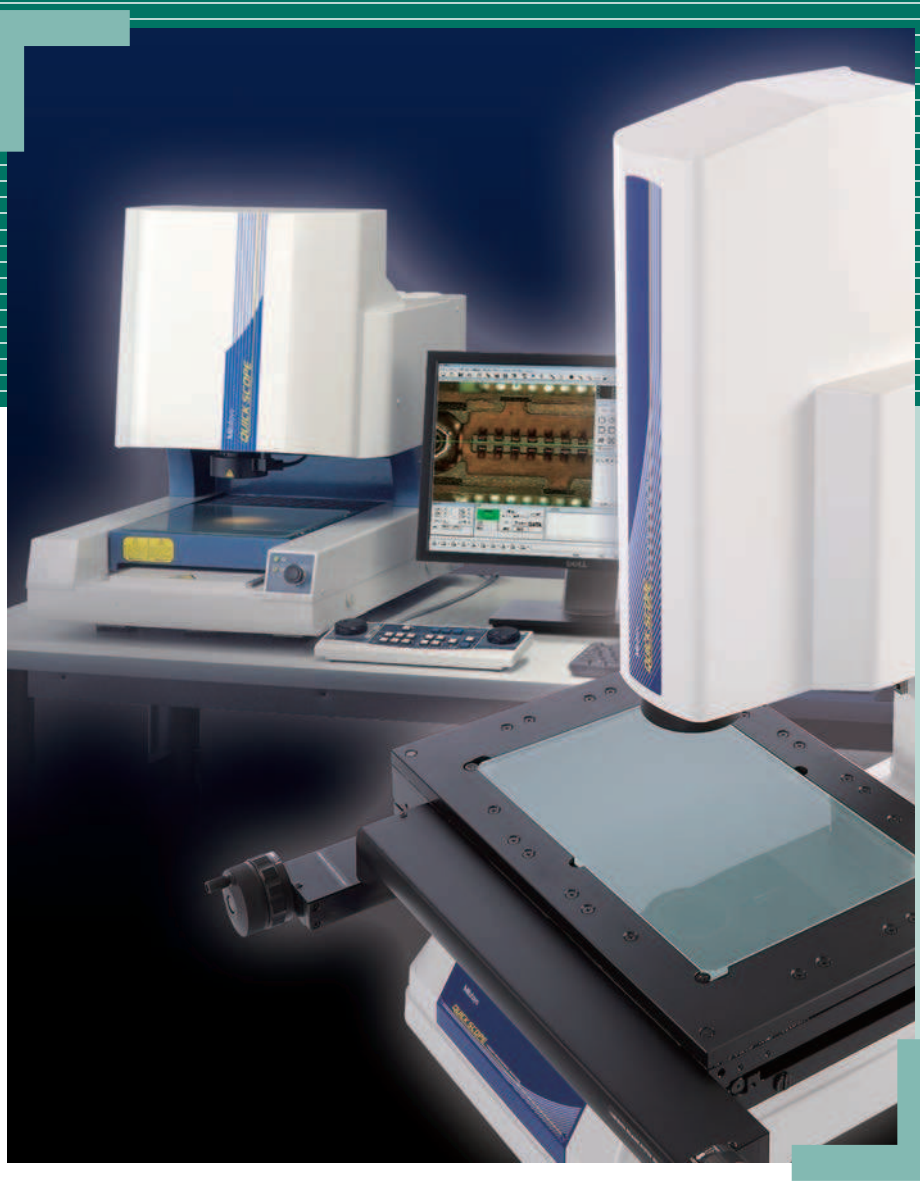
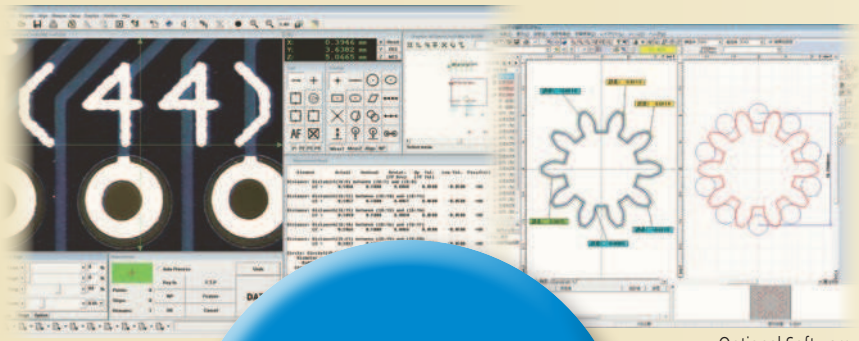
Vision Measuring Systems
QUICK SCOPE Series



Bulletin No. 2136

Mitutoyo

Refined Measurement Capabilities
"Intuitive Operation" and "High Precision Measurement"



Standard Software

Optional Software

Software

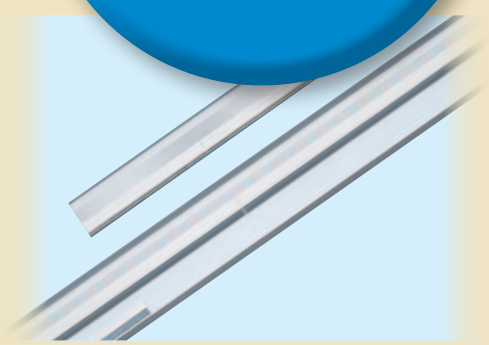
Intuitive software makes equipment operation easy for anyone.

High-Accuracy

Industry leading .1µm resolution Linear Scales on the X, Y, & Z axes.

Optical

Optical technologies designed to take the place of a human eye.



