Each Mitutoyo profile projector is a measuring machine that performs measurement, inspection and observation efficiently by projecting an image of a test workpiece on the stage onto a viewing screen under accurate magnification.

The inherently non-contact measurement method of profile projectors makes this type of instrument highly suitable for measuring small parts that are unmeasurable with general-purpose contact instruments or easily deformed plastic parts, and can also be used to observe the surface profiles of workpieces or inspect minute assemblies with surface illumination. Additionally, a wide selection of accessories allows advanced measurement and inspection of various workpieces.
PJ Series

Screen diameter
300mm

- Applicable to a wide range of workpiece size
- Operations concentrated at the front of the instrument
- An extensive choice of workstages

PV Series

Screen diameter
500mm

- Optimal for measurement compared with an enlarged drawing or tracing of a projection image on the screen
- Clock components, electronic parts, precious metal parts, precision parts, etc.

PH Series

Screen diameter
350mm

- Observation/measurement of cutting tools (end mills, lathe tools, tipped saws, etc.)
- Cylindrical form (screws, springs, etc.)
- Horizontal-beam design means easy workpiece loading/unloading coupled with high weight-carrying capacity of glassless stage.
High cost-performance and high degree of operability. Stage-size selectable standard model with a screen diameter of 300mm. Built-in digital counter in the large character display specification.

PJ-A3000

Technical Data
- Projected image: Inverted
- Protractor screen:
  - Effective diameter: 315mm (12.4"
  - Screen material: Fine-ground glass
  - Screen rotation: ±360°, the counter displays up to ±370°
  - Angle reading: Digital counter (LED); Resolution: 1° or 0.01" (switchable)
  - Range: ±370°, ABS/INC mode switching, Zero Set
- Cross hairs: 90° Solid lines
- Projection lens: 10X (Standard accessory) Optional: 20X, 50X, 100X
- External half-reflecting mirror for surface illumination (only for 10x, 20x)
- Lens mount: Bayonet mount
- Magnification accuracy:
  - Contour illumination: ±0.1% or less
  - Surface illumination: ±0.15% or less
- Maximum workpiece height: Refer to the projection lenses (H) right.
- Contour illumination:
  - Light source: Halogen bulb (24V, 150W)
  - Optical system: Telecentric
  - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- Surface illumination:
  - Light source: Halogen bulb (24V, 150W)
  - Optical system: Vertical illumination with adjustable condenser lens
  - Functions: Heat-absorbing filter, Cooling fan
- Resolution for X/Y counter: 0.001mm or .0001/0.001mm (Digital head)
- Power supply: 100 - 240V AC, 50/60Hz, power cord (2m)
- Mass: 105kg - 140kg
- Power consumption: Approx. 400W

Main unit side panel
- Slide mechanism for replacing the tungsten-halogen lamp

Dimensions

Projection lenses (10X is a standard accessory)
Data Processing System Diagram

- PJ-A3000 Series main unit
- RS-232C cable (2m, cross) No.12AAA807
- QM-Data200 (Arm type) No.264-156*
- Adjustable stand No.172-270
- Detector attachment (A) No.12AAE671
- OPTOEYE 200 No.332-151
- Thermal printer with cable*

For details, refer to the QM-Data200 and Vision Unit brochure.

*Order numbers differ depending on the connector form.

System Diagram

- Standard scale: 50mm / 2"
  No.172-116 / No.172-117
- Reading scale: 200mm / 8"
  No.172-118 / No.172-119
- Reading scale: 300mm / 12"
  No.172-161 / No.172-162
- Green filter No.172-160-2
- Overlay chart set No.12AAM027 (12 pcs.)
- Machine stand No.172-269
  External dimensions: 500 (W) × 830 (D) × 650 (H) mm
- Green filter No.172-160-3
  For PJ-A3005D-50
- Oblique reflection mirror No.172-229
- Oblique reflection mirror No.172-230
- Projection lens 10x Set (Standard accessory) No.172-202
- Projection lens 20x Set No.172-203
- Projection lens 50x No.172-204
- Projection lens 100x No.172-207
- Oblique reflection mirror No.172-230
- Projection lens 50x No.172-204
- Projection lens 100x No.172-207
- Oblique reflection mirror No.172-229

For PJ-A3010F-100, PJ-A3005F-150, and PJ-A3010F-200

Note: If an optional unit is installed on the stage, the H (Max. workpiece height) length is reduced by the optional unit height.

Lamp replacement
515530: High-luminance halogen bulb of 24V/150W
512305*: Long-life halogen bulb of 24V/150W
(Long-life specification, Rating approx. 500 hours)
* This lamp is a standard accessory. Illuminance for Long life specification is rather low.
Powerful PJ-series machine with the ultimate bright and crisp projection image. Equipped with a high-rigidity main unit and linear scales, this series achieves high-accuracy measurement.

A total of 8 models are available including one equipped with the long-stroke stage of 300 x 179mm. Provided with quick-release wheels for smooth and rapid operation of the stage. Standard-equipped turret changes the projection lens smoothly and efficiently.

- **Projected image:** Erect
- **Protractor screen**
  - Effective diameter: 306mm (12"
  - Screen material: Fine-ground glass
  - Screen rotation: ±360°, The counter displays up to ±370°
  - Angle Reading: Digital counter (LED)
  - Resolution: 1° or 0.01° (switchable)
- **Cross hairs:** Solid lines
- **Projection lens:** 10X (Standard accessory)
  - Optional: 5X, 20X, 50X, 100X
  - Half-reflecting mirror for surface illumination
  - Parfocal lens
- **Lens mount:** 3-mount turret, Bayonet mount
- **Magnification accuracy**
  - Contour illumination: ±0.1% or less
  - Surface illumination: ±0.15% or less
- **Maximum workpiece height:** 105mm (when rotary table is not equipped).

