**PROFILE PROJECTOR V-20B**

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

**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.

**Maximum sample weight**

Combined with the PS 10x6B stage, samples as heavy as 20 kg can be loaded.

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**SPECIFICATIONS**

**PROJECTION LENSES**

Five lenses are available, each featuring a different magnification, working distance, and field of view (FOV) diameter.

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<tr>
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<th>FOV diameter</th>
<th>Half mirror</th>
<th>A (mm)</th>
<th>D (mm)</th>
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<tr>
<td>5x</td>
<td>100</td>
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<td>50</td>
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<td>100x</td>
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<td>50.5</td>
<td>130</td>
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*Part of the FOV is vignetted when 5x or 10x projection lens are used under diascopic illumination.

**Stage Adapter S**

For V-20B only

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

**Parfocal projection lenses**

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**PROFILE PROJECTOR**

**V-12B Series**

Benchtop projector with a wide measuring stroke up to 250×150 mm (cross travel). Models with a built-in digital counter and/or protractor are available.

### SPECIFICATIONS

- **Projection Lens**
  - PS 10×6B, PS 8×6B, PS 4×4B, PS 8×4B, PS 2×2B directly mountable
  - V-12BSC/V-12BDC: 360° rotateable screen with knob for digital protractor
  - V-12BSC/V-12BDC: fixed screen

- **Magnification accuracy**
  - Oblique reflected/diascopic: 0.1 %
  - Vertical reflected: 0.15 %

- **Maximum sample height**
  - 70 mm: with PS 10×6B, PS 8×6B Stage

- **Power source**
  - AC 100/120V (50/60 Hz), AC 220/230/240V (50/60 Hz)

- **Dimensions (W×D×H)**
  - 410×650×938-1038 mm

- **Weight**
  - Approx. 80 kg

- **Accuracy**
  - 3.0 ± 1.5 µm

*Part of the FOV is vignetted when 5× or 10× projection lens are used under diascopic illumination.

---

**Increased maximum sample height**

Samples as tall as 100 mm can be loaded because the rigidity of the projector is increased by its CAE design.

**Built-in digital counter and protractor**

V-12BDC and V-12BSC come with a digital XY counter, while V-12BDC and V-12BD 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**

Easier edge detection achieved with the switchable built-in reflection illuminator.

**4-step zooming condenser lens with diascopic illumination**

Delivers the right amount of light to suit the magnification of the projection lens. (DIA condenser needed for 200x magnification)

**DIA Condenser Lens**

Necessary when using 200x projection lens and diascopic illumination. *Cannot be removed when using PS 2×2B stage*

---

**SYSTEM DIAGRAM**

**PROFILE PROJECTOR**

V-12BDC configured with PS 10×6B Stage
**Stages**

- **PS 10x6B** (Stroke: 250x150 mm)
- **PS 8x6B** (Stroke: 200x150 mm)
- **PS 6x4B** (Stroke: 150x100 mm)

**Stage Specifications**

<table>
<thead>
<tr>
<th>Type</th>
<th>Surface</th>
<th>Stage glass dimensions</th>
<th>Stroke</th>
<th>Reading method</th>
<th>Min. reading (µm)</th>
<th>Rotation range</th>
<th>Tool installation screw hole</th>
<th>Loading capacity (kg)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 10x6B</td>
<td>ø107</td>
<td>12-M6 depth 10</td>
<td>20</td>
<td>Linear encoder</td>
<td>0.1 mm</td>
<td>±180° (rotation table)</td>
<td>6-M6 depth 7</td>
<td>5</td>
<td>51.5</td>
</tr>
<tr>
<td>PS 8x6B</td>
<td>ø107</td>
<td>12-M6 depth 10</td>
<td>15</td>
<td></td>
<td></td>
<td>±3°</td>
<td>6-M6 depth 7</td>
<td>10</td>
<td>48.5</td>
</tr>
<tr>
<td>PS 6x4B</td>
<td>ø107</td>
<td>12-M6 depth 10</td>
<td>15</td>
<td></td>
<td></td>
<td>±3°</td>
<td>6-M6 depth 7</td>
<td>10</td>
<td>23.5</td>
</tr>
<tr>
<td>PS 2x2B</td>
<td>ø107</td>
<td>10-M6 depth 7</td>
<td>5</td>
<td></td>
<td></td>
<td>±1.5°</td>
<td>6-M6 depth 7</td>
<td>5</td>
<td>16.5</td>
</tr>
</tbody>
</table>

**Rotating Tables**

- **Type 3**
  - For PS 6x4B, PS 4x4B
  - Rotating Table Type 3
  - Capacity: 262 kg
  - Stroke: 100×100 mm
  - Tilt angle: ±1.5°
  - Min. reading: 360 µm
  - Reading range: 10 mm increments