Glass scales

Lens design and manufacturing

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The Quick Scope series can be used by anyone to easily perform manual work piece observation or automatic measurement of single or multiple items. The image measurement software, QSPAK, offers intuitive operability and advanced functionality that can solve your measurement challenges. Used with the optional FORMPAK-QV application software, the Quick Scope series can also perform form analysis.

Series Lineup

QS

ZOOM AF

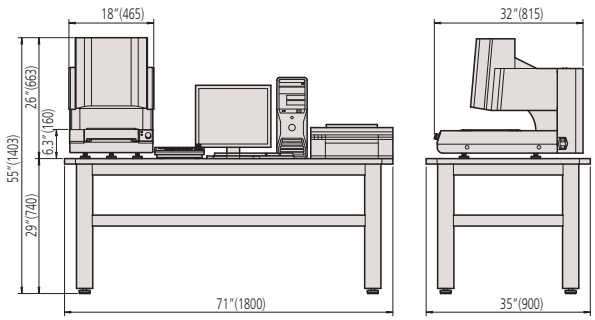
Motor driven X, Y, and Z axes (zoom optics)

CNC

Measuring Range (X×Y×Z):
8"×10"×4"(200×250×100mm)
Field of View: 9.5×7.1mm~1.3×1.0mm

QS250Z

Unit: inch (mm)



QS-LZB

ZOOM

Manually operated X, Y, and Z axes (zoom optics)

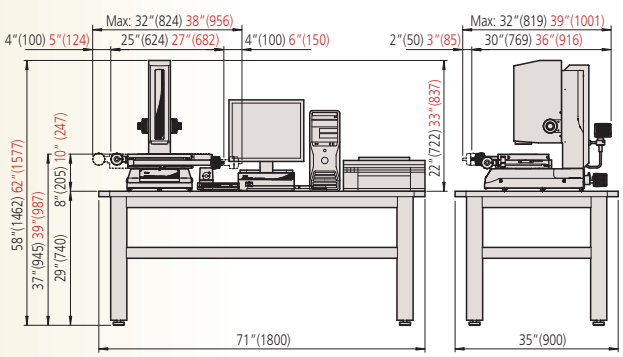
Manual

Measuring Range (X×Y×Z):
8"×4"×6"(200×100×150mm)
12"×7"×6"(300×170×150mm)
16"×8"×6"(400×200×150mm)
Field of View: 8.8×6.6mm~1.2×0.9mm

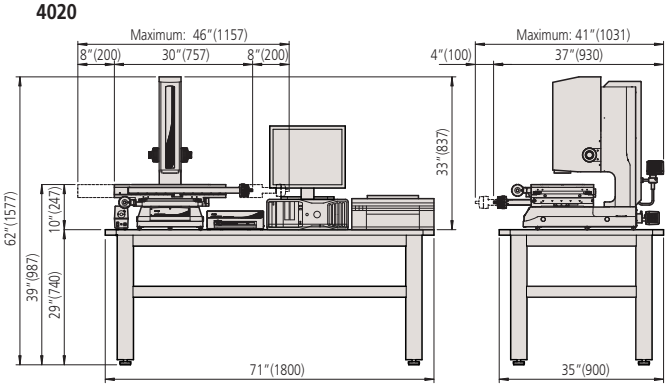
QS-LZB

Unit: inch (mm)

2010/3017 Dimensions in red indicate those for model **3017**.



4020



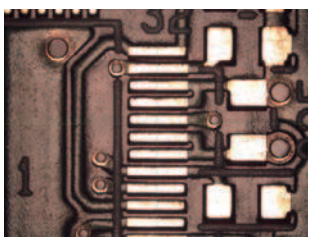
Improve your Measurement Efficiency with a wide array of features focused on Operator Ease of Use

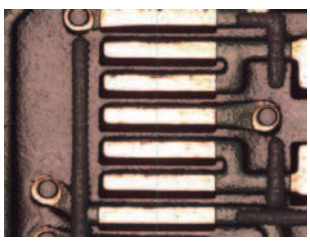
Programmable Optical Zoom

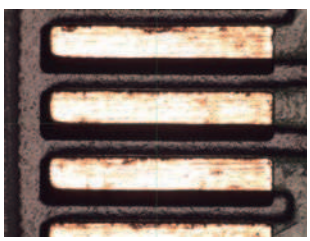
ZOOM

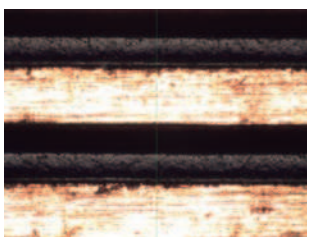
Low to high magnification zooming provides support for both wide-field of view observation and high-magnification measurement, without the need to change lenses. The working distance is a constant 55mm, regardless of the magnification. The long working distance makes it possible to perform measurement on even uneven workpieces using the optimal magnification.
The QS series provides a full set of automatic correction features, such as automatic light adjustment associated with a zooming operation, automatic position adjustment, pixel calibration, and more.

QS: 0.5X-3.5X (zoom ratio 7X in 8 steps)
(26X-180X)*
QS-LZB: 0.75X-5.25X (zoom ratio 7X in 8 steps)
(29X-202X)*


0.75X (29X)*


1.5X (58X)*


3X (116X)*

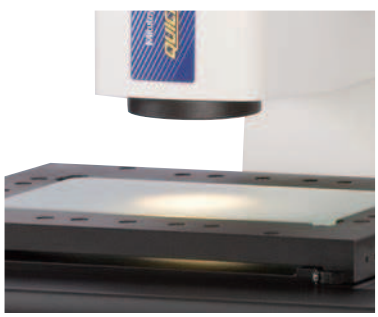

5.25X (202X)*

Fixed 55mm working distance

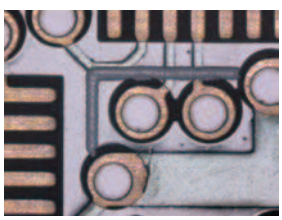
* Total magnification shown in the above table is a reference value displayed in the default window state when using 22-inch wide LCD monitor.

