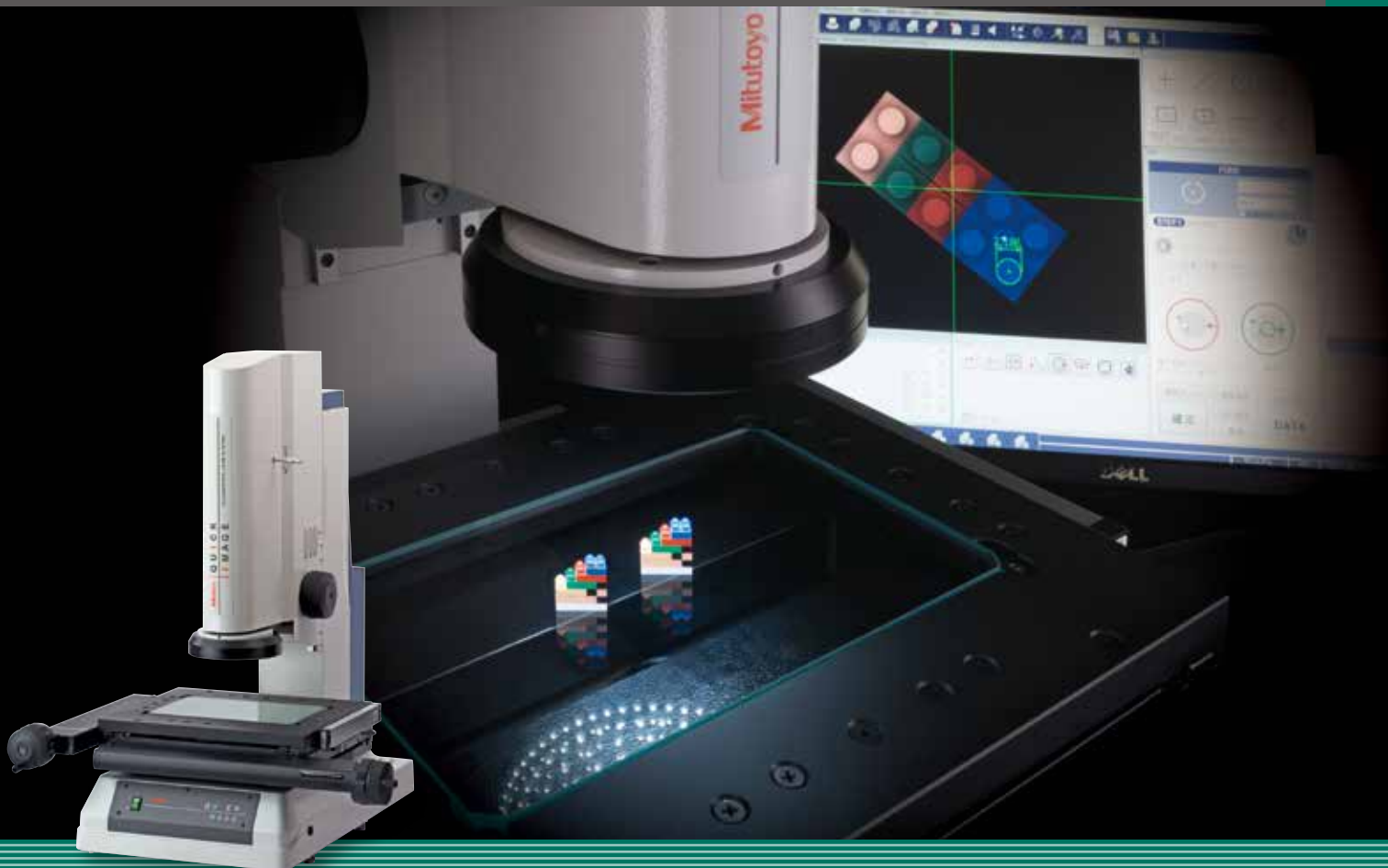# Mitutoyo

2-D Color Vision Measuring System
QUICK IMAGE Series

2-D Color Vision Measuring System