- **Type 4**
  - For PS 10x6B, PS 8x6B
  - Rotating Table Type 4
  - Capacity: 262 kg
  - Stroke: 150×100 mm
  - Tilt angle: ±1.5°
  - Min. reading: 360 µm
  - Reading range: 10 mm increments

**Rotating Table Specifications**

<table>
<thead>
<tr>
<th>Rotating Table Type 3</th>
<th>262</th>
<th>262</th>
<th>360 (uncalibrated)</th>
<th>Screw hole 6-M6</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotating Table Type 4</td>
<td></td>
<td></td>
<td>360 (uncalibrated)</td>
<td>Screw hole 6-M6</td>
<td></td>
</tr>
</tbody>
</table>

**Stage Operation**

- Lever control allows for smooth changeover of coarse and fine movement.
- Swivel plate comes as standard for PS 10x6B and PS 8x6B stages.
- The coarse/fine changeover lever and the RESET and SEND buttons are located near the X- and Y- axis knobs.
- Not available for PS 2x2B stage.

**Large stage adjustment knob**

- Enables fine adjustment of swivel plate rotation.
- Available for PS 10x6B and PS 8x6B stages.

**Tilting Center Fixture A2**

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

**Standard 300 mm Scale**

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

**Maximum sample size**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Height</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø107</td>
<td>1000</td>
<td>2.2</td>
</tr>
</tbody>
</table>

**Measuring Range**

- ±3° (rotation table)
- ±1.5° (swivel plate)
- Linear encoder
Nikon has a complete lineup of measurement support system/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 2D data from manual measuring instruments. Data result can be saved as a csv file.

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

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

E-MAX/D Set

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

• Specialized for processing measurement data
• Enhanced 2D data processing functions
• Can be installed on notebook PCs (D Set only)

Data Processor DP-E1A

Effectively used in combination with a profile projector and/or measuring microscope, the DP-E1A quickly calculates geometrical features with simple and interactive operations. Measurement results are automatically memorized as teaching steps and can be easily used as a measurement routine.

• User-friendly, small-footprint system
  Includes a measurement counter function.
• Easy-to-master control keys
  Controlled using measurement code buttons and measurement result lists, enabling users to easily conduct measurement.
• 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
Thermal Printer TSP743 II

Used to send load command to DP-E1A. Frees both hands to enhance measurement efficiency.

<table>
<thead>
<tr>
<th>TSP743 II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper width</strong></td>
</tr>
</tbody>
</table>

Foot Switch 4

Used to send load command to DP-E1A. Frees both hands to enhance measurement efficiency.

2-Axis Counter Display

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

Retrofit Counter/DP Unit

Needed to connect DP-E1A or 2-axis counter display to V-12BD and V-12BS.

Glass Scale Set

Used to check the magnifying accuracy of the projector being used. Equipped with:

- 50 mm standard scale in 1 mm increments (accuracy ±[3+7L100] µm)
- 300 mm standard scale in 0.1 mm increments (accuracy ±[6+L50] µm)
- 6x magnifier

*L = measurement length

Foot Switch 4

Glass Scale Set

2-Axis Counter Display

Retrofit Counter/DP Unit

Glass Reading Scale

Chart Clip Type LL

200 mm and 300 mm scales, both in 0.5 mm increments, are available.

Accuracy: ±(15+L20) µm

* = measurement length

Green Filter, ND Filter, DIA Adapter A

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.

For V-12B only

3rd Party Solutions: Data Processor

- 7-inch color wide screen (15:9 multi-touch screen)
- Resolution: WVGA 800×480 pixels for dialogs, inputs, position values, and graphics functions
- Acquisition of 2D geometry features by measurement, design and definition of geometries
- Measuring point acquisition via crosshairs
- Creation of measuring programs (teach-in)
- Tolerance input and graphic display of measurement results
- Creation and output of measurement reports
- User management
- Measure Magic: automatic recognition of geometries

Image provided by HEIDENHAIN CORPORATION

QUADRA-CHEK 2000
Nikon Corporation Industrial Metrology Business Unit is certified as an ISO/IEC 17025 accredited calibration laboratory for measuring projectors (profile projectors) and measuring microscopes by the Japan Accreditation Board for Conformity Assessment.

**ISO/IEC 17025**: International standard, which specifies the general requirements to ensure that a laboratory is competent to carry out specific tests and/or calibrations

**Date of initial accreditation**: September 8, 2006

**Scope of accreditation**: Measuring projectors

**Accredited section**: Industrial Metrology Business Unit

**Calibration site**: Customer’s laboratory (field service)

**Expanded Uncertainty**: Magnification Accuracy

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**X/Y-axis Indication Accuracy**

Linear scale up to 250 mm

(0.70 + 5.0×10⁻³×L) µm

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*Products: Hardware and its technical information (including software)

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