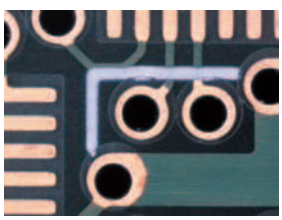
Illumination functions provide excellent support for measurement and observation

In addition to contour and surface illumination, Quick Scope is 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.




Contour (stage) illumination


Surface (coaxial) illumination


Fiber-optic ring illumination

During automatic measurement the part program provides automatic control over the illumination system, thus providing the necessary balance between user-friendliness and high efficiency.

Control box

Frequently-used operations such as changing illumination, data entry, zooming, and auto-focusing* can be performed with a single touch of individual buttons conveniently located on the included control box.
The CNC **QS** system's control box allows stage movement operations with a jog shuttle. The manual **QS** system's control box can execute a measurement routine with the touch of a button.
* Auto-focusing function included on QS CNC models.


For **QS**


For **QS-LZB**

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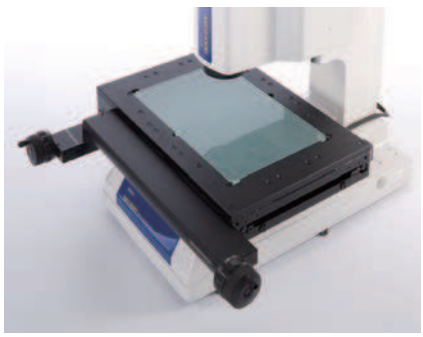
Stage sizes

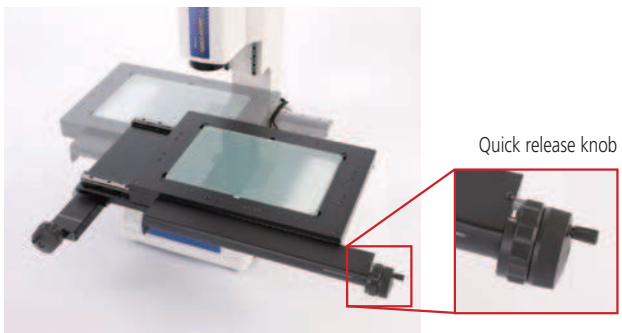
Multiple Stage Sizes are available to accommodate a wide variety of workpiece measurements.

- **QS** (X×Y) 8"× 10"(200×250mm)
- **QS-LZB** (X×Y) 8"× 4"(200×100mm), 12"× 7"(300×170mm), 16"× 18"(400×200mm)



Quick release mechanism Applicable models: **QS-LZB**

Manual QS systems incorporate a quick release mechanism on the XY stage. Stage feed can be switched between Coarse and Fine (FREE and LOCK) on the handle. When operating the stage in the free state, the operator is allowed to move quickly over long distances, increasing the speed of the measurements.



AF tool Applicable models: **QS**

The AF (Auto focus) tool allows focusing without operator error, thereby achieving high-accuracy height measurement.

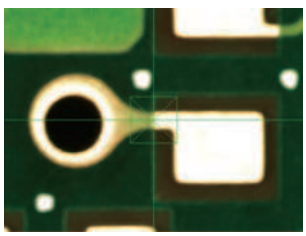


Image before AF

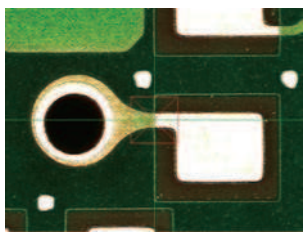
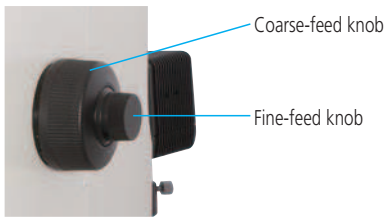


Image after AF

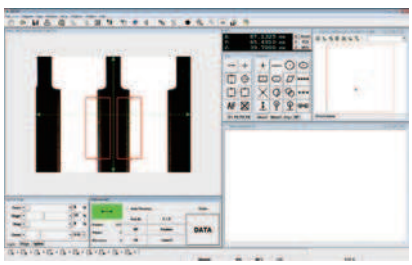
Ambidextrous Z-axis feed Applicable models: **QS-LZB**

Z-axis knobs are fitted to both sides of the column, making it easy to use for both left- and right-handed operators.
The outside coarse-feed knob adjusts the Z axis 30mm per revolution, and the inside fine-feed knob feeds at 0.2mm per revolution.
A contrast level meter is displayed, improving repeatability of focal positions in manual focusing.

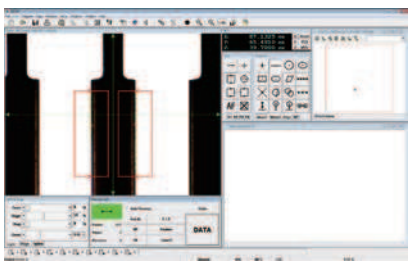


Digital zoom function

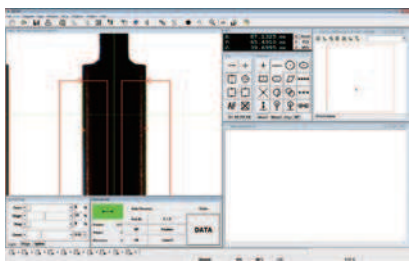
Digital zoom enables enlarged display and enhanced measurement detail.



