PROFILE PROJECTORS

V-20B

V-12B
PROFILE PROJECTOR

V-20B

Profile projector with an effective 500mm screen diameter

Large effective screen diameter of 500mm. Permits mounting of a large stage and includes a built-in digital counter and digital protractor.

V-20B configured with PS 10x6B Stage + DP-E1A

SYSTEM DIAGRAM

*1: Standard accessory   *2: Letters above the stages represent accessories that can be mounted.  
*3: To use the Foot Switch and [Reset/Send] buttons simultaneously, the "MM cable for simultaneous use (PXA20224)" is required.  
*4: 5x projection lens is not available.
**Parfocal projection lenses**

All projection lenses have the same parfocal distance and feature long working distances. The built-in half mirror eliminates the need to adjust illumination each time the magnification is changed. With improved images with excellent quality, while enabling observation in a comfortable posture by adjusting the eye-point height.

**Workpieces up to 20kg measurable**

The stage up/down movement unit is rigidly built, and if the PS 10x6B Stage is used, workpieces as heavy as 20kg can be loaded.

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**Stage Adapter S**  For the V-20B

This adapter is used to mount a stage other than the PS 10x6B, PS 8x6B Stage to the V-20B profile projector.

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**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Vertical optical axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td>Inverted and reversed</td>
</tr>
<tr>
<td>Screen</td>
<td>ø500mm; protractor screen; inclined 8</td>
</tr>
<tr>
<td>Lens mount</td>
<td>3-lens turret mount; screw type</td>
</tr>
<tr>
<td>Projection lens</td>
<td>5x, 10x, 20x, 50x, 100x</td>
</tr>
<tr>
<td>Magnification accuracy</td>
<td>0.1% for contour illumination</td>
</tr>
<tr>
<td>Magnification accuracy</td>
<td>0.15% for surface illumination</td>
</tr>
<tr>
<td>Light source</td>
<td>24V-150W halogen lamp</td>
</tr>
<tr>
<td>Max. workpiece height</td>
<td>150mm</td>
</tr>
<tr>
<td>Stage</td>
<td>PS 10x6B, PS 8x6B Stage directly mountable.</td>
</tr>
<tr>
<td>Stage</td>
<td>PS 6x4B, PS 4x4B, PS 2x2B Stage mountable via adapter</td>
</tr>
<tr>
<td>Power input</td>
<td>AC 100-120V (CSA), 220-240V (CEE), 240V (SAA)</td>
</tr>
<tr>
<td>Dimensions(WxDxH)</td>
<td>570x1,200x1,900mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 260kg</td>
</tr>
<tr>
<td>XY counter</td>
<td>1.0/0.5/0.1µm selectable</td>
</tr>
<tr>
<td>Digital protoractor</td>
<td>0.01°/0.1° selectable</td>
</tr>
</tbody>
</table>
PROFILE PROJECTOR

V-12B Series

*Desktop-type profile projectors with an effective 305mm screen diameter*

Wide measurable range: cross travel 250×150mm
Models with a built-in digital counter and/or protractor are available.

Four types available

<table>
<thead>
<tr>
<th>Model</th>
<th>Built-in digital protractor</th>
<th>Built-in digital counter</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-12BDC</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>V-12BD</td>
<td>☐</td>
<td>–</td>
</tr>
<tr>
<td>V-12BSC</td>
<td><em>Fixed screen</em></td>
<td>☐</td>
</tr>
<tr>
<td>V-12BS</td>
<td><em>Fixed screen</em></td>
<td>–</td>
</tr>
</tbody>
</table>

D: Deluxe type. Comes with a built-in digital protractor
S: Standard type. No digital protractor is included
C: With built-in X-Y digital counter

*1: The V-12BSC and V-12BS types have a fixed screen. Therefore, angular measurement by rotating the screen is not possible.

**Large stage mountable**
The V-12B adapts a focusing mechanism that achieves focus by moving the objective head up and down, allowing stages with longer cross travel to be mounted. When the PS 10×6B Stage is used, the projector can measure areas as wide as 250×150mm.

**Adjustable base feet**
The projector is less affected by irregularities in the installation surface and external vibrations because the base is 2mm away from the installation surface and the base feet are adjustable.