### Technical Data

- **Contour illumination**
- **Light source:** Halogen bulb (24V, 150W)
- **Optical system:** Zoom Telecentric
- **Functions:** Non-stepped brightness adjustment, Heat-absorbing filter, Cooling fan

- **Surface illumination**
- **Light source:** Halogen bulb (24V, 150W)
- **Optical system:** Vertical / oblique illumination with an adjustable condenser lens
- **Functions:** Non-stepped brightness adjustment, Heat-absorbing filter, Cooling fan

- **Focusing:** Projection screen head driving
  - PJ-H30A(manual), PJ-H30D(power drive)

- **Resolution for X/Y counter:** 0.001mm or 0.0001mm
- **Power supply:** ON/OFF switch, 100 - 240V AC, GND terminal, 50/60Hz, power cord (2m)
- **Mass:** 178kg - 212kg
- **Power consumption:** Approx. 420W

### Main unit side panel

#### Dimensions

(Unit: mm)

#### Projection lenses (10X is a standard accessory)

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Magnification</th>
</tr>
</thead>
<tbody>
<tr>
<td>5X Lens</td>
<td>5X</td>
</tr>
<tr>
<td>10X Lens</td>
<td>10X</td>
</tr>
<tr>
<td>20X Lens</td>
<td>20X</td>
</tr>
<tr>
<td>50X Lens</td>
<td>50X</td>
</tr>
<tr>
<td>100X Lens</td>
<td>100X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>View field:</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>W</td>
</tr>
<tr>
<td>D</td>
</tr>
</tbody>
</table>
**System Diagram**

- Standard scale: 50mm/2" (No.172-116/No.172-117)
- Reading scale: 200mm/8" (No.172-118/No.172-119)
- Reading scale: 300mm/12" (No.172-161/No.172-162)
- Overlay chart set (No.12AAM027) (12 pcs.)
- Green filter (No.12AAG981)
- Adjustable stand (No.172-270)
- Lens cleaning set (No.12AAA165)
- Projection lens 5X (No.172-271)
- Projection lens 10X (Standard accessory) (No.172-472)
- Projection lens 20X (No.172-473)
- Projection lens 50X (No.172-474)
- Projection lens 100X (No.172-475)
- rotary table with fine feed wheel (No.172-198)
- rotary table with fine feed wheel (A) (No.176-305)
- rotary table with fine feed wheel (B) (No.176-306)
- stage adapter C (No.176-317)
- stage adapter (No.176-304)
- stage adapter (No.176-304)
- Swivel center support (No.176-105)
- Swivel center support (No.176-197)
- Holder with clamp (No.176-107)
- Holder with clamp (No.176-197)
- V-block with clamp (No.172-378)
- V-block with clamp (No.172-378)
- rotary table with fine feed wheel (No.172-198)
- rotary table with fine feed wheel (A) (No.176-305)
- rotary table with fine feed wheel (B) (No.176-306)
- stage adapter C (No.176-317)
- stage adapter (No.176-304)
- stage adapter (No.176-304)
- Swivel center support (No.176-105)
- Swivel center support (No.176-197)
- Holder with clamp (No.176-107)
- Holder with clamp (No.176-197)
- V-block with clamp (No.172-378)
- V-block with clamp (No.172-378)

Note: If an optional unit is installed on the stage, the H (Max. workpiece height) length is reduced by the optional unit height.

**Data Processing System Diagram**

- PJ-H30 Series main unit
- Detector mounting bracket (No.12AAG983)
- Detector attachment (A) (No.12AAE671)
- OPTOEYE 200 (No.332-151)
- Thermal printer (with the connecting cable)*
  - Foot switch: No.937179T
- RS-232C cable (2m, cross) (No.12AAG982)
- QM-Data200 mounting stand (No.12AAG982)
- QM-Data200 (Arm type) (No.264-155*)
- QM-Data200 (Standard type) (No.264-155*)
- Adjustable stand (No.172-270)
- Thermal printer DP4U14 (For printing counter and angle display values (with connecting cable)*
- RS-232C cable (cross) (No.12AAE807)
- Real-time process control program MeasurLink
- Inspection table generation program MeasureReport

*Order numbers differ depending on the connector form.

**Lamp replacement**

- 51530*: High-luminance halogen bulb of 24V/150W (Long-life specification, Rating approx. 500 hours)
- 512305*: Long-life halogen bulb of 24V/150W (Long-life specification, Rating approx. 500 hours)

*1 This lamp is a standard accessory.
*2 Illuminance for Long Life specification is rather low.

For details, refer to the QM-Data200 and Vision Unit brochure.

Note: If an optional unit is installed on the stage, the H (Max. workpiece height) length is reduced by the optional unit height.
PV-5110

Optimal for comparative inspection such as tracing of a projected image or observation of a contour with the 500mm forward-tilted screen. This model supports improvement in efficiency of the inspection of mass-production precision parts.

### Technical Data

- **Projected image:** Inverted
- **Protractor screen:**
  - Effective diameter: 508mm (20"
  - Screen material: Fine-ground glass
  - Screen rotation: ±360°, The counter displays up to ±370°
  - Angle reading: Resolution: 1' or 0.01' (switchable)
  - Range: ±370'
  - ABS/INC mode switching, Zero Set
- **Cross hairs:** Solid lines
- **0 Line (Index):** Built-in, With a LED back light
- **Projection lens:**
  - Standard accessory: 10X
  - Optional: 5X, 20X, 50X, 100X
- **Lens mount:** Insert type mount
- **Magnification accuracy:**
  - Contour illumination: ±0.1% or less
  - Surface illumination: ±0.15% or less
- **Maximum workpiece height:** Refer to the projection lenses (H) right.
- **Contour illumination:**
  - Light source: Halogen bulb (24V, 150W)
  - Optical system: Zoom Telecentric
  - Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
- **Surface illumination:**
  - Light source: Halogen bulb (24V, 150W)
  - Optical system: Vertical illumination
  - Functions: Adjustable condenser lens, Oblique illumination (for 5X, 10X and 20X), Heat-absorbing filter, Cooling fan
- **Focusing:** Stage part drive, Manual
- **Resolution for XY counter:** 0.001mm or 0.0001".0001mm
  (using optional KA counter)
- **Power supply:** 100 - 240V AC, 50/60Hz, power cord (2m)
- **Mass:** 190kg
- **Power consumption:** Approx. 500W

Note: X and Y counters are not built into the PV-5110 main unit. If a counter display is required, it is recommended that a QM-Data200 or KA-12 is purchased separately.