Low magnification



Medium magnification



High magnification

CNC Vision Measuring System
QS

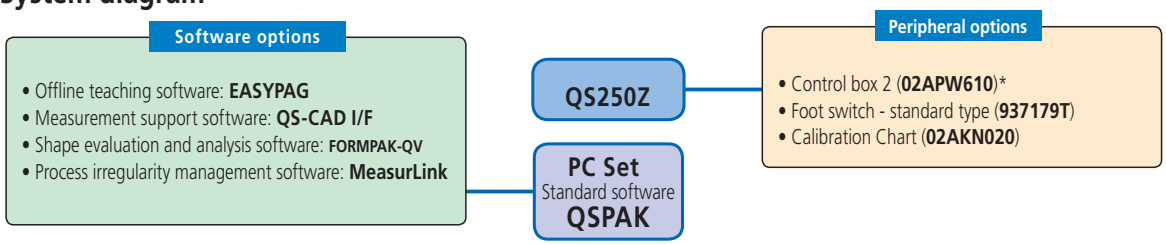
QS250Z
* Printer and table are optional accessories. These options can vary.

Specifications

Zoom lens system	Model	QS250Z
	Order No.	**359-508**
Drive method		X axis / Y axis / Z axis: CNC
Optical Magnification*1		Zoom: 0.5X-3.5X (in 8 steps)
Measuring range (X×Y×Z)		8"× 10"× 4"(200×250×100mm)
Resolution/Length standard		0.1µm/Linear encoder
Image detecting unit		1/3" Color CCD camera
Measuring accuracy*2	E_1X, E_1Y	(2.5+6L/1000)µm
	E_1Z	(5.0+6L/1000)µm
Operating temperature range		20±1°C
Drive speed		Max 80mm/s
Acceleration and deceleration		Max 250mm/s^2
Stage glass size		11"× 12"(269×311mm)
Maximum stage loading		22 lbs (10kg)
Illumination		Stage light: 12V/30W Halogen Co-axial light: 12V/50W Halogen Ring fiber light: 12V/100W Halogen
Dimensions (W×D×H)mm		18"× 32"× 26"(465×815×663mm)
Mass		169 lbs (76kg)
Power consumption*3		500W at max

*1 Monitor Magnification is in the reference table located below
*2 Measuring accuracy is calculated at the 2.5X zoom magnification level under an installation environment of 20°C.
*3 QS main unit only (excluding PC and monitor).

System diagram



Optical system magnification ratios available for QS

* Switching required

Total magnification Field of View (mm)	26X 9.5×7.1	34X 7.3×5.4	44X 5.6×4.2	52X 4.7×3.5	78X 3.1×2.3	103X 2.3×1.7	129X 1.9×1.4	180X 1.3×1.0
QS	●	●	●	●	●	●	●	●
Working distance (mm)	0.5X	0.65X	0.85X	1X	1.5X 55	2X	2.5X	3.5X

* Total magnification shown in the above table is a reference value displayed in the default window state when using 22-inch wide LCD monitor.

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Manual Vision Measuring Systems
QS-LZB

QS-L2010ZB
* Printer and table are optional accessories. These options can vary.

Specifications

Zoom lens system	Model	QS-L2010/ZB	QS-L3017/ZB	QS-L4020/ZB
	Order No.	**359-710-1**	**359-711-1**	**359-712-1**
Drive method		X axis / Y axis / Z axis : Manual		
Optical Magnification*1		Zoom: 0.75X-5.25X (in 8steps)		
Measuring range (X×Y×Z)		8"× 4"× 6" (200×100×150mm)	12"× 7"× 6" (300×170×150mm)	16"× 8"× 6" (400×200×150mm)
Resolution/Length standard		0.1µm/Linear encoder		
Image detecting unit		1/2" Color CMOS camera		
Indication accuracy*2	X, Y	(2.5+20L/1000)µm		
	Z	(5.0+40L/1000)µm		
Operating temperature range		20±1°C		
Stage glass size		10"× 6" (250×150mm)	15"× 9" (370×240mm)	17"× 9" (440×240mm)
Maximum stage loading		22 lbs (10kg)	44 lbs (20kg)	33 lbs (15kg)
Illumination		Stage light: 12V/50W Halogen Co-axial light: 12V50W Halogen Ring fiber light: 12V/100W Halogen		
Main Unit	Dimensions (W×D×H)mm*3	25"× 30"× 28" (624×769×722mm)	27"× 37"× 33" (682×916×837mm)	30"× 37"× 33" (757×930×837mm)
	Mass	160 lbs (72kg)	309 lbs (140kg)	321 lbs (146kg)
Power Unit	Dimensions (W×D×H)mm	12"× 13"× 4" (310×330×102.5mm)		
	Mass	11 lbs (5kg)		
Power consumption*4		160W at max		

*1 Monitor Magnification is in the reference table located below
*2 Measuring accuracy is calculated at the 3X zoom magnification level under an installation environment of 20°C.
*3 The width and height increase by the amount of the X axis and Z axis stroke at the maximum. The depth increases by the amount of half of the Y axis stroke at the maximum.
*4 QS main unit only (excluding PC and monitor).

