Non-Contact Vision Measuring Machine Offers High Accuracy, Real Affordability and Powerful Functionality!
In industry, where the need for high-accuracy non-contact measurement currently increases, high-speed and high-accuracy vision systems are becoming the mainstream in non-contact precision measurement.

Mitutoyo Quick Scope Series are vision measuring microscopes that anyone can easily use to perform not only image observation and single part measurement, but also automatic multiple part measurement.

Quick Scope powerfully supports your vision measurement applications in most diverse environments.

Software

Basic software to control Quick Scope

The vision measuring software, QSPAK, continues to evolve. QSPAK and various application software provide multifunctional analysis, high-speed image processing, and ease of operation.

Optical system

The optical system used in Quick Scope machine is manufactured based on leading-edge optical technologies that Mitutoyo has developed over the years. This is an ideal optical system that provides an even and flare-free image over the entire visual field.

Traceability

Mitutoyo offers calibration services of various kinds from a unique company that is home to nationally accredited calibration laboratories in three fields - laser sources for length measurement, end standards, and line standards. Also, as a comprehensive manufacturer of precision instruments, Mitutoyo provides a number of measuring instruments traceable to national standards, such as coordinate measuring machines, optical measuring instruments, and form measuring instruments as well as vision measuring systems.
The Quick Scope Series can be used for measurement in various industries for such products as molded-plastic parts, machined parts, cutting tools, medical devices and electronic components. The vision measuring software QSPAK, which combines excellent operability with high functionality, aids customers in meeting measurement challenges. The additional use of the application software FORMPAK-QV can extend QSPAK capabilities to enable form assessment and analysis.

**QS Series Lineup**

**QS-250Z**

<table>
<thead>
<tr>
<th>Drive method</th>
<th>Focus</th>
<th>Optical system</th>
<th>Image detecting unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNC all axes</td>
<td>AF</td>
<td>zoom lens selectable</td>
<td>Color CCD camera</td>
</tr>
</tbody>
</table>

**QS-LZB**

<table>
<thead>
<tr>
<th>Drive method</th>
<th>Focus</th>
<th>Optical system</th>
<th>Image detecting unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual all axes</td>
<td>Contrast-level function</td>
<td>Zoom</td>
<td>CMOS color camera</td>
</tr>
</tbody>
</table>

**Workpiece examples**

- Molded-plastic part
- Cutting tool
- Pressed part
- Printed circuit board
Drastic Improvement in Working Efficiency
Thanks to Functions Focused on Operability

■ Stage variations
The QS-250Z Series stage lineup offers a single size with an XY measuring range of 200×250mm. The QS-LZB stage lineup comprises three sizes with an XY measuring range of 200×100mm, 300×170mm and 400×200mm, respectively.

■ Quick release mechanism
Applicable models: QS-LZB
A quick release mechanism is installed on the XY stage of these models. Stage feed can be switched between Coarse and Fine (FREE and LOCK). Since this mechanism puts the stage in a completely free state, it greatly eases moving the stage if it is a long way to the next measuring point.

■ Illumination functions provide excellent support for measurement and observation
In addition to contour and surface illumination, Quick Scopes are equipped with a fiber-optic ring light to aid in reproducing color images more clearly. This illumination enables measurement and observation of images under optimal conditions.

■ Left and right knobs on the Z-axis feed mechanism
Applicable models: QS-LZB
Z-axis feed knobs are fitted to both sides to allow the choice of focusing hand. The outside coarse-feed knob adjusts the Z axis 30mm per revolution and the inside fine-feed knob feeds at 0.2mm per revolution. This type of dual-concentric coarse- and fine-feed control dramatically improves operability.

■ AF tool
Applicable models: QS-250Z
The AF (Auto-focus) tool allows focusing without personal error, therefore achieving high-accuracy height measurement.
Programmable power zoom

Applicable models: Zoom lens models of QS-250Z and QS-LZB

Zooming from low to high magnifications can support either observation to high-magnification measurement without changing lenses. Additionally, the automatic light control function associated with a zooming operation and automatic correction functions, such as image displacement and pixel calibration, is installed in these models.

QS-250Z: 0.5X – 3.5X (20X – 137X) at 8 steps, 7X zoom
QS-LZB: 0.75X – 5.25X (30X – 208X) at 8 steps, 7X zoom

* Each numeral in parentheses indicates the image magnification using a 19-inch LCD monitor.

