

# QUICK SCOPE

Catalog No. E4142-359



**Quick Scope Non-contact Vision Measuring Machine Offer High Accuracy, Excellent Affordability and Powerful Capabilities!**

**Mitutoyo**

## Non-contact Vision Measuring Microscope

# QUICK SCOPE

Series 359

Quick Scope has been developed through Mitutoyo's extensive experience and leading-edge technologies in optics and precision measuring. It performs complex, automatic measurements of batches of workpieces or prototype work with more measuring and analysis capability than a profile projector or traditional microscope.

- A color CCD camera provides real-life, sharp workpiece images.
- Available in CNC or manual version, with zoom or fixed magnification.
- Multiple lighting options allow users to customize their Quick Scopes to meet their particular lighting needs.
- Navigation and Graphic functions allow easy operation and movement around the part.
- One-click edge detection.
- Macro icon tools for many common measuring routines.
- Compact and light weight design fits where you need it.
- Powerful, Windows® based software is easy-to-use and intuitive.

Windows is a registered trademark of Microsoft Corporation.

Model	QS	QS-L	QS-E
CNC	○	—	—
Auto-focus	○	○* <sup>1</sup>	—
Ring light illumination	○	○	▲
Zoom lens	○	○* <sup>2</sup>	—
Control box	▲	○	—
Programmable illumination adjustment	○	○	—
QSPAK	○	○	○

○: Provide ▲: Available as option —: Not available

\*QS-L1020AF, QS-L1020ZAF

\*<sup>2</sup>QS-L1020Z, QS-L1020ZAF

### Easy-to-use Manually-operated System

# QS-L

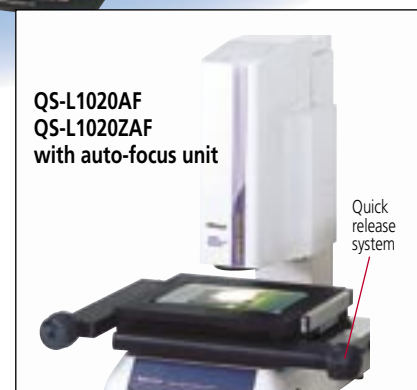
QS-L1020Z



### Features/benefits

- Excellent surface observation model for a wide variety of workpieces.
- 0.1μm resolution and 150mm (6") Z-axis range.
- Power zoom allows for easy and fast magnification change. (QS-L1020AF is a fixed-magnification type)
- Fine illumination capability allows for lighting changes to match workpiece requirements.
- The quick release system in the stage allows instant switching between a coarse movement and a fine movement.
- Quick Navigation function allows the user to do repeat measurements quickly.
- An auto-focus function is available for QS-L1020AF and QS-L1020ZAF.

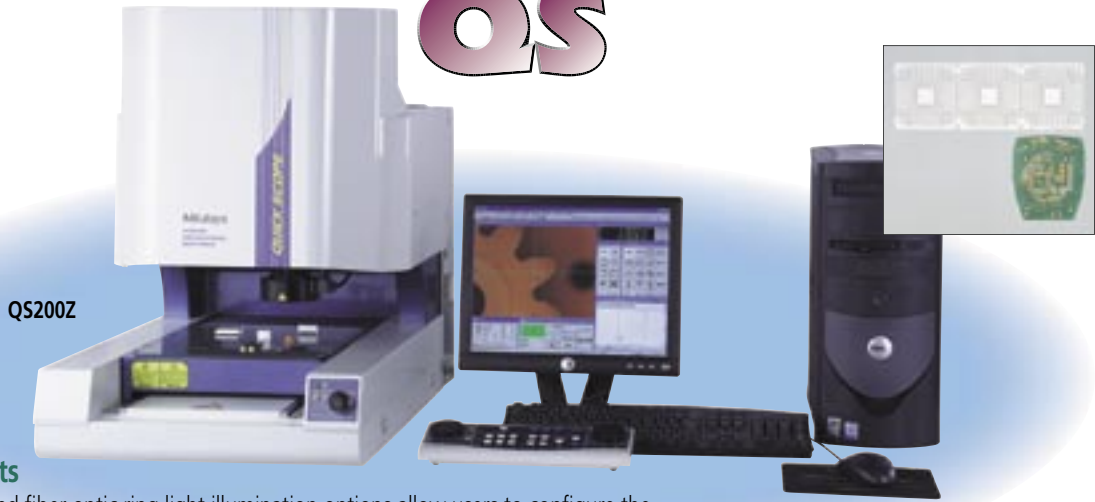
QS-L1020AF  
QS-L1020ZAF  
with auto-focus unit



# Mitutoyo

### Excellent Performance-cost Ratio CNC System

# QS



QS200Z

#### Features/benefits

- Surface, contour and fiber-optic ring light illumination options allow users to configure the QS lighting to meet a variety of measurement needs.
- Powerful, Windows® based QSPAK software is easy to use and offers a wide spectrum of measuring and analysis capabilities.
- Functions include zoom, auto-focus, measurement playback, one-click edge detection, graphic display, 48 different macros, and a pattern matching function for several common part features.
- X,Y stage can be controlled by mouse or through the optional multi-function control box.