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*1: Standard accessory
*2: Letters above the stages represent accessories that can be mounted.
*3: To use the Foot Switch and [Reset/Send] buttons simultaneously, the "MM cable for simultaneous use (PXA20224)" is required.

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V-12BDC configured with PS 10×6B Stage
Increased maximum workpiece height
Because the rigidity of the instrument is increased, thanks to CAE (Computer-Aided Engineering) design, workpieces as tall as 100mm can be loaded.

Built-in digital counter and protractor
The V-12BDC and V-12BSC types come with a digital XY counter, while the V-12BDC and V-12BD types have a built-in digital protractor for greater ease of use.

Erect images
Projection images are erect and unreversed for easy measurements, and their quality is as sharp as inverted images.

Switchable vertical/oblique illumination
The built-in surface illuminator can be switched between vertical and oblique illumination, making detection of edges in resin parts and other workpieces much easier.

Four-step zooming condenser lens
When contour illumination is used, this condenser lens delivers the right amount of light to suit the magnification of the projection lens selected. (DIA condenser must be used with this lens when the magnification is 200x)

DIA Condenser Lens
Under contour illumination, the DIA condenser lens is necessary when 200x projection lenses are used.

PROJECTION LENSES
Three projection lenses can be mounted on the rotary turret at one time. All projection lenses boast high resolution and minimal distortion, with long working distance.

<table>
<thead>
<tr>
<th>Magnification</th>
<th>Diameter of field of view</th>
<th>Half mirror</th>
<th>A</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>5x</td>
<td>61</td>
<td>Built-in; fixed</td>
<td>60</td>
<td>127</td>
</tr>
<tr>
<td>10x</td>
<td>30</td>
<td>Built-in; switchable</td>
<td>74</td>
<td>215</td>
</tr>
<tr>
<td>20x</td>
<td>15</td>
<td>Built-in; switchable</td>
<td>74</td>
<td>244</td>
</tr>
<tr>
<td>25x</td>
<td>12</td>
<td>Built-in; switchable</td>
<td>62</td>
<td>178</td>
</tr>
<tr>
<td>50x</td>
<td>6</td>
<td>Built-in; switchable</td>
<td>61</td>
<td>173</td>
</tr>
<tr>
<td>100x</td>
<td>3</td>
<td>Built-in; switchable</td>
<td>49</td>
<td>123</td>
</tr>
<tr>
<td>200x</td>
<td>1.5</td>
<td>Built-in; switchable</td>
<td>24</td>
<td>49</td>
</tr>
</tbody>
</table>

*Part of the field of view is vignetted when the 5x projection lens is used under contour illumination.

SPECIFICATIONS

Type
Vertical optical axis bench type

Image
Erect and unreversed

Screen
V-12BDC/V-12BD ø305mm; etched center crossline; provided with digital protractor fine rotation knob; 360 Rotatable (with digital reading to 1 minute of arc) V-12BSC/V-12BS ø305mm fixed screen

Lens mount
3-lens turret mount; clamping type

Projection lens
5x, 10x, 20x, 25x, 50x, 100x, 200x

Magnification accuracy (except 200x)
0.1% for oblique surface/contour illumination
0.15% for vertical surface illumination

Light source
24V-150W halogen for both contour and surface illumination

Max. workpiece height
100mm (70mm: with PS 10x6B, PS 8x6B Stage)

Stage
PS 10x6B, PS 8x6B, PS 6x4B, PS 4x4B or PS 2x2B Stage directly mountable

Power input
AC 100/120V (50/60 Hz), AC 220/230/240V (50/60 Hz)

Dimensions (WxDxH)
410 x 650 x 938-1038 mm

Weight
Approx. 80kg

XY counter (Built-in)
1.0/0.5/0.1µm selectable

Digital protractor
0.01”/1’ selectable
**Stage Operation**

- **Twist roller drive** allows smooth changeover of course/fine stage movement.
- **Swivel plate** comes as standard for PS 10×6B and PS 8×6B stage.
- The course/fine changeover lever and the RESET and SEND buttons are located near the X- and Y-axis knobs.