Image examples in QS-LZB

Control box

Applicable models: QS-250Z, QS-LZB

Frequently-used operations such as illuminating, data entry, zooming, and auto-focusing* can be performed with a single touch of individual buttons conveniently positioned on the control box. The CNC QS system allows remote operation with a jog shuttle. The manual QS system can be operated with a single touch of a button when repeating measurement.

* Function available only in QS and QS-L/AFB

Digital zoom function

Applicable models: QS-250Z, QS-LZB

Every click on the menu icon magnifies an image display from normal 1X to 2X and then 4X. An image can be measured by digital-zooming at every magnification level.
CNC Vision Measuring System
QS-250Z

Specifications

<table>
<thead>
<tr>
<th>Zoom lens system</th>
<th>Model</th>
<th>QS250Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive method</td>
<td></td>
<td>CNC</td>
</tr>
<tr>
<td>Range (XxYxZ) (mm)</td>
<td>8&quot;x10&quot;x4&quot; (200x250x100)</td>
<td></td>
</tr>
<tr>
<td>Resolution/length standard</td>
<td>0.5µm/linear encoder</td>
<td></td>
</tr>
<tr>
<td>Image detecting unit</td>
<td>1/3&quot; Color CCD camera</td>
<td></td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>XY: 25.4±0.001µm, Z: 5±0.010µm</td>
<td></td>
</tr>
<tr>
<td>Drive speed</td>
<td>Max 800mm/s</td>
<td></td>
</tr>
<tr>
<td>Acceleration and deceleration</td>
<td>Max. 250mm/s²</td>
<td></td>
</tr>
<tr>
<td>Stage glass size</td>
<td>11&quot;x12&quot; (289x305)</td>
<td></td>
</tr>
<tr>
<td>Maximum stage loading</td>
<td>280lbs (127kg)</td>
<td></td>
</tr>
<tr>
<td>Illumination</td>
<td>Contour Illumination: 12V/50W Halogen, Reflected Illumination: 12V/50W Halogen, Fiber-optic ring light: 12V/100W Halogen</td>
<td></td>
</tr>
<tr>
<td>Dimensions (WxDxH) (mm)</td>
<td>18&quot;x32&quot;x26&quot; (457x813x663)</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>168lbs (76kg)</td>
<td></td>
</tr>
<tr>
<td>Power consumption**</td>
<td>970W at max</td>
<td></td>
</tr>
</tbody>
</table>

* Company standard 2.5X at the time of zooming in) under an installation environment of 20°C and during use of the standard lens.

** Value in the case of selecting the color ink-jet printer.

Optional accessories:
- Calibration chart (02AKM020)
- Control box 2 (02APW610)
- Joystick box (02ATD415)
- Foot Switch (9371797)
- Color ink-jet printer

System diagram

Optical system magnification ratios available for Quickscope Systems

<table>
<thead>
<tr>
<th>Optical magnification (mm)</th>
<th>20X</th>
<th>25X</th>
<th>34X</th>
<th>39X</th>
<th>59X</th>
<th>78X</th>
<th>98X</th>
<th>137X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual field (mm)</td>
<td>9.5x7.1</td>
<td>7.3x5.4</td>
<td>5.6x4.2</td>
<td>4.7x3.5</td>
<td>3.1x2.3</td>
<td>2.3x1.7</td>
<td>1.9x1.4</td>
<td>1.3x1.0</td>
</tr>
<tr>
<td>Zoom lens system</td>
<td>0.5X</td>
<td>0.65X</td>
<td>0.85X</td>
<td>1X</td>
<td>1.5X</td>
<td>2X</td>
<td>2.5X</td>
<td>3.5X</td>
</tr>
</tbody>
</table>

*The values of monitor magnification indicate those for a 19-inch LCD monitor. Each lens of a fixed lens system is optional.
Wider view with mega-pixel camera

Applicable models: QS-LZB

A mega-pixel camera has widely expanded the visual field available. The field is approximately 40% wider than those of predecessors. This camera achieves efficient measurement in batch measuring of multiple items in the display screen.

Improved manual focusing repeatability

An indication of image contrast near the center of the video window is displayed on a level meter. A peak level indicates a focal position. This improves the repeatability of focal positions in manual focusing.