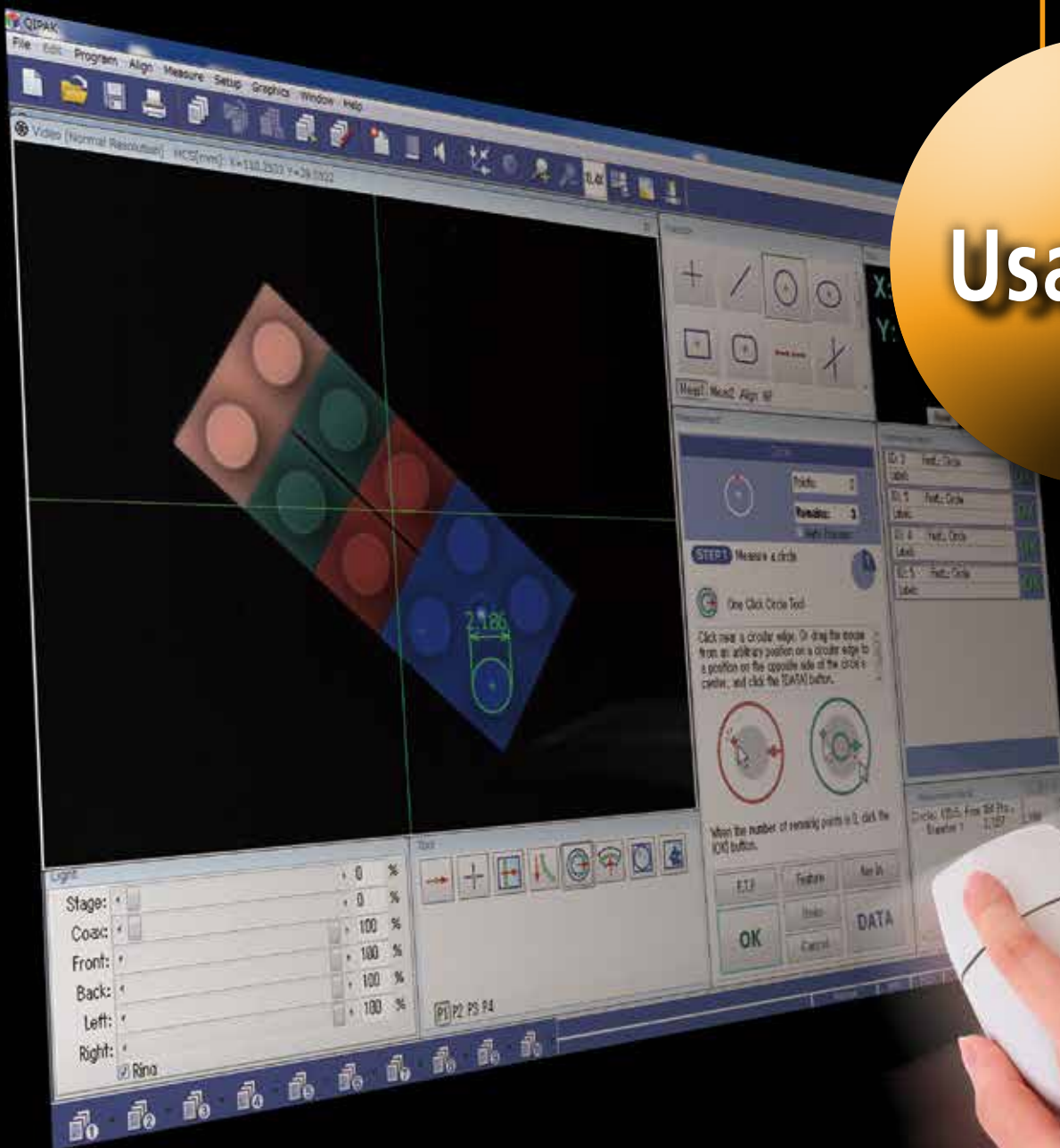## One-Click Instant Measurement
QUICK IMAGE
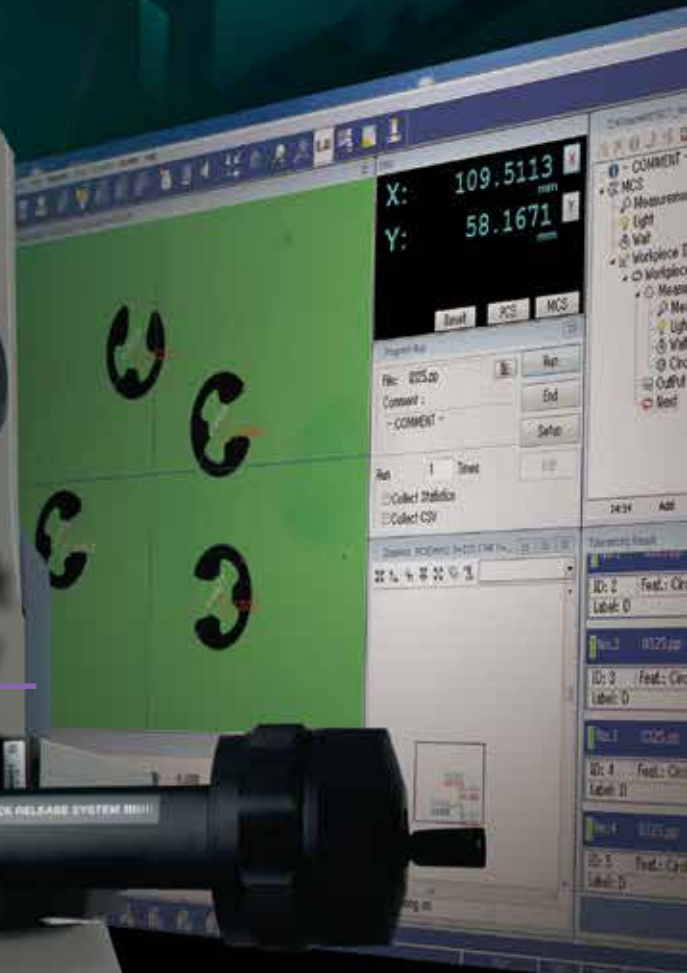
Measurement Made Simple