### Most Affordable Manually-operated System

# QS-E

#### Estimated times to measure common workpieces with Quick Scope compared to a traditional microscope:

Workpiece	QS (CNC)	QS-L	Microscope
Lead frame	9 minutes	18 minutes	60 minutes
P.C.B.	6 minutes	20 minutes	60 minutes



QS-E1020

#### Features/benefits

- The most affordable Quick Scope model.
- 0.1µm resolution and 150mm (6") Z-axis range.
- Magnification can be adjusted by changing objectives.
- Excellent observation/measurement for a single workpiece.
- The quick release system in the stage allows instant switching between a coarse movement and a fine movement.
- An optional fiber-optic ring light is available.
- Graphic and Navigation functions allow for quick maneuvering around the workpiece.
- Part programs are easily created in the Windows® based QSPAK software.

# Space Saving and Compact Design Makes Quick Scope Easy-to-use and Affordable!

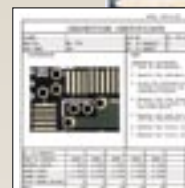
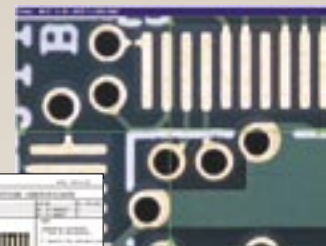
**QS Series**

## Built-in control unit for QS

The illumination intensity and zoom lens control unit is built-in to the housing for protection.

## True color image processing function

A color CCD camera is used to provide for realistic workpiece observation and measurement. The color image can be captured and stored as a bitmap image for other uses and can be printed out.



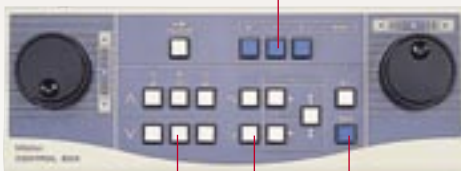
Print sample of video printer

QS250Z



## Easy operation with multi-function control box (optional accessory)

Counter zero-set key



Illumination control key

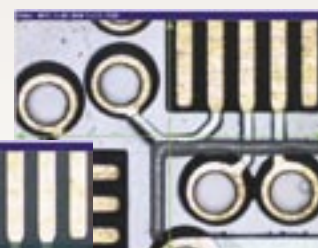
Data entry key

Zoom lens magnification control key

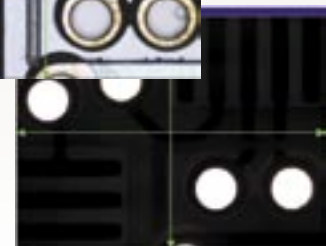
Fiber-optic ring light illumination



Surface (coaxial) illumination



Contour (stage) illumination



## Fiber-optic ring light provides sharp, clear images of your workpiece (QS and QS-L models)

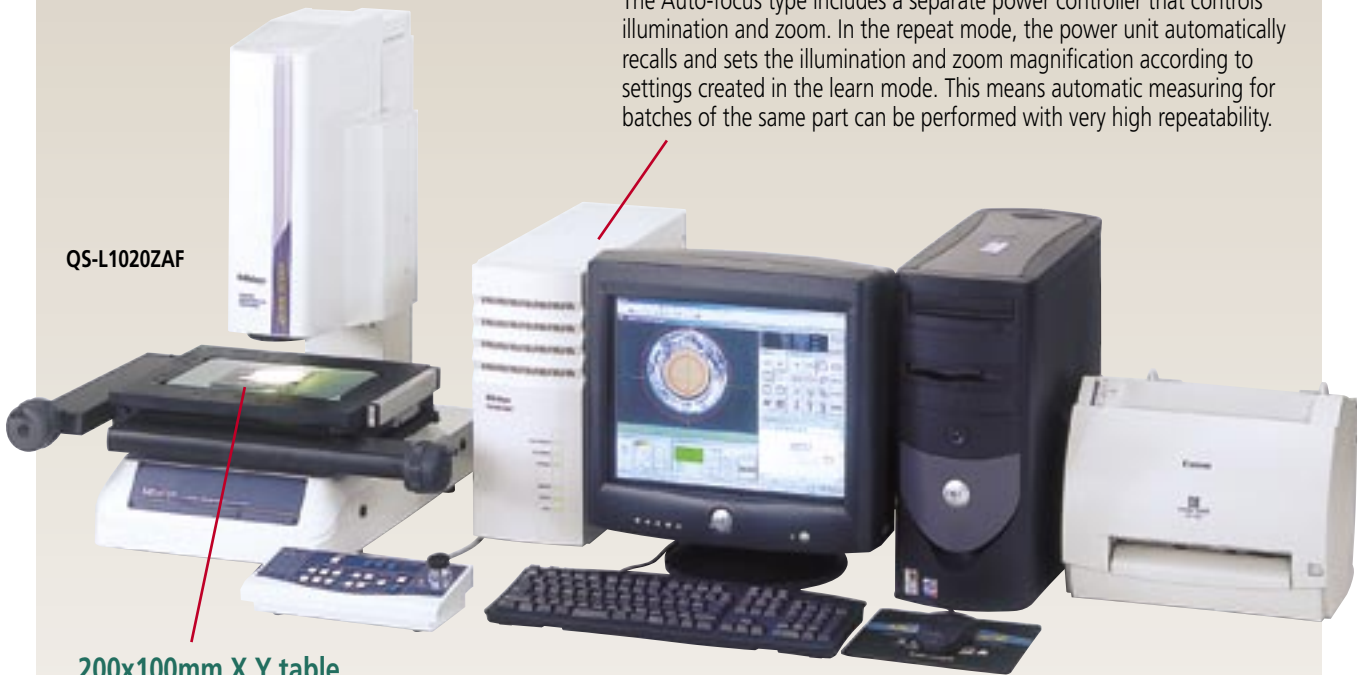
In addition to surface and contour illumination, the QS and QS-L models of Quick Scope are equipped with a fiber-optic ring light as standard equipment, providing clear color images without shadows.