This function is not available for PS 2×2B stage.

**Large stage adjustment knob**

- Enables fine adjustment of swivel plate rotation.

This is available for PS 10×6B and PS 8×6B stage.
Stage Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Surface area (mm)</th>
<th>Stage glass dimensions (mm)</th>
<th>Stroke (mm)</th>
<th>Reading method</th>
<th>Min. reading (µm)</th>
<th>Rotation range</th>
<th>Tool installation screw hole</th>
<th>Loading capacity (g)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 10x6B</td>
<td>398x260</td>
<td>305x190</td>
<td>250x150</td>
<td>Linear encoder</td>
<td>0.1</td>
<td>±3° (swivel plate)</td>
<td>6-M6 depth 10</td>
<td>20</td>
<td>51.5</td>
</tr>
<tr>
<td>PS 8x6B</td>
<td>348x260</td>
<td>255x190</td>
<td>200x150</td>
<td></td>
<td></td>
<td>10-M6 depth 10</td>
<td>6-M6 depth 10</td>
<td>15</td>
<td>48.5</td>
</tr>
<tr>
<td>PS 6x4B</td>
<td>354x230</td>
<td>210x160</td>
<td>150x100</td>
<td></td>
<td></td>
<td>8-M6 depth 10</td>
<td>6-M6 depth 7</td>
<td>5</td>
<td>27.5</td>
</tr>
<tr>
<td>PS 4x4B</td>
<td>284x230</td>
<td>160x160</td>
<td>100x100</td>
<td></td>
<td>±360° (rotation table)</td>
<td>8-M6 depth 10</td>
<td>6-M6 depth 7</td>
<td>5</td>
<td>23.5</td>
</tr>
<tr>
<td>PS 2x2B</td>
<td>ø174</td>
<td>ø107</td>
<td>50x50</td>
<td></td>
<td></td>
<td>6-M6 depth 10</td>
<td>6-M6 depth 7</td>
<td>5</td>
<td>15.5</td>
</tr>
</tbody>
</table>

Rotating Tables (mm)

Rotating Table Type 3
For PS 6x4B, PS 4x4B

Rotating Table Type 4
For PS 10x6B, PS 8x6B

Rotating Table Specifications

<table>
<thead>
<tr>
<th>Rotating Table Type 3</th>
<th>Table diameter (mm)</th>
<th>Glass insert diameter (mm)</th>
<th>Reading range</th>
<th>Tool installation</th>
<th>Weight (Approx. kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotating Table Type 3</td>
<td>204</td>
<td>165</td>
<td>360° (uncalibrated)</td>
<td>Screw hole 6-M6</td>
<td>5</td>
</tr>
<tr>
<td>Rotating Table Type 4</td>
<td>282</td>
<td>262</td>
<td>360° (uncalibrated)</td>
<td>Screw hole 6-M6</td>
<td>8</td>
</tr>
</tbody>
</table>

Standard 300mm Scale

Gauges stage travel accuracy up to 300mm. Both 10mm-interval sensor patterns and calibrations are provided. Made of low heat-expansion glass, for minimizing influence of heat. Pitch: 10mm (attached with calibrated value)

Tilting Center Fixture A2

Used to tilt samples around the center axis. Type A2 is available for PS 2x2B with Rotating Table Type 3.

<table>
<thead>
<tr>
<th>Maximum sample size (mm)</th>
<th>Center height (mm)</th>
<th>Tilt angle (in 1° increment)</th>
<th>Weight (Approx. kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø68x120</td>
<td>45</td>
<td>10</td>
<td>2.2</td>
</tr>
</tbody>
</table>
Nikon has a complete lineup of measurement support/data processing systems for specific purposes and applications that support data utilization.

**Data Processing Software E-MAX Series**

E-MAX is a series of general-purpose measurement support systems with a common user interface for PCs. The software processes two-dimensional data by a wide range of manual measuring instruments, including projectors. Data result can be saved as a csv file.

**User-friendly Windows® interface allows a host of measurement and processing functions to be easily controlled using easy-to-understand multi windows and a mouse.**

1. Graphical window  
2. Counter window  
3. Results display window  
4. Toolbar (measurement codes)

*An output window, image window, and editing listing window can be displayed as necessary.*

A built-in navigation function improves measurement efficiency by displaying the current position and the next measurement position during replays.