### Dimensions

To mount the counter (KA-12) and counter stand, approximately 300mm space is required on the right-hand side of the main unit.

### Projection lenses (10X is a standard accessory)

#### Optical System

- **Light source:** Halogen bulb (24V, 150W)
- **Optical system:** Vertical illumination
- **Functions:** Adjustable condenser lens, Oblique illumination (for 5X, 10X and 20X), Heat-absorbing filter, Cooling fan

#### Focusing

- **Stage part drive, Manual**

#### Power Supply

- **100 - 240V AC, 50/60Hz, power cord (2m)**

#### Resolution

- **XY counter:** 0.001mm or 0.0001".0001mm
  (using optional KA counter)

### Technical Specifications

<table>
<thead>
<tr>
<th>Lens Set</th>
<th>Magnification</th>
<th>Unit: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>5X</td>
<td>5X</td>
<td>5X</td>
</tr>
<tr>
<td>10X</td>
<td>10X</td>
<td>10X</td>
</tr>
<tr>
<td>20X</td>
<td>20X</td>
<td>20X</td>
</tr>
<tr>
<td>50X</td>
<td>50X</td>
<td>50X</td>
</tr>
<tr>
<td>100X</td>
<td>100X</td>
<td>100X</td>
</tr>
</tbody>
</table>

- **View field:**
  - Ø101.6
  - Ø95.8
  - Ø93.4
  - Ø101.6
  - Ø5.08
- **H:**
  - 125
  - 181
  - 206
  - 87
  - 87
- **W:**
  - 60 (27)
  - 60
  - 60
  - 32.4
  - 22.5
- **D:**
  - 120
  - 120
  - 120
  - 64.8
  - 45

*: When using surface illumination
**System Diagram**

- **Standard scale**: 50mm/2"  
  No.172-116/No.172-117
- **Reading scale**: 200mm/8"  
  No.172-118/No.172-119
- **Reading scale**: 300mm/12"  
  No.172-161/No.172-162
- **Reading scale**: 600mm  
  No.172-329
- **Green filter**:  
  No.172-160-2
- **Canopy**:  
  No.172-319
  External view*: 1200(W) x 1500(D) x 2000(H)mm

**PV-5110 main unit**
- **KA-12 (Counter)**  
  No.174-173*
- **Stage adapter C**:  
  No.176-317
- **Rotary table with fine feed wheel**:  
  No.172-198
- **Swivel center support**:  
  No.176-105
- **Holder with clamp**:  
  No.176-107
- **V-block with clamp**:  
  No.172-378
- **Swivel center support**:  
  No.172-197

---

**Data Processing System Diagram**

- **PV-5110**
- **QM-Data200***:  
  Detector attachment(B)  
  No.12AAE672
- **OPTOEYE 200**:  
  No.332-151
- **Thermal printer**:  
  (with connecting cable)*

---

**Lamp replacement**

- **512305*: Long-life halogen bulb of 24V/150W**

*Order numbers differ depending on the connector form.*

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*Order numbers differ depending on the connector form.*

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For details, refer to the QM-Data200 and Vision Unit brochure.

---

*Order numbers differ depending on the connector form.*

---

Note: If an optional unit is installed on the stage, the W (Working distance) length is reduced by the optional unit height.

*Order numbers differ depending on the connector form.*

---

*Order numbers differ depending on the connector form.*

---

*Illuminance for Long life specification is rather low.*
PH-3515F

Optimal for contour observation/measurement of cutting tools (end mills, lathe tools, tipped saws, etc.), screws and springs.

Technical Data

Projected image: Erect*

Protractor screen:
- Effective diameter: 353(13.9") mm
- Screen material: Fine-ground glass
- Screen rotation: ±360°, The counter displays up to ±370°.
- Angle reading: Digital counter (LED)
  - Resolution: 1° or 0.01° (switchable)
  - Range: ±370°
  - ABS/INC mode switching, Zero Set
- Cross hairs: 90° Solid lines
- Projection lens: 10X (Standard accessory)
- Optional: 5X (PH-3515 only), 20X, 50X, 100X
- Lens mount: Screw mount
- Magnification accuracy:
  - Contour illumination: ±0.1% or less of nominal magnification
  - Surface illumination: ±0.15% or less of nominal magnification
- Maximum workpiece height: Refer to the projection lenses (L) right.

Contour illumination
- Light source: Halogen bulb (24V, 150W)
- Optical system: Telecentric
- Functions: 2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan

Surface illumination
- Light source: Halogen bulb (24V 200W),
- Optical system: Vertical illumination
- Functions: Adjustable condenser lens, Vertical/Oblique surface illumination selectable, Heat-absorbing filter, Cooling fan

Focusing:
- Stage part drive, Manual
- Resolution for X/Y counter: 0.001mm or .0001" (switchable)
- Power supply: 100 - 240V AC, 50/60Hz, power cord (2m)
- Mass: 150kg
- Power consumption: Approx. 400W

Note1) X and Y counters are not built into the projector main unit. If a counter display is required, it is recommended that a QM-Data200 or KA-12 is purchased separately.