# QS-L Series

## Power controller unit for the Auto-focus type

The Auto-focus type includes a separate power controller that controls illumination and zoom. In the repeat mode, the power unit automatically recalls and sets the illumination and zoom magnification according to settings created in the learn mode. This means automatic measuring for batches of the same part can be performed with very high repeatability.

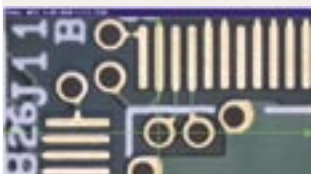
QS-L1020ZAF



200x100mm X,Y table with linear scales



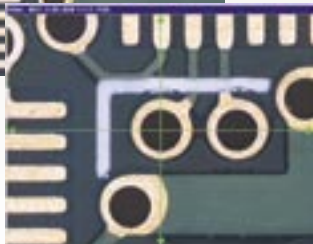
Examples of workpieces



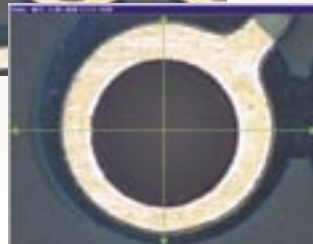
0.5X



2.0X



1.0X



3.5X

## 8-Step programmable power zoom lens (QS & QS-L\* models)

The programmable power zoom lens provides zoom magnifications from 21X to 147X and variable illumination intensity for tailoring your part measurement routines. Image gap and pixel calibration take place automatically.

\*QS-L1020AF is a fixed-magnification type.

## Optional objectives

The QS-E1020 and QS-L1020AF allow for three different magnification settings (42X, 105X, and 210X) through the simple and easy changing out of objectives.



- 02ALA400 1X objective
- 02ALA410 2.5X objective
- 02ALA420 5X objective

# QSPAK—A unique vision measuring software system that provides powerful measuring capabilities and comprehensive measurement analysis

- QSPAK operates in a Windows® based operating system for easy operation with on-screen dialog.
- All operations can be performed on-screen for maximum operator efficiency: measuring, workstage drive, zoom control, illumination, data processing, and printing.
- Macros include one-click edge detection for fast distance and angle calculation, and circle measurement—just by clicking on the icon and then the feature on the screen.
- Easy X,Y table navigation function provides on-screen instructions for automatic measurement or repeat measurements.
- Template matching and manual pattern matching functions allow for comparison to many common part forms.
- Bit-map image storage capability.



## For observation/comparison of a form

- Template matching function
- Manual pattern matching function

## For simple measurement

- One-click edge detection tool function
- Smart tool function
- User macro function

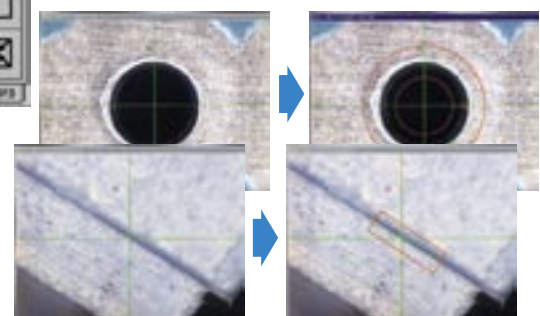
## For repeated measurement/auto-measurement

- Stage navigation function (QS)
- Quick navigation function (QS-L, QS-E)
- Graphic function
- External data output function
- Statistical calculation function

## One click edge detection



Just by clicking the mouse near the edge of a workpiece, QSPAK automatically scans the edge and detects it, showing its coordinates. This function also works with the point tool, box tool, circle tool and auto-focus tool.





## Macro functions

The function window allows easy selection of macro icons for 48 different measurements. Macros are shown on three different pages, easily accessed by tabs located along the bottom edge of the window. Using the macro function, QSPAK automatically selects the appropriate measuring tool to detect workpiece edge and calculate the appropriate feature: diameter, radius, etc.