Reliab

Usability

Repeatable Measurements, Accurate Results

ility

Efficiency

Outstanding Measurement Efficiency and Productivity
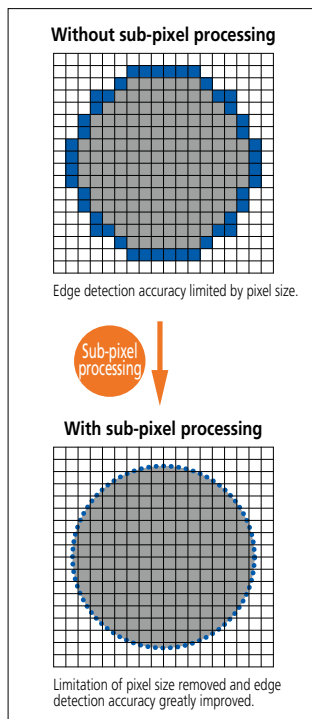
Repeatable Measurements, Accurate Results

Accurate measurements anywhere within the field of view

- High-accuracy measurements performed on small-sized workpieces.
- Consistent measurement performance regardless of the operator.
- Accuracy of ±1.5μm within the screen, repeatability of ±0.7μm in high-resolution mode (QI-B Series), and the ability to focus through a wide range.

The highest field of view accuracy in its class

Both a wide view field and high accuracy

- Sub-pixel processing enables high-accuracy edge detection.

Without sub-pixel processing

Edge detection accuracy limited by pixel size.

Sub-pixel processing

With sub-pixel processing

Limitation of pixel size removed and edge detection accuracy greatly improved.

Sub-pixel processing image

Stable and high-accuracy measurements of large workpieces

- Highly accurate measurements performed on long or large workpieces.
- Stable focusing no matter the height of the workpiece.

Approx. 280 mm

Gasket
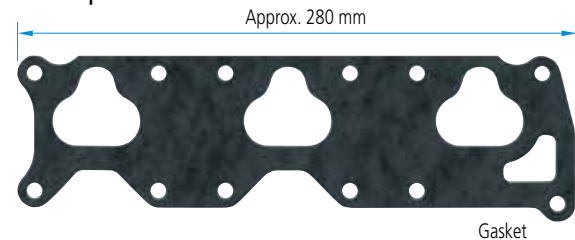
Highly accurate stages

- Stages come in various sizes with an accuracy of ± (3.5 + 0.02L) μm, letting you perform highly accurate and stable measurements and obtain reliable data for any type of workpiece.

Rigid construction

- Its rigid construction allows for a maximum load capacity of 20Kg, and its 100 mm heightwise stroke enables large-contour workpieces to be placed on the stage.