System diagram

Software options
- Measurement support software: **QS-CAD I/F**
- Shape evaluation and analysis software: **FORMPAK-QV**
- Process irregularity management software: **MeasurLink**

QS-LZB

PC Set
Standard software
QSPAK

Peripheral options
- Foot switch - standard type (**937179T**)
- Calibration chart (**02AKN020**)

Stage accessory options
- Rotary table
  ·Rotary table with fine-feed knob (A) (**176-305**)
  For 2010 size stages
  ·Rotary table with fine-feed knob (B) (**176-306**)
  For 3017 or 4020 size stages
- Swivel center support (**172-197**)
- Holder with clamp (**176-107**)
- V-block with damp (**172-378**)

*1 Adapter B (**176-310**) is required for 2010 model separately.
Adapter (**176-304**) is required for 3017 and 4020 models separately.
*2 It can be installed on Rotary table with fine-feed knob (A).
It cannot be installed on Rotary table with fine-feed knob (B).

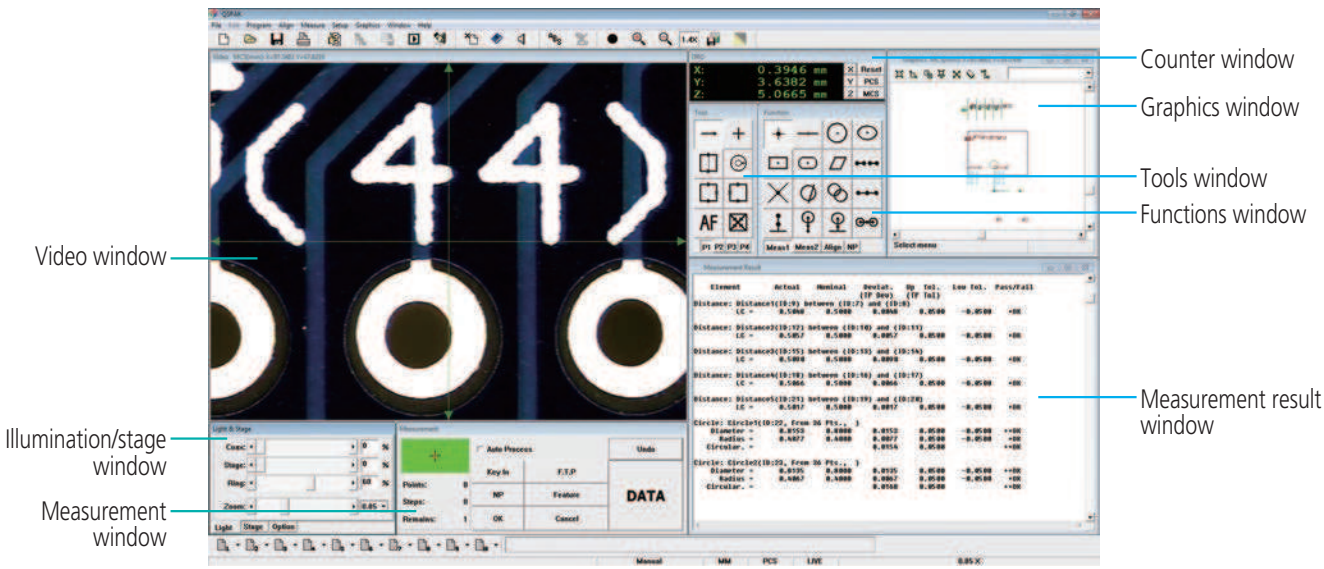
Optical system magnification ratios available for QS-LZB

Total magnification Field of View (mm)	29X 8.8×6.6	38X 6.8×5.1	49X 5.2×3.9	58X 4.4×3.3	87X 2.9×2.2	116X 2.2×1.6	145X 1.7×1.3	202X 1.2×0.9
QS-LZB	0.75X	0.98X	1.28X	1.5X	2.25X	3X	3.75X	5.25X
Working distance (mm)	55							

* Total magnification shown in the above table is a reference valve displayed in the default window state when using 22-inch wide LCD monitor.

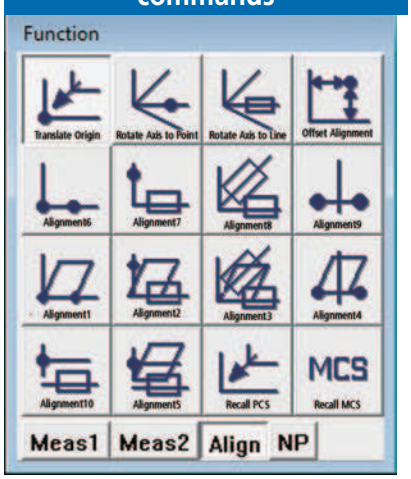
QSPAK® – A powerful vision measuring software system that supports a wide variety of measurement

QSPAK supports various measuring methods from measurement of individual work pieces to CNC measurement of mass production parts, **QSPAK** incorporates both high-reliability vision edge detecting capability and user-friendly operability.

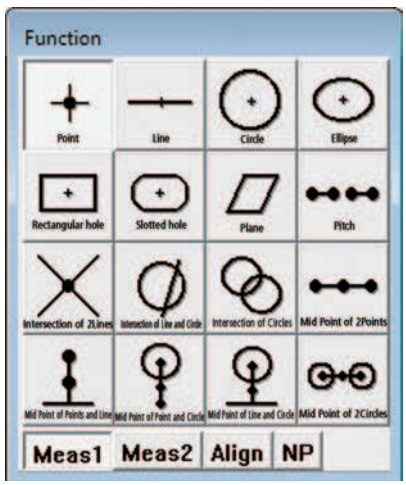


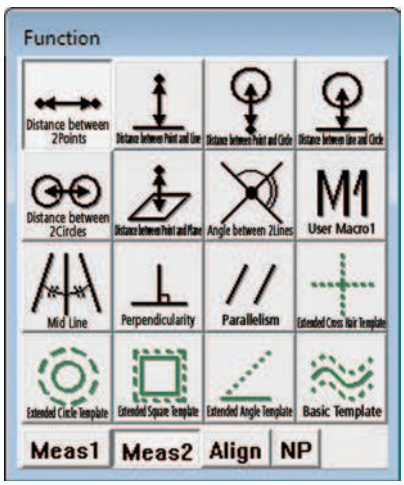
Measurement Commands Covering Basic Methods of Measurement

Coordinate system creation commands



Measurement item commands





* Item names are not actually displayed, but displayed as on-line help.