## Smart tool



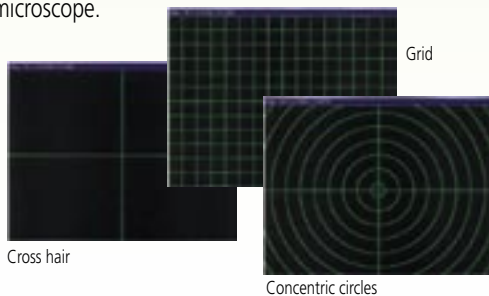
By moving an image into the central measuring circle, QSPAK automatically scans and detects the clearest edge and centers it in the circle. It's faster and more accurate than using a profile projector or microscope with cross-hairs.



## Template tools

### Standard templates

The standard templates function as reticles of microscope.



Cross hair

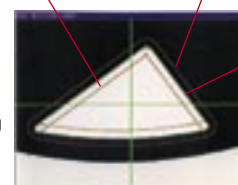
Grid

Concentric circles

### Manual pattern matching

Different templates can be generated from the master workpiece which are not included in the standard and extended template sections. Upper and lower tolerance levels can be added onto the master workpiece template by entering the tolerance values via the keyboard. This allows the user to customize templates for individual workpieces.

Lower limit value Upper limit value



Input the edges by using the manual tool. Join the input points to complete the template.

Design value Upper and lower tolerance limits can be added.

### Extended templates

Four other templates are available as extended template: cross, circle, square and angle. The size of a diameter, a distance, an angle, etc. can be changed just by entering a desired value with the keyboard. It allows simple comparison measurements, only much faster and more accurately than with a profile projector.



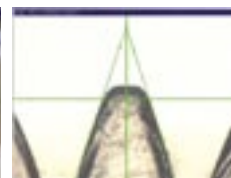
Cross



Circle



Square



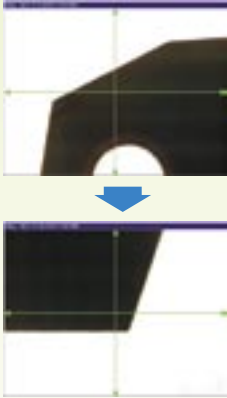
Angle

## Stage navigation function (QS CNC model)

The stage navigation function allows X,Y stage movement with the mouse. It speeds measurement and shortens part programming time by reducing stage overrun and short run. For long travel, the user can click on the drawing image in the graphic window; short travel is accomplished by clicking on the video window.

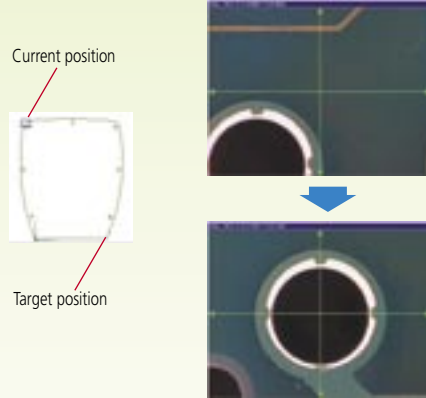
Step feeding is also possible on the QS model. By setting a desired value and clicking an arrow (up, down, right, left) the stage will move by the entered value. In addition to the machine coordinate system, the stage can be moved using the workpiece coordinate system. The user can measure the workpiece without worrying about its positioning on the table.

### Stage control through graphic window



Click the mouse with "Ctrl" key, Quick Scope moves to the position clicked.

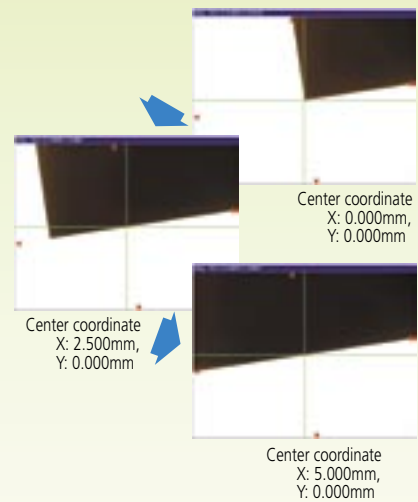
### Stage control through video window



Click the mouse with "Ctrl" key, the clicked point will be centered on the display.

## Stage movement in the workpiece coordinate system

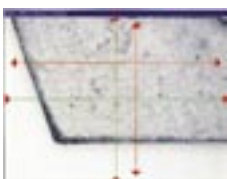
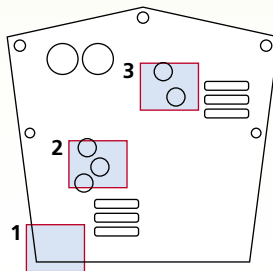
In addition to the machine coordinate system, when moving the stage by step feeding, the workpiece coordinate system is available. The stage can be moved along the workpiece coordinate system set.



Even though the workpiece is not placed in parallel with the machine coordinate system, after setting the workpiece coordinate system, the stage can be moved along the workpiece coordinate system.