Ultra-long working distance of 90 mm

- The 90 mm working distance ensures that you can focus, even with stepped workpieces, without worrying about collisions.
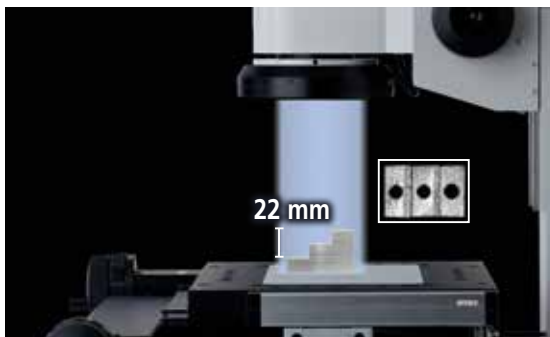
Human errors due to focusing have been eliminated

Measurements can be done on many types of parts, including:
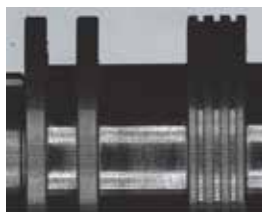- Stepped workpiece
- Cylindrical workpiece

Telecentric Optical System

Patent registered (Japan, the U.S.A. and Europe)

- Errors due to height are minimized within the depth of focus with steps of up to 22 mm.

22 mm

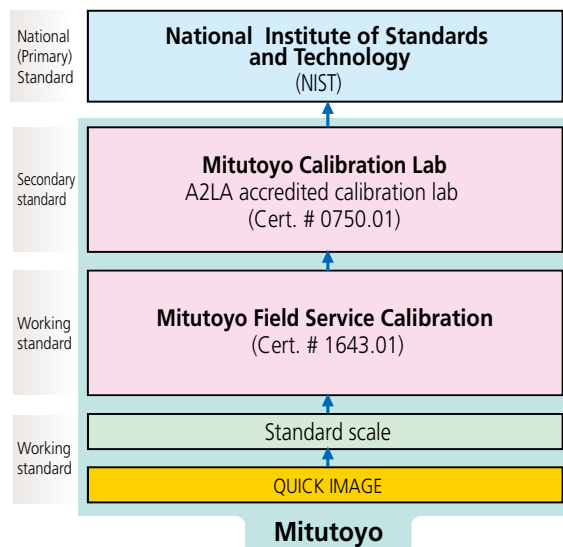Measuring of a stepped workpiece

Measuring of a cylindrical workpiece

Traceable to national standards

- From the trusted leader in metrology, Mitutoyo's Quick Image systems are directly traceable to NIST.

Uses standards traceable to national standards

Traceability is an essential requirement for all measurements. At Mitutoyo, we consider providing traceability to our customers to be a critical part of our business. Traceability is often referred to as a "chain of comparisons," and that chain always starts with a precise definition. For length measurements, the meter is defined by how far light moves in a vacuum in a defined amount of time. The job of reducing that definition into a practical measurement belongs to the world's National Metrology Institutes (NMI). The NMI in the United States is the National Institute of Standards and Technology (NIST), where they realize and transfer the definition of length to physical measurements of gage blocks, line scales and other primary standards. From there, traceable measurements at other laboratories and factories are possible. Mitutoyo factories and calibration labs regularly send their standards to NIST; however, traceability can also be established through other recognized NMIs, such as the National Metrology Institute of Japan (NMIJ). The world's leading NMIs, such as NIST and NMIJ, routinely participate in intercomparisons to ensure global traceability to the same unit of length.

|	
National (Primary) Standard	**National Institute of Standards and Technology** (NIST)
Secondary standard	**Mitutoyo Calibration Lab** A2LA accredited calibration lab (Cert. # 0750.01)
Working standard	**Mitutoyo Field Service Calibration** (Cert. # 1643.01)
Working standard	Standard scale
	QUICK IMAGE

Mitutoyo

Measurement Made Simple

Positioning not required

•Complete measurement tasks without the need to position and align the part each time.