Number ① is the current position and number ② is the next measurement position.

**E-MAX/D Set**

Example combination with V-12B, E-MAX, and PC

- Specialized for processing measurement data
- Enhanced two-dimensional data processing functions
- Handy functions dedicated for manual measuring instrument, including a navigation function
- Can be installed on notebook PCs (D Set only)

**Data Processing Software E-MAX Series: Measurement Processing**

**Actual measurement + recall measurement**

1. Point (X, Y, Z, E)  
2. Midpoint (X, Y, Z)  
3. Maximum point (X, Y, Z)  
4. Minimum point (X, Y, Z)  
5. Circle (X, Y, Z, R, D, E)  
6. Ellipse (X, Y, Z, LD, SD, N1)  
7. Line (N1, E)  
8. Plane (N, N1, E)  
9. Square (X, Y, Z, L1, L2, N1)  
10. Key input point  
11. Key input circle

**Recall settings**

1. Distance between two points (L, Lx, Ly, Lz)  
2. Distance between a point and a line (X, Y, Z, L)  
3. Intersect of two lines (X, Y, Z, A)  
4. Midline (N1)  
5. Intersect of a circle and a line (X1, Y1, Z1, X2, Y2, Z2)

**Recall measurement (reference settings)**

1. Reference axis setting  
2. X/Y origin setting  
3. Coordinate system rotation 1  
4. Coordinate system rotation 2  
5. Coordinate system reset  
6. Coordinate system recall 1  
7. Coordinate system rotation 3  
8. Perpendicularity (W1)  
9. Parallelism (W1)  
10. Intersection angle

**Name of output element**

- X, Y, Z: Coordinate values  
- E: Deviation  
- R: Radius  
- D: Diameter  
- A: Intersection angle  
- LD: Longest diameter  
- SD: Shortest diameter  
- L: Distance  
- N: Slope from third axis  
- N1: Slope from first axis  
- W1: Geometric deviation

**Image 1**

- Measurement position.
- Number is the current position and number is the next measurement position during replays.

**Image 2**

- User-friendly Windows® allows host of measurement and processing functions to be easily controlled.

**Image 3**

- Enhanced two-dimensional data processing.

**Image 4**

- A built-in navigation function improves measurement efficiency by displaying current position and next position during replays.

**Image 5**

- Number ① is the current position and number ② is the next measurement position.

**Image 6**

- User-friendly Windows® interface allows host of measurement and processing functions to be easily controlled using easy-to-understand multi windows and a mouse.

**Table**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Point (X, Y, Z, E)</td>
</tr>
<tr>
<td>2</td>
<td>Midpoint (X, Y, Z)</td>
</tr>
<tr>
<td>3</td>
<td>Maximum point (X, Y, Z)</td>
</tr>
<tr>
<td>4</td>
<td>Minimum point (X, Y, Z)</td>
</tr>
<tr>
<td>5</td>
<td>Circle (X, Y, Z, R, D, E)</td>
</tr>
<tr>
<td>6</td>
<td>Ellipse (X, Y, Z, LD, SD, N1)</td>
</tr>
<tr>
<td>7</td>
<td>Line (N1, E)</td>
</tr>
<tr>
<td>8</td>
<td>Plane (N, N1, E)</td>
</tr>
<tr>
<td>9</td>
<td>Square (X, Y, Z, L1, L2, N1)</td>
</tr>
<tr>
<td>10</td>
<td>Key input point</td>
</tr>
<tr>
<td>11</td>
<td>Key input circle</td>
</tr>
</tbody>
</table>

**Image 7**

- Recall settings.

**Image 8**

- Recall measurement (reference settings).

**Image 9**

- Name of output element.

**Image 10**

- Measurement Support Application (option).

**Image 11**

- Retro Fit Counter/DP unit is also required.

**Image 12**

- Teaching files and measurement results files can be saved to USB memory device for easy access.

**Image 13**

- Serves measurement result lists. This enables users to easily conduct reports easily.