## Repeat measurement navigation (QS-L model)

The Quick Scope QS-L can repeat measurement routines (measuring commands, illumination settings, zoom lens magnification, etc.) set in the Learn mode. The distance from the current position (green cross-hairs at the center) to the next target point (red cross-hairs) are indicated by the counter above the screen. When moving to the next measurement point, all the operator has to do is move the X,Y table until either the counter reads zero or by laying the green cross-hairs on top of the red cross-hairs.



1. Start repeat-mode.



2. Move the stage to place the green cross-hairs on top of the red cross-hairs.



3. As the green cross-hairs approach the red cross-hairs the next measurement point comes into the screen.

## Output of measurement results

The measurement results obtained in the Repeat mode can be output via the CSV format which is compatible with application software such as Microsoft Excel®. QSPAK can help the operator create an inspection chart.





## Graphic window

The measurement results and measured elements are plotted in the graphic window in real-time. By using this function the operator can check the current measuring position at a glance. The graphic window can be used for geometrical calculation between features to speed up measurement.

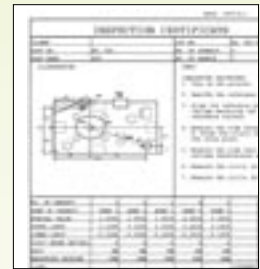
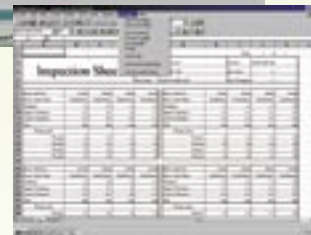
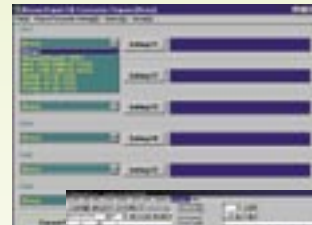


## Application software (optional)

### MeasureReport/E

MeasureReport/E is a Microsoft Excel® based inspection report creation software, capable of formatting the measured data from Quick Scope into an inspection report that can be automatically printed out. Statistical calculation, GO/NG judgment and printing out can be dealt with macro commands. Thus, the time and cost involved in creating an inspection report can be reduced dramatically over the conventional way. Furthermore, the layout of inspection report forms can be arranged as required with graphical/image pasting functions.

Note) MeasureReport/E does not include Microsoft Excel  
It needs to be provided by the user.



## Icon editor function

The layout for the macro icons in the function window and the tool icons in the tool window can be easily changed by the user for increased efficiency.



## Smart editor function

A series of operation procedures such as moving the X,Y table, changing magnifications, etc., can be displayed as a flow chart for quick reference or teaching new operators measuring routines. This function also allows part programs to be edited by using the edit screen.



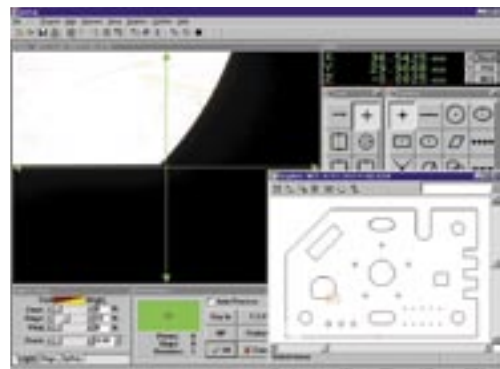
## Security function

This function limits access to the QSPAK operation by requiring a password for access. This prevents unauthorized users from changing part programs, measuring conditions, etc.

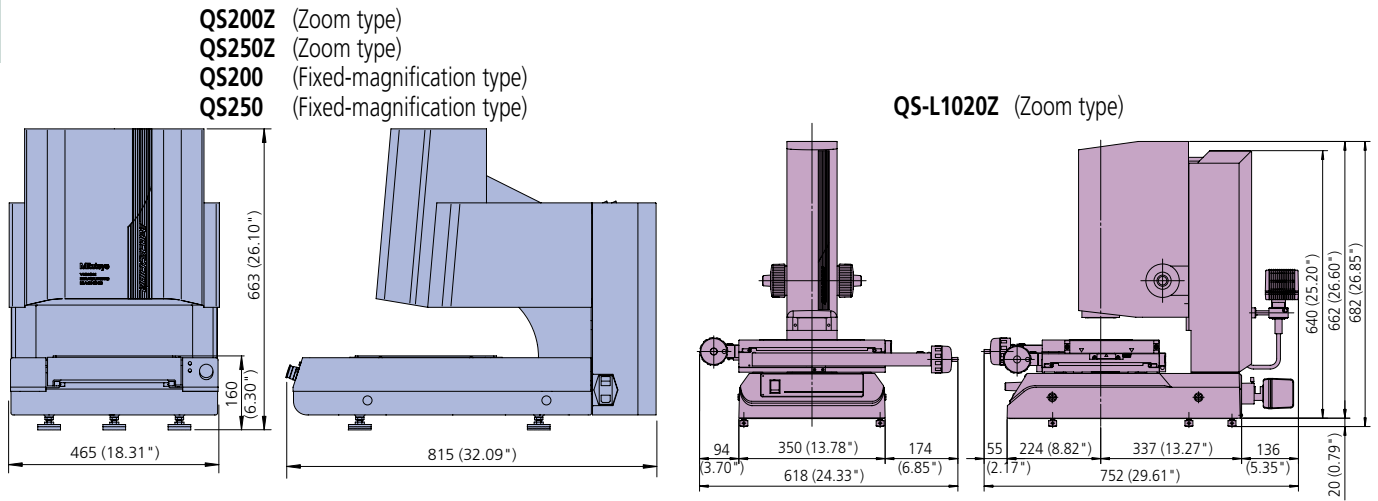
## CAD-Import & Export

The CAD-Import & Export program converts the workpiece CAD data (IGES or DXF format) so that it can be brought into QSPAK. This allows part programs to be created in QSPAK directly from the CAD data, saving time and eliminating data entry errors.