One-click execution function • Patent pending (Japan)

• After placing the workpiece within the field of view, the machine automatically recognizes the position and inclination of the registered workpiece using a pattern search function and then executes the measurements.
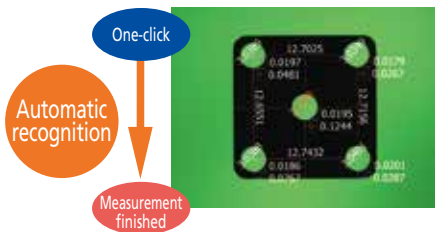
■ The position and inclination of a workpiece can be measured even if it has moved.
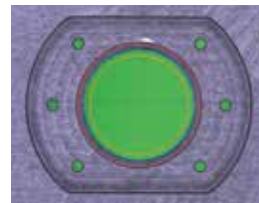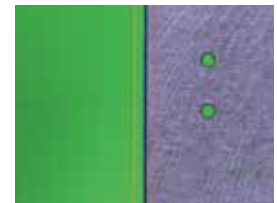
Simple execution of multiple measurements

•Capture repeatable measurement results from multiple measurements.

One-click video tool

• With just a single click, anyone can easily perform measurements.
• The abnormal point removal function automatically ignores abnormal points generated by dust or burrs.
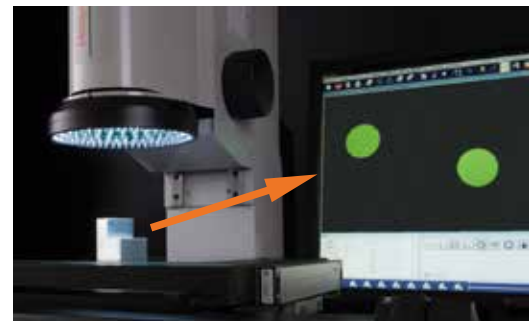

One-click circle tool

One-click box tool

Simple focusing

•Reduces the setup time of each workpiece and repeated runs.

Wide focus range

• Quick Image has a depth of focus up to 22 mm.
• Fine focusing adjustments are unnecessary.

Focusing in on a workpiece like the one shown above is unnecessary.

Easy-to-operate without the manual

• An intuitive user-friendly interface for beginners.

EZ mode • Design application pending (Japan)

• This mode provides an operation guidance display to guide the operator performing measurements, thus eliminating the need for lengthy training or often referring to the instruction manual.
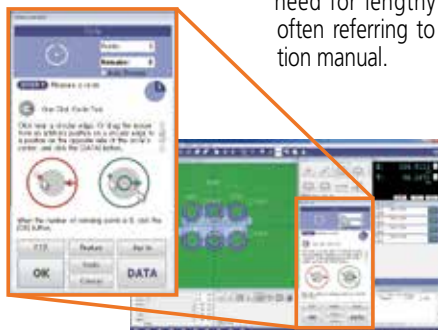
Go/no-go judgment

• Similiar to an overlay chart used on an optical comparator, an operator can quickly determine if a feature fits within the tolerance bandwidth.
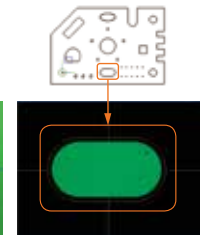
Template comparison

• Compare workpieces against their templates to enable go/no-go judgments to be made at a glance.
• Users can also define a custom overlay template.

Enhanced rectangle template   User template

CAD user template
Note: QS-CAD I/F is required (available as an option).

Graphics window - measurement efficiency

• Enables the operator to visualize the entire workpiece and quickly move the stage to a feature.

Graphics function

• The current position, coordinate system, measuring item and measurement result are automatically displayed in a graphics window.
• 2-D CAD model data can be imported (optional) in order to better visualize the entire workpiece.

## Quick measurements on large workpieces

• Combine multiple measurements across multiple fields of view on large workpieces.

Quick-release mechanism on the XY stage

• Quick-release mechanisms are built into both fine feed controls on the XY stage.
• This allows the stage to be moved rapidly to bring the next measuring point into view no matter where it is on the workpiece.
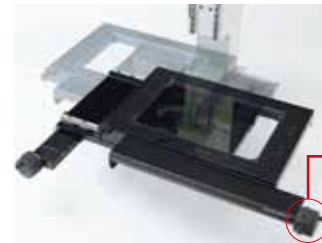
Quick-release ring

Measure multiple workpieces simultaneously

- Batch measure several workpieces in a single setup.

- Use pattern search for multiple workpieces within the screen view, and measure them all in one operation with the one-click execution function.

- Measurements can be performed very efficiently making accurate positioning unnecessary, and eliminating the need for costly holding fixtures.