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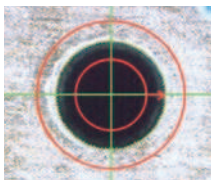
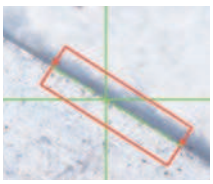
Tools that Reduce Operation Error and Improve Repeatability

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.



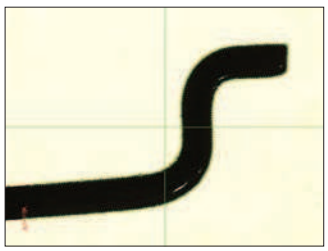
One-click circle tool



One-click box tool

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.



The Auto-trace tool for **QS-LZB**, functions within the magnification field of view.

Convenient Tools Effective for Various Measuring Points

Multi-click Plus Arc Tool

Overall drawing tool size, scan direction size, and edge selector positions can be set as desired.
This tool is effective for the measurement of arcs with small radius angles, and for objects with many irregularities, whose edges are not easily identified.

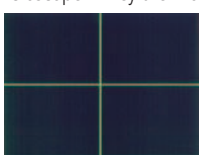
Datum Circle Measurement

In addition to calculating mean-circle measurements using the standard least-square method, the QS series can also perform calculations based on interior diameter (maximum inscribed circle) and external diameter (minimum circumscribed circle).
This measurement approach is useful for circle measurement of the contact sides of fitted components, etc.

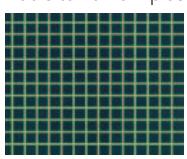
Template tools

Basic templates

Included are three basic templates typically found on a measuring microscope. They are modifiable to fit work piece needs.



Cross hairs

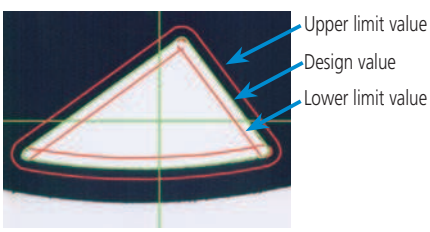


Grid type

Concentric circles

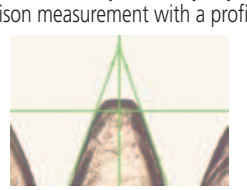
User pattern overlay

The user can freely create a template (master) to suit practically any 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.

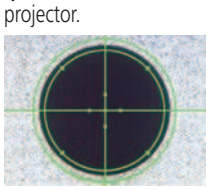


Extension templates

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



Angle template

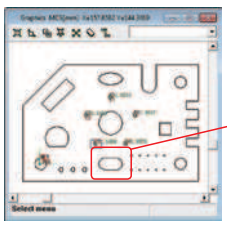


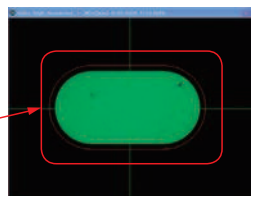
Circle template

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.

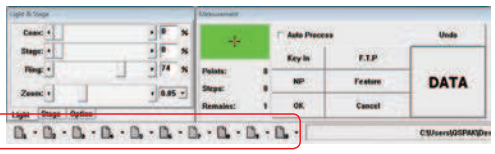




Convenient Functions to Simply Execute and Edit an Auto-measurement Procedure Program

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.

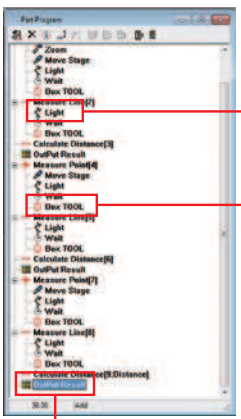


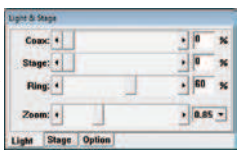
Program launcher icons

Auto-measurement procedure program association window

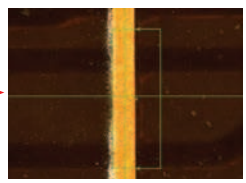
Smart Editor

This function allows an XY-stage 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.





Editing an illumination condition according to the dialog



Editing a direct tool on the Video window

Editing design values and tolerances according to the dialog

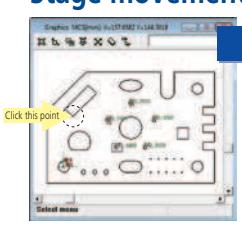
Navigation Function Contributes to Reduction in Measurement Time

Stage Navigation (QS) ● Patent registered (Japan)

This stage navigation function enables pinpoint positioning when the stage needs to be moved. 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 reduce wasted stage motion such as overrun.

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 creation of a part program.