- Nominal values for each measurement are automatically converted and imported into QSPAK.
- The X,Y stage can be quickly moved to a position specified in the CAD data.
- Dimensional calculations between elements can be done in the graphic window.



## Dimensions



## SPECIFICATIONS

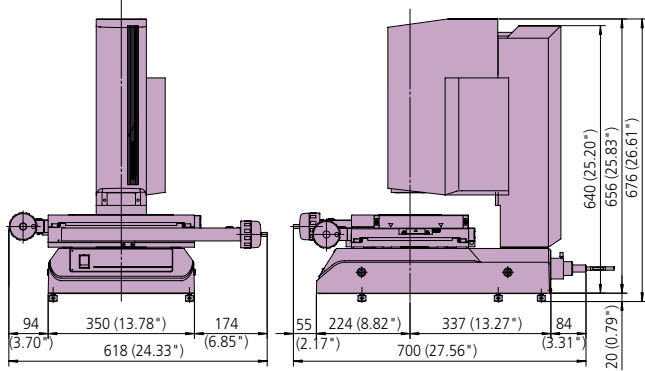
Model		QS200Z/QS200	QS250Z/QS250
Range	X-axis	200mm (8")	
	Y-axis	200mm (8")	250mm (10")
	Z-axis	100mm (4")	
Resolution		0.0005mm	
Length standard		Reflective linear encoder	
Measuring accuracy (at 20°C)		XY: (2.5+6L/1000)µm, Z: (5+6L/1000)µm	
Machine operation		CNC/manual (motor-driven) Maximum drive speed: 80mm/s Maximum acceleration: 250mm/s <sup>2</sup>	
Auto-focus function		Provided as standard	
Magnification on 17" monitor  (Select either the power-zoom lens type or the fixed-magnification type.)		<b>QS200Z/250Z:</b> 21X - 147X (8-step zoom) <b>QS200/250:</b> 42X <sup>†</sup> /105X <sup>††</sup> /210X <sup>†††</sup> <sup>†</sup> when using 1X objective ( <b>02ALA400</b> ) <sup>††</sup> when using 2.5X objective ( <b>02ALA410</b> ) <sup>†††</sup> when using 5X objective ( <b>02ALA420</b> )	
Image detecting unit		High-resolution 1/3" color CCD camera	
Illuminations	Surface	Co-axial light, fiber-optic ring light	
	Contour	Stage light	
Table glass size		269x261mm (10.59"x10.28")	269x311mm (10.59"x12.24")
Maximum workpiece height		110mm (4.33")	
Maximum workpiece weight		10kg (22 lbs.)	
Power supply		100V - 240V AC	
Power consumption		1300VA at max.	
Dimensions (WxDxH)	Main unit	465x815x663mm (18.31"x32.09"x26.10")	
	Power unit	—	
Mass	Main unit	76kg (168 lbs.)	
	Power unit	—	

\*When using 2.5X objective or the zoom lens in 2.5X magnification (Magnification on monitor: 105X), L= Measuring length (mm)

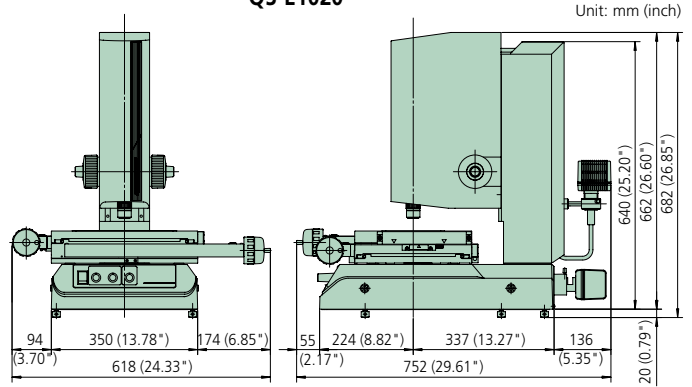
## PC Operation Environment

PC type		IBM PC-compatible
CPU	Processor	Intel Pentium III or faster
	Memory	128MB or more
	Hard disk	10GB or more
	3.5" floppy disk drive	1 or more
	CD-ROM drive	1 (12X or faster)
	Expansion slot (PCI)	2 or more (w/cooling fan)
	OS	Windows2000
Monitor	Screen size	17-inch
	Display	SVGA-color (1024x768 dots)
Peripherals		Keyboard, mouse