System diagram

Optical system magnification ratios available

<table>
<thead>
<tr>
<th>Monitor magnification</th>
<th>30X</th>
<th>39X</th>
<th>40X</th>
<th>51X</th>
<th>60X</th>
<th>89X</th>
<th>99X</th>
<th>119X</th>
<th>149X</th>
<th>198X</th>
<th>208X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual field (mm)</td>
<td>8.8x5.6</td>
<td>6.8x4.1</td>
<td>6.6x4.9</td>
<td>5.2x3.9</td>
<td>4.6x3.3</td>
<td>2.9x2.2</td>
<td>2.6x2.0</td>
<td>2.2x1.6</td>
<td>1.7x1.3</td>
<td>1.3x0.9</td>
<td>1.2x0.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QS-LZB</th>
<th>0.75X</th>
<th>0.98X</th>
<th>1.28X</th>
<th>1.5X</th>
<th>2.25X</th>
<th>3X</th>
<th>3.75X</th>
<th>5.25X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working distance (mm)</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The values of monitor magnification indicate those for a 19-inch LCD monitor. The values in parentheses indicate those in the case of using digital zoom 4X. Each lens of a fixed lens system is optional. During the use of digital zoom the image in each visual field in the above table is expanded. The use of digital zoom 4X narrows each visual field in the table to 1/4.

Common options

- Calibration chart (O2AKN020)

Main unit

- CCMS color camera
- Power Unit
- Stop switch

Illumination unit

- Contour illumination
- Surface illumination
- Fiber-optic ring light (Option for QS-LZB)

Optional software

- QSPAK
- Optional software

Stage options

- Rotary table with fine-feed knob (A) (176-305)
- Stage adapter (B) (176-310)

- Rotary table with fine-feed knob (A) (176-306)
- Stage adapter (176-304)

- Swivel center support*3 (172-197)
- Holder with clamp (176-107)
- V-block with clamp (172-378)

- Foot switch (937179T)

Stage adapter

- For model 2010 (176-310)
- For model 3017/4020 (176-306)

HQ-EB: Contour Illumination

HQ-EB: Fiber-optic ring light

HQ-EB: Infrared ring light

HQ-EB: Fiber-optic ring light (Option for QS-LZB)

Optical accessories

- Common options
- Calibration chart (O2AKN020)
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>QS-L2010ZB</th>
<th>QS-L3017ZB</th>
<th>QS-L4020ZB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>359-710-1A</td>
<td>359-711-1A</td>
<td>359-712-1A</td>
</tr>
<tr>
<td>Observation unit</td>
<td>Zoom: 0.75X – 5.25X (8X in 7 steps)</td>
<td>Zoom: 0.75X – 5.25X (8X in 7 steps)</td>
<td>Zoom: 0.75X – 5.25X (8X in 7 steps)</td>
</tr>
<tr>
<td>Range (X×Y×Z) Inch/mm</td>
<td>8”×4”×6” (200×100×150)</td>
<td>12”×7”×6” (300×170×150)</td>
<td>16”×8”×6” (400×200×150)</td>
</tr>
<tr>
<td>Resolution/length standard</td>
<td>0.5µm/Linear encoder</td>
<td>0.5µm/Linear encoder</td>
<td>0.5µm/Linear encoder</td>
</tr>
<tr>
<td>Image focusing unit</td>
<td>1/2-inch color CCD camera</td>
<td>1/2-inch color CCD camera</td>
<td>1/2-inch color CCD camera</td>
</tr>
<tr>
<td>Digital zoom</td>
<td>1X – 2X – 4X</td>
<td>1X – 2X – 4X</td>
<td>1X – 2X – 4X</td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>( \frac{XY}{2} )</td>
<td>( \frac{XY}{2} )</td>
<td>( \frac{XY}{2} )</td>
</tr>
<tr>
<td>Stage glass size Inch/mm</td>
<td>10”×6” (250×150)</td>
<td>15”×9” (370×240)</td>
<td>17”×9” (440×240)</td>
</tr>
<tr>
<td>Maximum stage loading</td>
<td>22lbs (10kg)</td>
<td>44lbs (20kg)</td>
<td>33lbs (15kg)</td>
</tr>
<tr>
<td>Illumination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main unit</td>
<td>Contour illumination: 12V/50W halogen, Surface illumination: 12V/50W halogen, Fiber optic ring light: 12V/100W halogen</td>
<td>Contour illumination: 12V/50W halogen, Surface illumination: 12V/50W halogen, Fiber optic ring light: 12V/100W halogen</td>
<td>Contour illumination: 12V/50W halogen, Surface illumination: 12V/50W halogen, Fiber optic ring light: 12V/100W halogen</td>
</tr>
<tr>
<td>Control unit</td>
<td>12”×9”×3” (310×330×103)</td>
<td>12”×9”×3” (310×330×103)</td>
<td>12”×9”×3” (310×330×103)</td>
</tr>
<tr>
<td>Max</td>
<td>160lbs (72kg)</td>
<td>311lbs (146kg)</td>
<td>248lbs (116kg)</td>
</tr>
<tr>
<td>Power unit</td>
<td>11lbs (4kg)</td>
<td>11lbs (4kg)</td>
<td>11lbs (4kg)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>160W at max</td>
<td>160W at max</td>
<td>160W at max</td>
</tr>
</tbody>
</table>