**Image 14**

- The unit is controlled using measurement code buttons and easy-to-master control keys.

**Image 15**

- The compact body includes a measurement counter function.

**Image 16**

- User-friendly, small-footprint system.
Data Processor DP-E1A

Data processing system combining both enhanced accuracy and ease of use

The DP-E1A was developed in response to the demands for enhanced accuracy and improved work efficiency across the entire measurement system. Despite its compact form with a built-in counter, the unit dramatically improves usability thanks to its 320x240 pixel LCD. It enables integrated operation with measuring microscopes and profile projectors, speedy measurement calculations, and reliable data processing.

- **User-friendly, small-footprint system**
  The compact body includes a measurement counter function.

- **Easy-to-master control keys**
  The unit is controlled using measurement code buttons and measurement result lists. This enables users to easily conduct measurement, even for the very first time.

- **Saves measurement results on USB memory**
  Teaching files and measurement results files can be saved to a USB memory device for easy access.

* Retrofit Counter/DP unit is also required

### Measurement Support Application (option)

**Custom Create**
Direct link to Excel sheet programs

Measurement data from counters and/or data processors can be transferred directly to Excel sheets.

- Usable measuring instruments: MM-400/800 series, DP-E1A, V-20B, V-12B
- Allows data transfer to customized inspection-result sheet form
- Three standard inspection-result sheet forms are available
- Transfer from multiple worksheets allows for more efficient measurements

Operating environment: Windows®7 or Windows®10 / Microsoft Excel 2003 or later
Required memory: 512MB (min)
Codevelopment: Aria Co., Ltd.

**Custom Fit QC**
The software can make measurement reports easily. 10 standard formats are supplied and can be customized. It can handle angle in degree, minute and seconds and can create graphics automatically. Custom Fit QC can create histograms, X-R chart, scatter diagrams, etc., used in QC.

Operating environment: Windows®7 or Windows®10
Required memory: 512MB (min)
Codevelopment: Aria Co., Ltd.
**ACCESSORIES**

**Digital Thermal Printer DPU-414**
Thermal Printer TSP651-24

This switch can be used for such purposes as issuing load instructions for the DP-E1A from a Retrofit Counter/DP Unit or for EXRST/EDGE connector (V-20B, V-12BSC, or V-12BDC). It helps improve measurement efficiency by freeing the user’s hands to perform other tasks.

<table>
<thead>
<tr>
<th>DPU-414</th>
<th>TSP651-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper width</td>
<td>112mm</td>
</tr>
</tbody>
</table>

**2-Axis Counter Display**

These displays show X and Y-axis coordinates with Retrofit Counter/DP Unit.
(Can be switched between 1μm, 0.1μm, and 0.01μm)

**Retrofit Counter/DP Unit**

This is for adding the DP-E1A Data Processor or connecting the 2-Axis Counter display to V-12BD and V-12BS.

**Glass Reading Scale**

Used to measure projection images on the screen.
200mm and 300mm scales—both in 0.5mm increments—are available.
Accuracy: ±(15+L/20)μm

**Chart Clip Type LL**

Used to measure charts on the screen. Comes standard with V-12B.
This switch can be used for such purposes as issuing load instructions for the DP-E1A from a Retrofit Counter/DP Unit or for EXRST/EDGE connector (V-20B, V-12BSC, or V-12BDC). It helps improve measurement efficiency by freeing the user’s hands to perform other tasks.

**Glass Scale Set**

Used to check the magnifying accuracy of the projector being used. Equipped with:
- 50mm standard scale in 1 mm increments (accuracy ±[3+7L/100]μm)
- 300mm standard scale in 0.1 mm increments (accuracy ±[6+L/50]μm)
- 6x magnifier

*L* = measurement length

**Accessory Cabinet**

Used to store accessories. Measures (WxDxH): 450x600x740mm
(This is not for placing profile projector)

**Green Filter, ND Filter, DIA Adapter A**

For V-12B only

The green filter is used for black-and-white photography or for viewing edges of a workpiece with greater sharpness. The ND filter is used to adjust brightness. Both filters must be used with the DIA Adapter A.

[DIA Adapter A]  [ND Filter]  [Green Filter]