Stage movement with the Graphics window



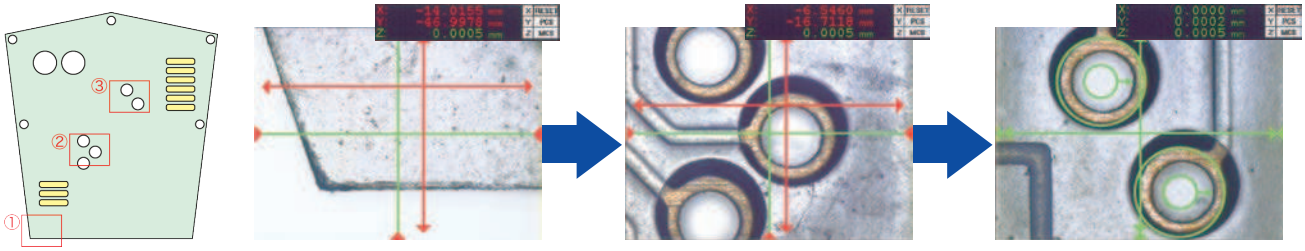
Specify the point which you want to center in the video window

Stage movement with the Video window

Specify the point which you want to center in the video window

Quick navigation QS-LB ● Patent registered (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 stored measurement procedure. Move the stage until the red cross-hairs indicating the next measuring point 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.

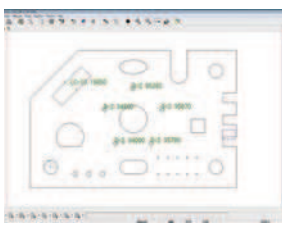
(2) As the stage approaches the next measuring point, the red cross-hairs and green cross-hairs get closer to one another.

(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

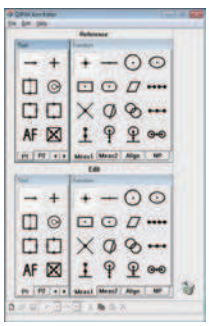
Graphics window

Measuring features and measurement results are displayed in real time in 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 layout of measurement item icons, tool icons, etc., can be freely rearranged. The operator can apply free 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 log-in password entry when QSPAK® starts up.

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.

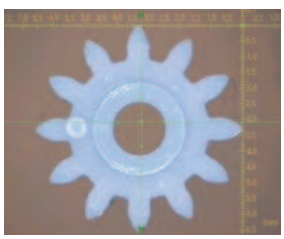
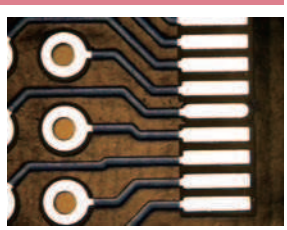


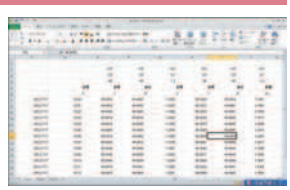
Image storage

Color images in the Video window can be output as a file in BMP or JPG format. Also, the images can easily be attached to the record of workpiece graphics, inspection report, etc. Add: When an image is stored as a bitmap it can be recalled and additional measurements can be applied.



Measurement report ● Patent pending (Japan)

Measurement results obtained by a part program can be output as they are in CSV format. Since the results are output to commercial spreadsheet software such as Excel, you can create a company specific inspection report.



Options

Lineup of Application Software to Meet Advanced Measurement Requirements

Form assessment and analysis software

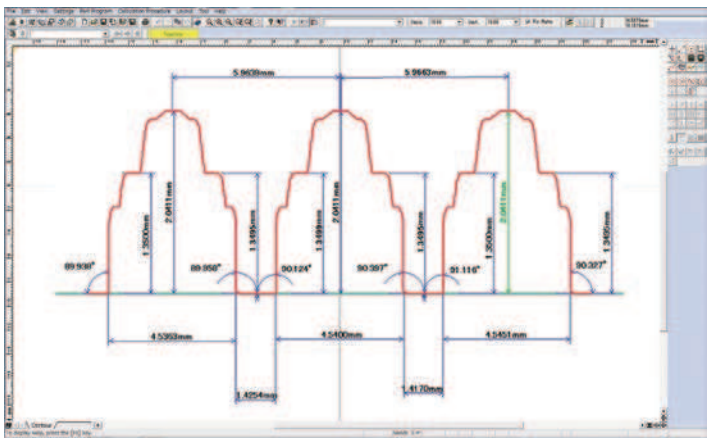
● FORMPAK-QV

This 2D data processing software reads in point group data acquired via tools such as the auto trace tool, performing shape analysis.

* Auto tracing is performed of areas displayed on the monitor for the **QS-L/AFB** and **QS-LZB**.

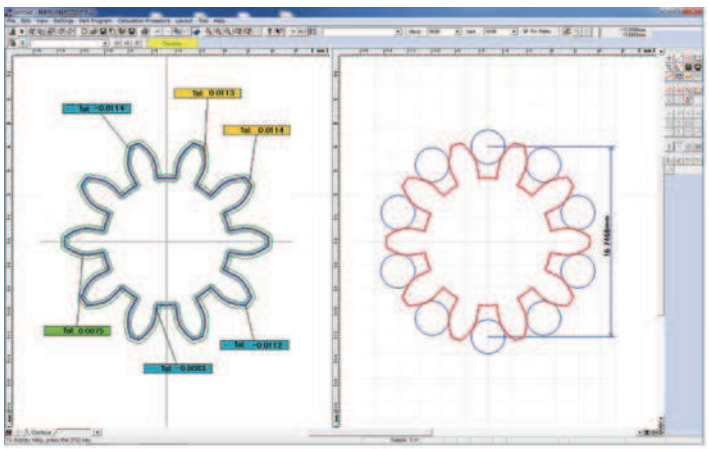
▼ Examples of fine dimension analysis

• The dimensions of fine shapes displayed on-screen can be measured using intuitive controls.



▼ Example of gear contour matching and overpin diameter analysis

• The software can be used to perform contour matching against the design value data.
• You can define virtual circles of any desired diameter.