Note2) The indicated value of a measurement may be slightly smaller than the actual value due to optical distortion caused by the illumination conditions.

* The projected image of the workpiece is erect but inverted horizontally, which means that the vertical orientation and displacement direction of the image is the same as on the workpiece side, but the horizontal orientation and displacement direction are reversed.

Main unit side panel

Dimensions

To mount the optional counter (KA-12) and counter stand, approximately 300mm space is required on the right side of the main unit.

Projection lenses (10X is a standard accessory)

<table>
<thead>
<tr>
<th>Magnification</th>
<th>5X</th>
<th>10X</th>
<th>20X</th>
<th>50X</th>
<th>100X</th>
</tr>
</thead>
<tbody>
<tr>
<td>View field</td>
<td>70.6</td>
<td>35.3</td>
<td>17.65</td>
<td>7.06</td>
<td>3.5</td>
</tr>
<tr>
<td>L</td>
<td>175</td>
<td>235</td>
<td>235</td>
<td>80</td>
<td>109</td>
</tr>
<tr>
<td>W</td>
<td>160 (64)</td>
<td>93 (35)</td>
<td>40</td>
<td>14.6</td>
<td>9.5</td>
</tr>
<tr>
<td>D</td>
<td>152.4</td>
<td>152.4</td>
<td>116</td>
<td>39.4</td>
<td>19</td>
</tr>
<tr>
<td>H</td>
<td>152.4</td>
<td>152.4</td>
<td>152.4</td>
<td>152.4</td>
<td>152.4</td>
</tr>
</tbody>
</table>

( ) : When using surface illumination
System Diagram

PH-3515F main unit

- Standard scale 50mm / 2"
  No.172-116 / No.172-117
- Reading scale 200mm / 8"
  No.172-118 / No.172-119
  No.172-161 / No.172-162
- Surface illumination unit
  No.172-133
- Green filter
  No.172-286
- Overlay chart set
  No.12AAM027 (12 pcs.)

- Tipped-saw support stand*1
  No.172-001
- Cutter support stand*1
  No.172-002

- Vertical holder
  No.172-132
- Center support riser
  No.172-143
- Rotary vice
  No.172-144
- V-block with clamp
  No.172-234
- Center support
  No.172-142

- Projection lens 5X set
  No.172-145
- Projection lens 10X set
  (Standard accessory)
  No.172-184
- Projection lens 20X set
  No.172-173
- Projection lens 50X set
  No.172-165
- Projection lens 100X set
  No.172-166

For half-reflection mirror F
- For 5X
  No.172-294
- For 10X
  No.172-295

Counter stand
No.12AAF182

KA-12 (Counter)
No.174-173*2

*1 Mounting fixtures for tipped saws and cutters are compatible with the center hole diameter of 25.4mm.

*2 Order numbers differ depending on the connector form.

Data Processing System Diagram

- PH-3515F main unit
- QM-Data200 (Arm type)
  No.264-156
- Adjusting stand
  No.172-270
- Thermal printer
  (with connecting cable)*

Detector attachment (A)
No.12AAE671

OPTOEYE 200
No.332-151

QM-Data200 (Arm type)
No.264-156

Adjustable stand
No.172-270

Detector attachment (A)
No.12AAE671

For details, refer to the QM-Data200 and Vision Unit brochure.

*Order numbers differ depending on the connector form.

Lamp replacement

515530*1: High-luminance halogen bulb of 24V/150W
512305*2: Long-life halogen bulb of 24V/150W
(12BAA637*1: Parabolic halogen bulb 24V/200W
(for only PH-3515F)

*1 This lamp is a standard accessory.
*2 Illuminance for Long life specification is rather low.
## Stage

### PJ-A3000

<table>
<thead>
<tr>
<th>Model</th>
<th>Order No.</th>
<th>Measuring unit</th>
<th>Quick-release mechanism</th>
<th>Top surface size</th>
<th>Effective size of stage glass</th>
<th>Stage glass thickness</th>
<th>Stage glass No.</th>
<th>Swivel adjustment range</th>
<th>Maximum loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ-A3005D-50</td>
<td>302-704-1E</td>
<td>Digital micrometer head</td>
<td>—</td>
<td>50 x 50mm</td>
<td>52 x 52mm</td>
<td>5mm</td>
<td>308405</td>
<td>—</td>
<td>10kg</td>
</tr>
<tr>
<td>PJ-A3010F-100</td>
<td>302-703-1E</td>
<td>Digital scale</td>
<td>X- and Y-axes</td>
<td>100 x 100mm</td>
<td>142 x 142mm</td>
<td>5mm</td>
<td>12BAE041</td>
<td>—</td>
<td>10kg</td>
</tr>
<tr>
<td>PJ-A3005F-150</td>
<td>302-702-1E</td>
<td>Digital scale</td>
<td>X- and Y-axes</td>
<td>150 x 50mm</td>
<td>185 x 84mm</td>
<td>5mm</td>
<td>381349</td>
<td>± 3</td>
<td>8kg</td>
</tr>
<tr>
<td>PJ-A3010F-200</td>
<td>302-701-1E</td>
<td>Digital scale</td>
<td>X- and Y-axes</td>
<td>200 x 100mm</td>
<td>266 x 170mm</td>
<td>6mm</td>
<td>382762</td>
<td>—</td>
<td>8kg</td>
</tr>
</tbody>
</table>