* Dimensions for model 3017

---

### Dimensions

- **QS-L2B**

```
Dimensions: 30” (760) 30” (760) 30” (760)
Maximum: 28” (711) 30” (760) 30” (760)
```

- **QS-L2B**

```
Dimensions: 30” (760) 30” (760) 30” (760)
Maximum: 28” (711) 30” (760) 30” (760)
```

- **Model 4020**

```
Dimensions: 30” (760) 30” (760) 30” (760)
Maximum: 41” (1030) 31” (787) 31” (787)
```

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* Shown on optional table

Unit: Inch (mm)
QSPAK® –A Powerful Vision Measuring Software System that supports a wide variety of measurement

In order to support various measuring methods from measurement of a wide variety of single parts to CNC measurement of mass production parts, QSPAK® has achieved both high-reliability vision detecting capability and user-friendly operability.

Measurement Commands Covering Basic Methods of Measurement

* Item names are not actually displayed, but displayed as on-line help.
Tools that Reduce Operation Error and Improve Repeatability

**One-click tools**  ● Patent pending (Japan)

A single click in the vicinity of a workpiece edge allows automatic processing from tool setting to edge detection/calculation. Additionally, this function does not need stage movement for any workpiece measurement within a screen, drastically reducing measurement time.

- **One-click circle tool**
- **One-click box tool**

**Smart tool**  ● Patent pending (Japan)

The Smart tool automatically detects the clearest edge within the range enclosed with a circle, thus allowing speedy edge detection compared with edge alignment using the cross hairs of a microscope or profile projector.

**Auto-trace tool**

This is a tool for form measurement in which the edge of an arbitrary form is detected with multiple points at a time.

- **Cross hairs**
- **Crosshatch**
- **Concentric circle**

* The Auto-trace tool of QS-L2B, or QS-EB only functions within a screen.

**Automated Lighting Tools**  ● Patented Function

The Dual area contrast tool is a tool for automatically setting the light intensity so as to maximize the contrast of edge areas. The Brightness tool is for setting illumination so as to match the screen brightness between the times during part program creation and part program execution.

- **Dual area contrast tool**
- **Brightness tool**

Convenient Tools Effective for Visual Measurement

**Template tools**

- **Basic templates (overlays)**
  The following are three basic templates corresponding to the reticle of a microscope.
  - Cross hairs
  - Crosshatch
  - Concentric circle

- **User pattern matching**
  The user can freely create a template (master) in accordance with a workpiece, different from the basic templates and extension templates to perform tolerancing with a master. Also, the user can easily perform tolerancing by displaying key-entered upper limit and lower limit lines on the screen.
Convenient Tools Effective for Visual Measurement

Template tools

- **Extension templates**
  Extension templates are provided based on four types of pattern: cross-hair; circle; rectangle; and angle. A diameter, distance, angle, and other values can freely be set by key entry in the same manner as used in comparison measurement with a profile projector.

- **CAD user template function**
  This function allows a template to be created using a form (CAD data) in the Graphics window.
  * To create a template, CAD data needs to be imported and exported.

Convenient Functions to Simply Execute and Edit an Auto-measurement Procedure Program

- **One-click simple execution function – Program Launcher**
  An auto-measurement procedure program can be associated with a dedicated icon along with a photo and comments to enable a program to be started by a single click.
  A total of 10 icons are provided and programs can be managed for each operator or workpiece using these icons.