**QS-L1020AF** (Auto-focus type)  
**QS-L1020ZAF** (Zoom and Auto-focus type)



**QS-E1020**



## SPECIFICATIONS

QS-L1020Z	QS-L1020ZAF/QS-L1020AF	QS-E1020
200mm (8")		200mm (8")
100mm (4")		100mm (4")
150mm (6")		150mm (6")
0.0001mm		0.0001mm
Reflective linear encoder		Reflective linear encoder
XY: (3+20L/1000) $\mu$ m, Z: (5+6L/1000) $\mu$ m		(3+20L/1000) $\mu$ m
Manual		Manual
Not available	Provided as standard	Not available
Not available	21X - 147X (8-step zoom)	42X <sup>†</sup> /105X <sup>††</sup> /210X <sup>†††</sup>
	<b>QS-L1020AF:</b> 42X <sup>†</sup> /105X <sup>††</sup> /210X <sup>†††</sup>	<sup>†</sup> when using 1X objective ( <b>02ALA400</b> )
	<sup>†</sup> when using 1X objective ( <b>02ALA400</b> )	<sup>††</sup> when using 2.5X objective ( <b>02ALA410</b> )
	<sup>††</sup> when using 2.5X objective ( <b>02ALA410</b> )	<sup>†††</sup> when using 5X objective ( <b>02ALA420</b> )
	<sup>†††</sup> when using 5X objective ( <b>02ALA420</b> )	
High-resolution 1/3" color CCD camera		High-resolution 1/3" color CCD camera
Co-axial light, fiber-optic ring light		Co-axial light
Stage light		Stage light
240x140mm (9.44"x5.51")		240x140mm (9.44"x5.51")
150mm (5.90")		150mm (5.50")
10kg (22 lbs.)		10kg (22 lbs.)
100-120V/220-240V AC $\pm$ 10%		100-120V/220-240V AC $\pm$ 10%
160VA at max.	500VA at max.	160VA at max.
618x752x682mm (24.33"x29.60"x26.85")	618x700x676mm (24.33"x27.55"x26.61")	618x752x682mm (24.33"x29.60"x26.85")
300x300x66mm (11.81"x11.81"x2.59")	188x430x380mm (7.40"x16.92"x14.96")	—
63kg (139 lbs.)	58kg (128 lbs.)	57kg (126 lbs.)
3kg (6.6 lbs.)	14kg (31 lbs.)	—

## Zoom Lens Specifications for QS200Z, QS250Z, QS-L1020Z, and QS-L1020ZAF

Lens magnification (8-step)	0.5X	0.65X	0.85X	1X	1.5X	2X	2.5X	3.5X
Magnification on monitor	21X	27X	36X	42X	63X	84X	105X	147X
View fields	9.6x7.2mm (.378"x.283")	7.47x5.6mm (.294"x.22")	5.6x4.2mm (.22"x.165")	4.8x3.6mm (.189"x.142")	3.2x2.4mm (.126"x.094")	2.4x1.8mm (.094"x.071")	1.92x1.44mm (.076"x.057")	1.4x1mm (.055"x.039")
Working distance	55mm (2.17")							

# OPTIONAL ACCESSORIES

- 02ATE760** Machine table
- 02AKN020** Calibration glass chart
- 02ALA400** Objective 1X\*
- 02ALA410** Objective 2.5X\*
- 02ALA420** Objective 5X\*



Order No.	02ALA400	02ALA410	02ALA420
Magnification	1X	2.5X	3.5X
Magnification on monitor	42X	105X	147X
View field	4.8x3.6mm	1.92x1.44mm	0.96x0.72mm
Working distance	34mm	34mm	33.5mm

\*Can not be used for the power zoom type Quick Scope.

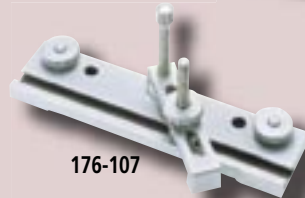
- 02APW610** Control box for QS CNC
- 02ATD415** Joystick box for QS CNC
- 937179T** Foot switch
- 12AAA645** Color filter (GIF) for QS-E
- 12AAA646** Color filter (LB80) for QS-E
- 12AAA643** Color filter (ND2) for QS-E
- 12AAA644** Color filter (ND8) for QS-E
- 359-643** Fiber-optic ring light unit for QS-E  
(Suffix code according to AC line voltage: **C** for 110V AC, **A** for 120V AC, **D** for 120V AC, **E** for 240V AC, no suffix for 100V AC)

- 176-305** Rotary table Ø183mm
- 176-310** Stage adapter (B)
- 172-197** Swivel center support\*\*
- 176-107** Holder with clamp\*\*
- 172-378** V-block\*\*

\*\*Can be used with Stage adapter (B) (176-310) for QS-L and QS-E.