### PJ-H30

<table>
<thead>
<tr>
<th>Model</th>
<th>Order No.</th>
<th>Measuring unit</th>
<th>Quick-release mechanism</th>
<th>Top surface size</th>
<th>Effective size of stage glass</th>
<th>Stage glass thickness</th>
<th>Stage glass No.</th>
<th>Swivel adjustment range</th>
<th>Maximum loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ-H30A1010B</td>
<td>303-712-1E</td>
<td>High-accuracy digital scale</td>
<td>X- and Y-axes standard</td>
<td>100 x 100mm</td>
<td>180 x 150mm</td>
<td>6mm</td>
<td>380412</td>
<td>± 3 (right)</td>
<td>10kg</td>
</tr>
<tr>
<td>PJ-H30A2010B</td>
<td>303-713-1E</td>
<td>High-accuracy digital scale</td>
<td>X- and Y-axes standard</td>
<td>200 x 100mm</td>
<td>250 x 150mm</td>
<td>6mm</td>
<td>382762</td>
<td>± 5 (left)</td>
<td>20kg</td>
</tr>
<tr>
<td>PJ-H30A2017B</td>
<td>303-714-1E</td>
<td>High-accuracy digital scale</td>
<td>X- and Y-axes standard</td>
<td>200 x 170mm</td>
<td>270 x 240mm</td>
<td>8mm</td>
<td>12BAD363</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PJ-H30A3017B</td>
<td>303-715-1E</td>
<td>High-accuracy digital scale</td>
<td>X- and Y-axes standard</td>
<td>300 x 170mm</td>
<td>370 x 240mm</td>
<td>8mm</td>
<td>12BAD330</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

### PJ-H30D

<table>
<thead>
<tr>
<th>Model</th>
<th>Order No.</th>
<th>Measuring unit</th>
<th>Quick-release mechanism</th>
<th>Top surface size</th>
<th>Effective size of stage glass</th>
<th>Stage glass thickness</th>
<th>Stage glass No.</th>
<th>Swivel adjustment range</th>
<th>Maximum loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ-H30D1010B</td>
<td>303-732-1E</td>
<td>High-accuracy digital scale</td>
<td>—</td>
<td>100 x 100mm</td>
<td>180 x 150mm</td>
<td>6mm</td>
<td>380412</td>
<td>± 3 (right)</td>
<td>10kg</td>
</tr>
<tr>
<td>PJ-H30D2010B</td>
<td>303-733-1E</td>
<td>High-accuracy digital scale</td>
<td>—</td>
<td>200 x 100mm</td>
<td>250 x 150mm</td>
<td>6mm</td>
<td>382762</td>
<td>± 5 (left)</td>
<td>20kg</td>
</tr>
<tr>
<td>PJ-H30D2017B</td>
<td>303-734-1E</td>
<td>High-accuracy digital scale</td>
<td>—</td>
<td>200 x 170mm</td>
<td>270 x 240mm</td>
<td>8mm</td>
<td>12BAD363</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PJ-H30D3017B</td>
<td>303-735-1E</td>
<td>High-accuracy digital scale</td>
<td>—</td>
<td>300 x 170mm</td>
<td>370 x 240mm</td>
<td>8mm</td>
<td>12BAD330</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Measured length: The measurement method conforms to JIS B 7184.
### PV-5110

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>XY range</td>
<td>200×100mm</td>
</tr>
<tr>
<td>PV-5110 main unit Order No.</td>
<td>304-919E</td>
</tr>
<tr>
<td>Measuring unit</td>
<td>Digital scale</td>
</tr>
<tr>
<td>Quick-release mechanism</td>
<td>X- and Y-axes</td>
</tr>
<tr>
<td>Top surface size</td>
<td>380×250mm</td>
</tr>
<tr>
<td>Effective size of stage glass</td>
<td>266×170mm</td>
</tr>
<tr>
<td>Stage glass thickness</td>
<td>6mm</td>
</tr>
<tr>
<td>Stage glass No.</td>
<td>382762</td>
</tr>
<tr>
<td>Swivel adjustment range</td>
<td>± 3°</td>
</tr>
<tr>
<td>Maximum loading</td>
<td>5kg</td>
</tr>
</tbody>
</table>

### PH-3515F

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>PH-3515F</td>
</tr>
<tr>
<td>XY range</td>
<td>254×152mm</td>
</tr>
<tr>
<td>PH main unit Order No.</td>
<td>172-868E</td>
</tr>
<tr>
<td>Measuring unit</td>
<td>Digital scale</td>
</tr>
<tr>
<td>Quick-release mechanism</td>
<td>Only X-axis</td>
</tr>
<tr>
<td>Top surface size</td>
<td>450×146mm</td>
</tr>
<tr>
<td>Dovetail groove</td>
<td>Two (Pitch = 43mm)</td>
</tr>
<tr>
<td>Minimum swivel angle reading</td>
<td>30°</td>
</tr>
<tr>
<td>Maximum measuring diameter (horizontally) *3</td>
<td>ø340mm</td>
</tr>
<tr>
<td>Swivel adjustment range</td>
<td>± 3°</td>
</tr>
<tr>
<td>Maximum loading</td>
<td>45kg</td>
</tr>
</tbody>
</table>

Photo: Cutter (Outside diameter of 175mm max.) is mounted on the tipped-saw support fixture (No.172-001).
## Accessories (Optional)

### 2-D Data Processing Unit QM-Data200

Patented in Japan.

The QM-Data200 is a geometric readout/analysis unit for optical instruments such as profile projectors. This unit features powerful 2-D coordinate measurement capabilities with easy-to-use key operation. Measurement results can be visualized on the LCD display and printed out if required.