- **Smart editor**
  This function allows an XY-stage travel position, lens magnification, illumination condition, etc., to be separately displayed as icons or labels in the list of part programs (auto-measurement procedure programs), thereby simplifying program editing.
Navigation Function Contributes to Reduction in Measurement Time

This stage navigation function enables pinpoint positioning when the stage needs to be moved significantly. To move the stage, click the point in the Graphics window to which the stage is to be repositioned. Then, the stage directly moves to the point. This can suppress wasted stage motion such as overrun or deficient run to the minimum. To accurately move the stage, click a point to move to the center of the Video window with the mouse. Then, the stage accurately moves to the center of the Video window. The use of this function will significantly reduce the setup time needed for a part program.

Stage movement with the Graphics window

Stage movement with the Video window

Quick navigation (QS-LB)  Patent pending (Japan)

This is a navigation function that concurrently uses the Learn/Repeat function for storing and reproducing a series of measuring procedures. This function navigates the operator to the next measuring point in accordance with the measuring procedure stored. Move the stage until the red cross-hairs indicating the next measuring point to coincide with the green cross-hairs at the center of the monitor screen. Then, the view at the next measuring point will appear on the screen. This function also allows zero approach using the digital counter. The operator does not need to check a measuring point while looking at a workpiece and can perform measurement while concentrating on the screen.

(1) The next measuring point is indicated with the red cross-hairs.

(2) As the stage approaches the next measuring point, the red cross-hairs and green cross-hairs get closer to one another.

(3) When the two cross-hairs coincide and the target view appears, press the Enter button to complete the measurement.
Enhanced Capabilities Supporting Tasks from Operator Management to Inspection Report Creation

**Graphics window**

*Measuring features and measurement results are displayed in real time on the Graphics window. This allows the operator to verify measurement points with visual images. Measuring features can also be selected from graphics, thus allowing speedier measurement. Calculation between features is possible using the Graphics window.*

**Icon editor**

*The layouts of measurement item icons, tool icons, etc., can freely be rearranged. The operator can apply custom icon configuration in which, for example, frequently-used icons are grouped on the first page.*

**Security function**

*This function restores the range of use depending on the task level by requesting password entry when QSPAK® starts up. Built in system level security for operators*

**Video image scale display**

*Scales in accordance with the actual field of view can be displayed on the Video window to quickly estimate size of a workpiece. If workpiece images are stored along with scale indication, it gives a rough indication of the size of each workpiece.*

**Image storage**

*Color images on the Video window can be output as a file in BMP or JPG format. Also, the images can easily be attached to record workpiece graphics, inspection report, etc.*

*They can be recalled from memory and remeasured*

**Measurement reporting**

*Measurement results obtained by a part program can be output as they are in CSV format. This file can then be imported into a commercial spreadsheet software, such as MS Excel. This allows for a company-specific inspection report.*
Optional Accessories

Application Software Lineup that Meets the Needs for Advanced Measurements

**Form assessment and analysis software**

*FORMPAK-QV (Optional Software)*

This software can perform contour analysis and tolerancing with design values from multi-point data acquired with the Auto-trace tool, etc.

* The Auto-trace tool for the QS-LAF, QS-L2L, or QS-EB only functions within a screen.

![Measurement with the Auto-trace tool](image1)

- Contour analysis screen
- Contour tolerancing screen

**Measurement Support Software**

*QS-CAD I/F (Optional Software)*

Importing CAD data (DXF- or IGES-formatted) created at the time of design to QSPAK® can drastically improve operability and reduce the creation time of a part program. This software can also convert measurement results of QSPAK® to CAD data.

**Feature**
- The design value of each measurement item is automatically entered.
- The stage can quickly be moved to a given point in the CAD data.
- Graphics data can be output in a specified CAD format.

**MeasurLink®**

A real-time display of measurement results and statistical analysis on the shop floor, with data saved in a database. Includes SPC and statistical analysis, data filtering and reporting systems for complete control of your manufacturing processes. MeasurLink includes modules for shop floor data collection, QC room data analysis and reporting, gage R&R studies, and gage tracking.
Optional Equipment

Calibration chart

This chart is used for correcting the pixel size of image detection. In zoom lens systems, it is also used for zoom offset calibration that corrects an optical axis offset.

Calibration chart

• Calibration chart

This chart is used for correcting the pixel size of image detection. In zoom lens systems, it is also used for zoom offset calibration that corrects an optical axis offset.

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Calibration chart

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