176-305



176-107



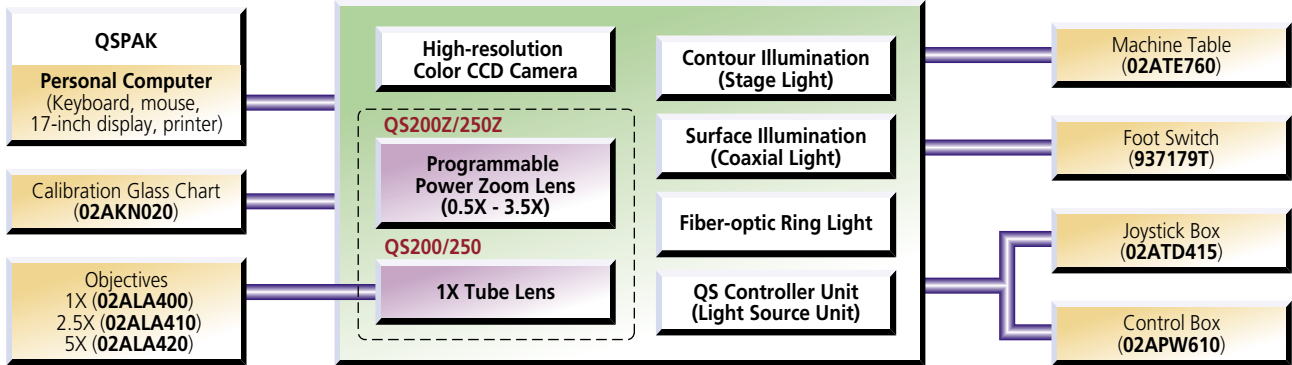
172-197



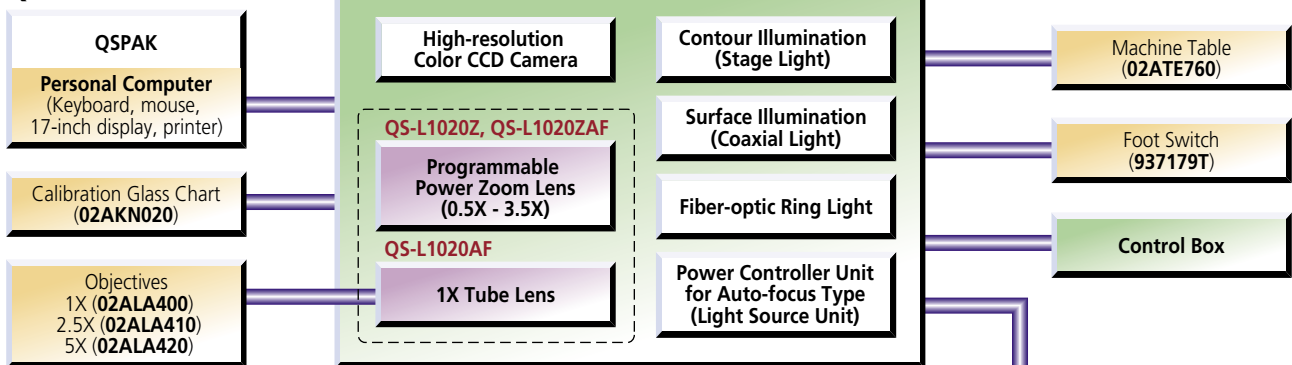
172-378

# SYSTEM DIAGRAM

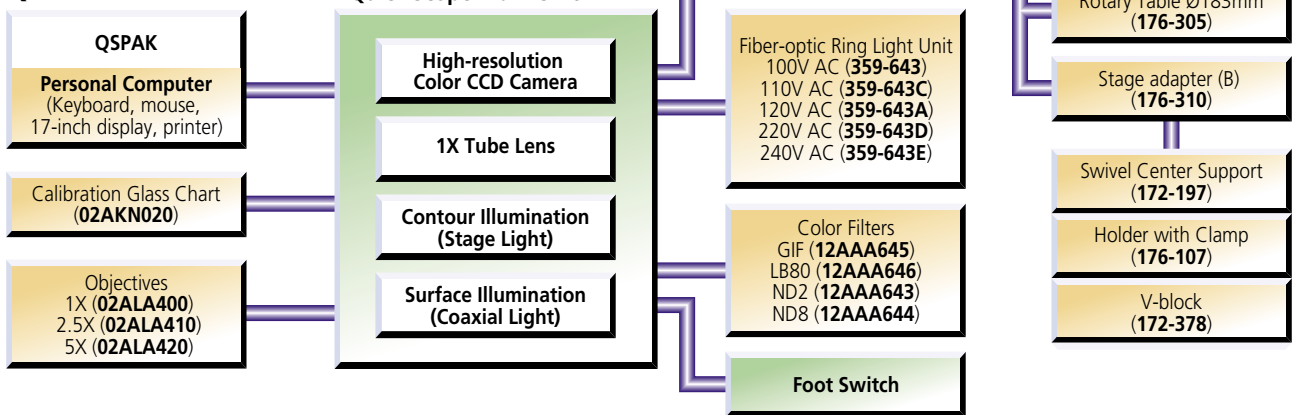
## QS CNC Series



## QS-L Series



## QS-E Series



Standard accessory    Optional accessory    Select either when ordering

Specifications are subject to change without notice.



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