### FEATURES
- High contrast color graphic displays on the large LCD screen with LCD backlight.
- One-key operation for combined measurements that are often used (circle-circle distance, etc.)
- Equipped with the measurement procedure teaching function and measuring position navigation in Repeat mode.
- Easy measurement using combination of visual cross-hair alignment and automatic edge detection (Optoeye positioning function).
- The AI measurement function (automatic identification of measuring item) eliminates switching between the measurement command keys.
- The user menu function allows user to store measurement commands or part programs to create his/her own menu.
- Tolerance zone judgment of data processing result and statistical processing for each item are possible.
- Measurement result output to *MS-Excel®* in spreadsheet (CSV format)*
- The measurement procedure and measurement result can be saved, using USB memory.**
- Two models are available: a stand-alone type with tilt system and a flexible arm type that can be mounted on a Profile Projector.
- Measurement possible even during printout

* MS-Excel® is a registered trademark of Microsoft Corporation.
** Operation is not assured for all commercial USB memories.

### Specifications

<table>
<thead>
<tr>
<th>Code</th>
<th>QM-Data200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>Stand-mount type</td>
</tr>
<tr>
<td>264-155E</td>
<td>264-156E</td>
</tr>
<tr>
<td>Display languages (selectable)</td>
<td>Japanese/English/German/French/Italian/Portuguese/Czech/Chinese/Korean/Turkish/Swedish/Polish/Dutch/Hungarian</td>
</tr>
<tr>
<td>Measured value unit</td>
<td>Length: mm Angle: degree</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1μm / degree-minute-second (selectable)</td>
</tr>
<tr>
<td>Program functions</td>
<td>Part program creation, execution, editing</td>
</tr>
<tr>
<td>Statistical processing</td>
<td>Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram, statistics on a measuring function basis (by command)</td>
</tr>
<tr>
<td>Display system</td>
<td>COLOR TFT LCD (with LED backlight)</td>
</tr>
<tr>
<td>Edgel Sensor/Position Comparator</td>
<td>Supported (Projector)</td>
</tr>
<tr>
<td>Input/Output</td>
<td>X,Y,Z: Maximum of three Linear Scales RS-232C 1: For connecting to external PC RS-232C 2: For connecting to counter of measuring instrument OPTOEYE: For inputting edge signal from OPTOEYE (OPTOEYE M2) FS: For connecting to optional foot switch PRINT: For connecting to optional printer USB-FD: For connecting to USB-FDD USB-MEMORY: For connecting to USB memory</td>
</tr>
<tr>
<td>Measurement result file output</td>
<td>RS-232C output (CSV format, MUX-10 format)</td>
</tr>
<tr>
<td>Power</td>
<td>AC100 - 240V</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>17W (does not include optional accessories)</td>
</tr>
<tr>
<td>External dimensions (WxDxH)</td>
<td>Approximately 260×242×310 (including the stand) Approximately 318×153×275mm (when the arm is in the horizontal posture)</td>
</tr>
<tr>
<td>Mass</td>
<td>Approximately 2.9kg Approximately 2.8kg</td>
</tr>
<tr>
<td>Standard accessories</td>
<td>AC adapter, power cable, Easy operation guide</td>
</tr>
</tbody>
</table>

### Operation panel

**Operation screen (tolerance zone measurement)**

Tolerance zone measurement result can be checked by color display at a glance.
### Rotary tables

<table>
<thead>
<tr>
<th>Order No.</th>
<th>176-106</th>
<th>172-198</th>
<th>176-305</th>
<th>176-306</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Name</td>
<td>Rotary table</td>
<td>Rotary table with fine feed wheel</td>
<td>Rotary table with fine feed wheel A</td>
<td>Rotary table with fine feed wheel B</td>
</tr>
<tr>
<td>Rotary stage size</td>
<td>ø112mm</td>
<td>ø146mm</td>
<td>ø240mm</td>
<td>ø270mm</td>
</tr>
<tr>
<td>Fine adjustment</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Effective glass diameter</td>
<td>ø60mm</td>
<td>ø96mm</td>
<td>ø182mm</td>
<td>ø238mm</td>
</tr>
<tr>
<td>Minimum angle reading</td>
<td>6'</td>
<td>2'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External dimensions (WxDxH)mm</td>
<td>152x152x21.5</td>
<td>240x172x19.7</td>
<td>280x280x23.7</td>
<td>342x342x23.2</td>
</tr>
<tr>
<td>Mass</td>
<td>1.7kg</td>
<td>2.4kg</td>
<td>5.5kg</td>
<td>6.5kg</td>
</tr>
<tr>
<td>Applicable models</td>
<td>PJ-A3000</td>
<td>PJ-H30</td>
<td>PJ-A3000</td>
<td>PJ-H30</td>
</tr>
</tbody>
</table>

Note: Rotary table with fine feed wheel (rotary stage size of ø315mm and effective glass diameter of ø280mm) is provided.

### Holder with clamp

<table>
<thead>
<tr>
<th>Order No.</th>
<th>176-107</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable models</td>
<td>PJ-A3000 Series PJ-H30 Series PV-5110</td>
</tr>
<tr>
<td>Maximum width to be clamped</td>
<td>0 - 35mm</td>
</tr>
<tr>
<td>Mass</td>
<td>0.4kg</td>
</tr>
</tbody>
</table>

### V-block with clamp

<table>
<thead>
<tr>
<th>Order No.</th>
<th>172-234</th>
<th>172-378</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable models</td>
<td>PH-3515F PH-A14</td>
<td>PJ-A3000 Series PJ-H30 Series PV-5110</td>
</tr>
<tr>
<td>Maximum workpiece diameter to be clamped</td>
<td>ø50mm</td>
<td>ø25mm</td>
</tr>
<tr>
<td>Central height from a mounting surface</td>
<td>38 - 48mm</td>
<td>38 - 48mm</td>
</tr>
<tr>
<td>Mass</td>
<td>1.24kg</td>
<td>0.8kg</td>
</tr>
</tbody>
</table>

