>MM Type</th>
<th>Compact Model</th>
<th>Basic Model</th>
<th>Large-Stage Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM-200</td>
<td>MM-400N</td>
<td>MM-800N</td>
<td></td>
</tr>
</tbody>
</table>

MM Type

With Nikon's optical technology and highly precise stages, high-precision measurement can be achieved.

Universal Type

Offers a line-up compatible with dimensional measurement and various observation methods.

High-Precision Stages

The coarse/fine changeover lever and the RESET and SEND buttons are located near the X- and Y-axis knobs.

Focusing Aid (FA)

The Split-Prism FA delivers sharp patterns to allow accurate focusing during 2-axis measurements. FA patterns are clearly visible because they are split vertically.

Profile Projectors

Nikon's profile projectors apply the principles of optics to the inspection of manufactured parts by projecting magnified silhouettes on a screen.

<table>
<thead>
<tr>
<th>Desktop Model</th>
<th>Large-Screen Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-12B</td>
<td>V-20B</td>
</tr>
</tbody>
</table>

Nikon’s profile projectors apply the principles of optics to the inspection of manufactured parts by projecting magnified silhouettes on a screen.

Data Processing Software

E-MAX

Provides the user with various advanced measurements and processing functions. Automated edge detection with sub-pixel processing enables more precise and repeatable measurements.

Data Processor

DP-E1A

Effectively used with a measuring microscope / profile projector, it quickly calculates and processes measurement data. Feature Oriented Operation of the DP-E1A allows the user to conduct measurements with the graphics, providing a seamless measuring environment.

Please refer to individual product brochures for further details.
Autocollimator is an easy-to-use but precise metrology instrument for angularity, parallelism, perpendicularity, straightness of precision components machine guide-way and many other applications.

**Optical Flat / Optical Parallel / Standard 300 mm Scale**

**Optical Flat**

The optical flat is used to check the flatness level of a surface provided with mirror-smooth finish. Flatness level can be measured by observing interference fringes by placing the optical flat in contact with the sample.

![Optical Flat](image)

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Glass (ø60 mm)</th>
<th>Glass (ø130 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>15 mm</td>
<td>27 mm</td>
</tr>
<tr>
<td>Flatness</td>
<td>0.1 µm</td>
<td>0.1 µm</td>
</tr>
</tbody>
</table>

**Optical Parallel**

Both planes of the optical parallel have been precisely finished flat and parallel. It is used to check the flatness and parallel levels of a sample by observing interference fringes by placing the optical flat in contact with the sample.

![Optical Parallel](image)

**Standard 300mm Scale**

Gauges stage travel accuracy up to 300 mm. Both 10 mm-interval sensor patterns and calibrations are provided. Made of the glass with low coefficient of thermal expansion, for minimizing thermal influence.

*Within 1 µm against compensation values.*

*Optical flats and parallels with greater precision are available by custom orders.*

**DIGIMICRO**

With built-in photoelectric digital length measuring systems, DIGIMICRO offers flawless contact measurements of dimension, thickness, and depth.

<table>
<thead>
<tr>
<th>Main unit</th>
<th>MF-1001</th>
<th>MF-501</th>
<th>MH-15M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>0–100 mm</td>
<td>0–50 mm</td>
<td>0–15 mm</td>
</tr>
<tr>
<td>Accuracy (µm)</td>
<td>3 µm</td>
<td>1 µm</td>
<td>0.7 µm</td>
</tr>
<tr>
<td>Measuring force</td>
<td>Downward direction 1.225N to 1.813N (variable to about 0.441N), lateral 0.637 to 1.225N</td>
<td>Downward direction 1.225N to 1.617N (variable to about 0.294N), lateral 0.637 to 1.225N</td>
<td>Upward direction 0.245N, downward 0.637N, lateral 0.441N</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>5 to 40°C</td>
<td>5 to 40°C</td>
<td>5 to 40°C</td>
</tr>
</tbody>
</table>

Refeer to individual product brochures for further details.