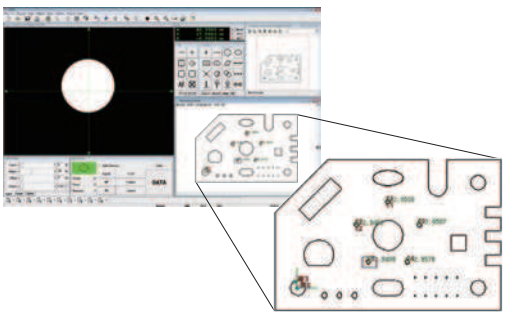
Measurement support software

● QS-CAD I/F

CAD data created during the design phase (DXF- or IGES-formatted) can be imported into **QSPAK**.
QSPAK measurement results can also be converted into CAD data.

▼ Features

• The design value for each measurement item is automatically entered.
• The stage can be quickly moved to a given point in the CAD data.
• Graphic data can be output in a specified CAD format.



Process irregularity management software

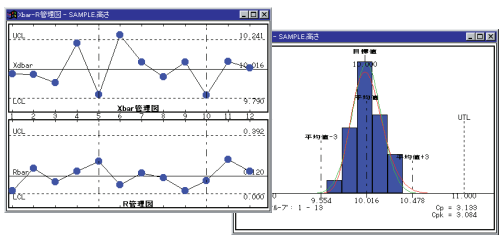
MeasurLink®

● MeasurLink

Statistical data can be displayed in real-time, making early detection of process irregularities possible. Data change-points can be analyzed in order to identify problems, and swiftly implement prevention measures when the problems are part of a trend.

▼ Usage examples

• Mold adjustment and replacement timing measures
• Cutting tool adjustment and replacement timing measures, etc.



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Peripherals

Options compatible with All Devices

Calibration chart

Order No.	**02AKN020**
Application	Used for CCD pixel size calibration, as well as autofocus accuracy and optic axis offset calibration for individual zoom levels.

Foot switch - standard type

Order No.	**937179T**

QS Options

Control box 2

Order No.	**02APW610**

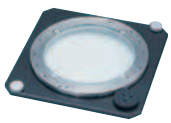
The Control Box is typically offered with the QS Unit. Only one type of machine positioning device can be used at a time.

Joystick box

Order No.	**02ATD415**

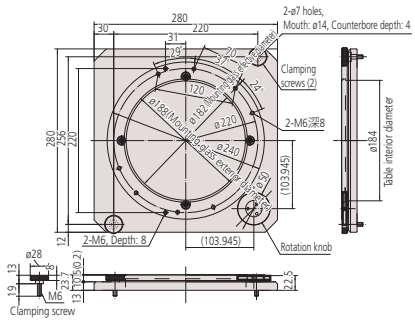
QS-LZB Options

Rotary table with fine-feed knob (A)

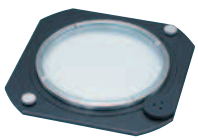


Order No.	**176-305**
Exterior dimensions	280(W)×280(D)×24(H)mm ø240mm table top 360 rotation - No angle readout
Mass	5.5kg
Effective glass diameter (mm)	ø182

Note) The V-block with clamp, swivel center support, and holder with clamp can be secured to the top of the table.

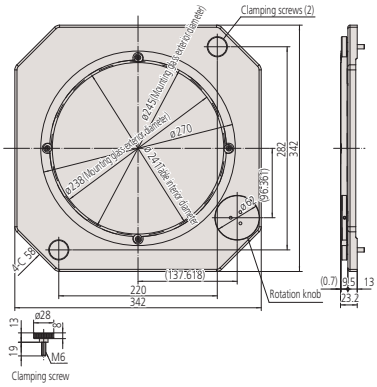


Rotary table with fine-feed knob (B)

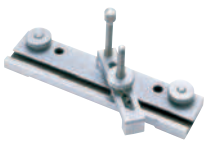


Order No.	**176-306**
Exterior dimensions	342(W)×342(D)×23(H)mm ø270mm table top 360 rotation - No angle readout
Mass	6.5kg
Effective glass diameter (mm)	ø238

Note) The V-block with clamp, swivel center support, and holder with clamp cannot be secured to the top of the table.



Holder with clamp



Order No.	**176-107**
Maximum clamping length	35mm
Exterior dimensions	62(H)×152(W)×38(D)mm
Mass	0.4kg

V-block with clamp

Order No.	**172-378**
	Maximum supportable diameter: ø25mm Center height from mounting surface: 38~48mm
Exterior dimensions	117(H)×90(W)×45(D)mm
Mass	0.8kg

Swivel center support

Order No.	**172-197**
	Can be set to tilt of ±10°, in minimum angle increments of 1° Optimal for measurement of screws, etc. Maximum supportable dimensions: ø80x140mm when horizontal Maximum supportable dimensions: ø65x140mm when tilted at 10° angle
Mass	2.5kg

*Adapter B (**176-310**) is required for **2010 models** separately.
Adapter (**176-304**) is required for **3017** and **4020 models** separately.

Stage adapter
Stage adapter B

Order No.	Stage adapter: **176-304** Stage adapter B: **176-310**
Exterior dimensions per adapter	50(W)×340(D)×15(H)mm Note) Adapter B is 280mm deep
Mass	Stage adapter: 1.5kg Stage adapter B: 1.2kg
Application	These are used when connecting some optional peripherals to the measurement device.

Note) One set consists of two adapters

- Coordinate Measuring Machines
- Vision Measuring Systems
- Form Measurement
- Optical Measuring
- Sensor Systems
- Testing Equipment and Seismometer
- Digital Scale and DRO Systems
- Small Tool Instruments and Data Management

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