### Swivel center support

<table>
<thead>
<tr>
<th>Order No.</th>
<th>176-105</th>
<th>172-197</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum workpiece size to be clamped*</td>
<td>ø70mm (45x140mm)</td>
<td>ø80mm (65x140mm)</td>
</tr>
<tr>
<td>Inclination</td>
<td>±10°</td>
<td>±10°</td>
</tr>
<tr>
<td>Mass</td>
<td>2.4kg</td>
<td>2.5kg</td>
</tr>
</tbody>
</table>

*The maximum possible size to be measured differs depending on the projection magnification selected. The size enclosed in parentheses ( ) indicates that for an inclination of 10°.
Accessories (Optional)

■ Rotary vise

172-144

Order No. 172-144
Applicable models PH-3515F PH-A14
Rotation range 360°
Size between mounting surface and top surface 76mm
Minimum angle reading 5°
Mass 2.8kg

■ Center support

172-142

Order No. 172-142
Applicable models PH-3515F PH-A14
Maximum workpiece diameter to be clamped 120mm (240mm)*
Mass 3.3kg
* When center support riser (No.172-143) is used.

■ Center support riser

172-143

Order No. 172-143
Applicable models PH-3515F PH-A14
Height 60mm
Mass 2.2kg

■ Vertical holder

172-132

Order No. 172-132
Applicable models PH-3515F PH-A14
Rotation range 360°
Size between mounting surface and top surface —
Minimum angle reading —
Mass 1.3kg

■ Standard scale

Glass scale used for checking magnification accuracy

172-116

Order No. 172-116 172-330 172-117
Range 50mm 80mm 2"
Graduation 0.1mm .01"
Accuracy (20°C) (3+5L/1000) μm L=Measured length (mm) (120+5L)×10⁴" L=Measured length (inch)

■ Reading scale

Glass scale specially designed for inspecting the magnified image of a standard scale on the projection screen

172-118

Order No. 172-118 172-161 172-329
Range 200mm 300mm 600mm
Graduation 0.5mm
Accuracy (20°C) (15+15L/1000) μm L=Measured length (mm)
Order No. 172-119 172-162
Range 8" 12"
Graduation .02"
Accuracy (20°C) (600+15L)×10⁴" L=Measured length (inch)
**OPTOEYE** (Projected image position detecting device)

- **OPTOEYE (Projected image position detecting device)**
- **Built-in OPTOEYE** (only PJ-H30D)
- **Thermal printer DPU-414**
- **Adjustable stand**

---

**An edge detecting device for improving the measuring efficiency and reliability of a profile projector by removing the need to position the cross hairs on an edge manually. This has the effect of eliminating the operator variability factor from data entry and shortening the measurement time.**

- **The detector uses an optical fiber that can be easily fixed on the screen with chart clips.**
- **The device is provided with an error detection function that works if the screen light intensity changes.**
- **This device can be retrofitted onto the QM-Data200 and does not need an AC adapter since power is supplied from the QM-Data200 through the connecting cable.**
- **The X and Y-axis linear scales on the projector main unit are directly connected to the QM-Data200 during use of the Optoeye system.**

- **This system can be used in combination with the QM-Data200 but is only available for the PJ-H30A. (PJ-H30D does not need this system because it has a built-in Optoeye sensor.)**

---

**Order No.** 332-151  
**Model** OPT-200  
**Illumination** Contour/surface*  
**Detecting directivity** Non direction  
**Minimum detectable circle** ø2mm  
**Minimum detectable line width** 1mm  
**Maximum response speed** 1000mm/s  
**Illumination range (Bright)** 30 - 1500 lx  
**Bright-Dark field difference** 20 lx X or higher  
**Repeatability (contour illumination)** $\sigma = 1\mu m$**  

* Mitutoyo’s condition  
**Mitutoyo test condition**

**Configuration of standard accessories**

- **Electronic unit**
- **Detector**: Optical fiber  
- **Connecting cable**: For connecting electrical component main unit and QM-Data200  
- **Fixture for QM-Data200 (No.128AG139)**: For fixing the electrical component main unit to QM-Data200  

---

**Order No.** 172-270  
**Platform position** Adjustable to a height of 720 to 1020mm  
**Platform size** 600x450mm

---

**Order No.** 172-269  
**External dimensions** 500 W x 830 D x 650 H mm

*Recommended for PJ-A3000 series

---

**Order No.** 332-151  
**Model** OPT-200  
**Illumination** Contour/surface*  
**Detecting directivity** Non direction  
**Minimum detectable circle** ø2mm (projected image size)  
**Minimum line width** 1mm (projected image size)  
**Repeatability**: $\sigma = 1\mu m$**  

* Mitutoyo’s condition  
**Mitutoyo test condition**

**Order numbers differ depending on the connector form.**

**Counter/angle display value printout**  
**Order numbers differ depending on the connector form.**

**Print method** Dot-matrix thermosensitive method  
**Number of print digits** 40 digits (normal character 9x7 dot-matrix)  
**Printing speed** Maximum 52.5 characters/sec (normal character)  
**External dimensions** 160(W)x170(D)x65.5(H)mm  
**Printer paper** No.908353 (5 rolls)  

* Counter/angle display value printout is for PJ-3000 series and PJ-H30 series.

---

**Order No.** 172-270  
**Platform position** Adjustable to a height of 720 to 1020mm  
**Platform size** 600x450mm

---

**Order No.** 172-269  
**External dimensions** 500 W x 830 D x 650 H mm

*Recommended for PJ-A3000 series

---

**Adjustable stand**

- **For QM-Data200 (stand-type specification), thermal printer, etc.**

---

**Machine stand**

- **For QM-Data200**
## Accessories (Optional)

To quickly check an image projected on the screen, an appropriate chart is used. 12 types of overlay charts are available according to the application.

### Overlay charts

To quickly check an image projected on the screen, an appropriate chart is used. 12 types of overlay charts are available according to the application.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Order No.</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overlay charts Set of 12</td>
<td>12AAM027</td>
<td>Set of 12 charts (Overlay charts No.11 – No.22)</td>
</tr>
<tr>
<td>Overlay chart No.11</td>
<td>12AAMS87</td>
<td>Upper side: radial lines (at intervals of 1&quot;) Lower side: concentric circles (at intervals of 1mm in radius)</td>
</tr>
<tr>
<td>Overlay chart No.12</td>
<td>12AAMS88</td>
<td>Concentric circles (at intervals of 5mm in radius) with cross hairs (1mm graduation)</td>
</tr>
<tr>
<td>Overlay chart No.13</td>
<td>12AAMS89</td>
<td>Concentric circles (at intervals of 1mm in radius) with cross hairs</td>
</tr>
<tr>
<td>Overlay chart No.14</td>
<td>12AAMS90</td>
<td>Horizontal: Parallel lines at intervals of 50mm (50-times enlargement of 1mm) Vertical: Parallel lines at intervals of 20mm (20-times enlargement of 1mm)</td>
</tr>
<tr>
<td>Overlay chart No.15</td>
<td>12AAMS91</td>
<td>10mm-interval grids</td>
</tr>
<tr>
<td>Overlay chart No.16</td>
<td>12AAMS92</td>
<td>Cross hairs (0.5mm graduation)</td>
</tr>
<tr>
<td>Overlay chart No.17</td>
<td>12AAMS93</td>
<td>1mm-interval grids</td>
</tr>
<tr>
<td>Overlay chart No.18</td>
<td>12AAMS94</td>
<td>1”-interval radial lines</td>
</tr>
<tr>
<td>Overlay chart No.19</td>
<td>12AAMS95</td>
<td>Horizontal: 1mm-interval parallel lines</td>
</tr>
<tr>
<td>Overlay chart No.20</td>
<td>12AAMS96</td>
<td>Concentric circles (at intervals of 1mm in radius) and radial lines (at intervals of 1&quot;)</td>
</tr>
<tr>
<td>Overlay chart No.21</td>
<td>12AAMS97</td>
<td>Metric screw for 20X lens: P = 0.2 to 2mm Unified screw: 28 to 12 thread/inch Whitworth screw: 20 to 10 thread/inch</td>
</tr>
<tr>
<td>Overlay chart No.22</td>
<td>12AAMS98</td>
<td>Involute tooth profile for 20X lens (reference rack tooth profile) 20° pressure angle: 0.2 to 1 14.5° pressure angle: 0.2 to 1</td>
</tr>
</tbody>
</table>
Quick guide to Profile Projectors

■ Erect Image and Inverted Image
An image of an object projected onto a screen is erect if it is orientated the same way as the object on the stage. If the image is reversed top to bottom, left to right and by movement with respect to the object on the stage (as shown in the figure below) it is referred to as an inverted image (also known as a reversed image, which is probably more accurate).

■ Magnification Accuracy
The magnification accuracy of a projector when using a certain lens is established by projecting an image of a reference object and comparing the size of the image of this object, as measured on the screen, with the expected size (calculated from the lens magnification, as marked) to produce a percentage magnification accuracy figure, as illustrated below. The reference object is often in the form of a small, graduated glass scale called a ‘stage micrometer’ or ‘standard scale’, and the projected image of this is measured with a larger glass scale known as a ‘reading scale’. (Note that magnification accuracy is not the same as measuring accuracy.)

\[
\Delta M(\%) = \left| \frac{L - f^2 M}{f M} \right| \times 100
\]

- \(\Delta M(\%)\): Magnification accuracy expressed as a percentage of the nominal lens magnification
- \(L\): Length of the projected image of the reference object measured on the screen
- \(f\): Length of the reference object
- \(M\): Magnification of the projection lens

■ Type of Illumination
- Contour illumination: An illumination method to observe a workpiece by transmitted light and is used mainly for measuring the magnified contour image of a workpiece.
- Coaxial surface illumination: An illumination method whereby a workpiece is illuminated by light transmitted coaxially to the lens for the observation/measurement of the surface. (A half-mirror or a projection lens with a built-in half-mirror is needed.)
- Oblique surface illumination: A method of illumination by obliquely illuminating the workpiece surface. This method provides an image of enhanced contrast, allowing it to be observed three-dimensionally and clearly. However, note that an error is apt to occur in dimensional measurement with this method of illumination. (An oblique mirror is needed. Models in the PJ-H30 series are supplied with an oblique mirror.)

■ Telecentric Optical System
An optical system based on the principle that the principal ray is aligned parallel to the optical axis by placing a lens stop on the focal point on the image side. Its functional feature is that the image will not vary in size though the image blurs as the object is shifted along the optical axis. For measuring projectors and measuring microscopes, an identical effect is obtained by placing a lamp filament at the focal point of a condenser lens instead of a lens stop so that the object is illuminated with parallel beams. (See the figure below.)

■ Working distance
Refers to the distance from the face of the projection lens to the surface of a workpiece in focus. It is represented by \(L\) in the diagram below.

■ Parallax error
When a reading scale is used to measure the size of a workpiece feature there is always a certain distance between the reading scale, which is laid on the top of the stage glass, and the projected image of the feature which is on the underneath surface. Unless the reading scale is always viewed from the same direction, ideally from directly above, the image will appear to shift against the reading scale graduations and thus cause a measurement error.

■ Field of view diameter
The maximum diameter of workpiece that can be projected using a particular lens.

\[
\text{Field of view diameter (mm)} = \frac{\text{Screen diameter of profile projector}}{\text{Magnification of projection lens used}}
\]

Example: If a 5X magnification lens is used for a projector with a screen of ø500mm:
The field of view diameter is given by \(\frac{500\,\text{mm}}{5} = 100\,\text{mm}\)
Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

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