Multiple pattern search

Measurement of several workpieces done all at once
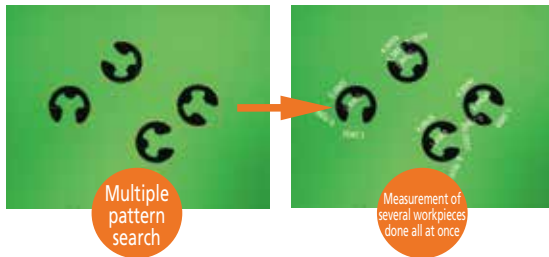
Confirm measurement results quickly and easily

- Intuitively determine the measurement results and measurement position at a glance.

Video window measurement results

- Measurement results can be understood intuitively just by looking at a measurement image.
- Change the display color of the go/no-go result to immediately perform tolerance determination as well as determine no-go items.
- Paste measurement images in inspection results report.

The measurement results display for go/no-go can be color-coded to meet your requirements.
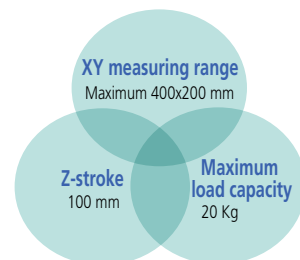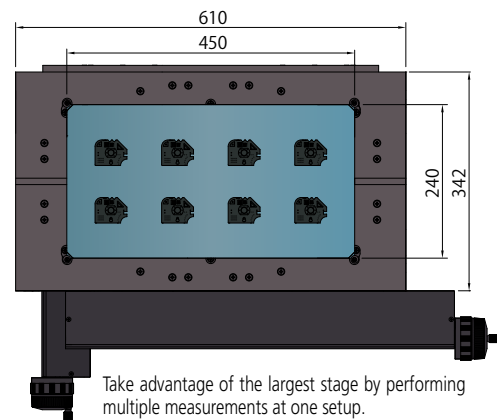
Capable of supporting a variety of workpieces

- Measure several workpieces in one setup.
- Measure larger workpieces, overcoming size restrictions.

Large-stage model

- The large stage allows you to arrange multiple workpieces and measure them in a single setup, thereby saving valuable time that would otherwise be spent in loading and unloading the stage.

Extensive lineup of stages

- XY measurement range: Measure workpieces up to 400x200 mm.
- 100 mm Z-stroke allows you to measure tall workpieces.
- A maximum load capacity of 20 Kg allows you to measure heavy workpieces.

610

450

240

342

Take advantage of the largest stage by performing multiple measurements at one setup.

XY measuring range
Maximum 400x200 mm

Z-stroke
100 mm

Maximum load capacity
20 Kg

ivity

Simple go/no-go judgment of multiple workpieces

- Go/no-go judgment made quickly and easily.
- Go/no-go judgment can be made for every workpiece.

Tolerance judgment result

- Go/no-go judgment can be seen at a glance, for faster operation.
- Go/no-go judgment can be done for each measurement item, and judgment can be passed on each workpiece.
- Prevents no-go data omissions.
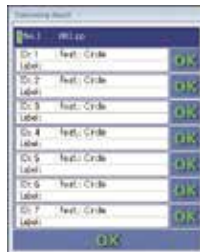
Generate reports and observe, all on one machine

- Observation and measurements on a single platform.
- Capture color images.

High-definition color camera

- The camera not only produces high-resolution color images of measurements, but it is also effective for observing the workpiece surface.
- Brilliant color images can be easily saved as files for use in measurement reports.

High accuracy measurement with bright and clear images

- Precisely measure the edges of a stepped workpiece.
- Clear measurements of rubber and black resin surfaces.

Wide field of view / high-resolution mode

- The high-resolution mode and the normal mode can share a single measurement procedure.
- The shallow depth of focus in high-resolution mode shows the edges of stepped workpieces more clearly, making measurements highly accurate.

Enhanced illumination   • Patent registered (Japan)

- The enhanced illumination function of the high-resolution mode enables measurements of low-reflectivity workpieces like rubber and black resin moldings to be performed with a clear image.
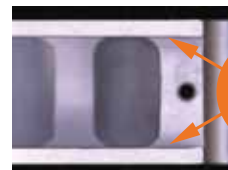
Edge measurement of a stepped workpiece (high resolution mode)

Surface observation of black rubber

Simple execution of measurement procedure programs

- Easily run measurement procedure programs.

Program launcher

- A measurement procedure program can be registered to a dedicated icon along with a photo and comments so that the required programs can be started easily.
- Programs can be managed for each operator or workpiece.
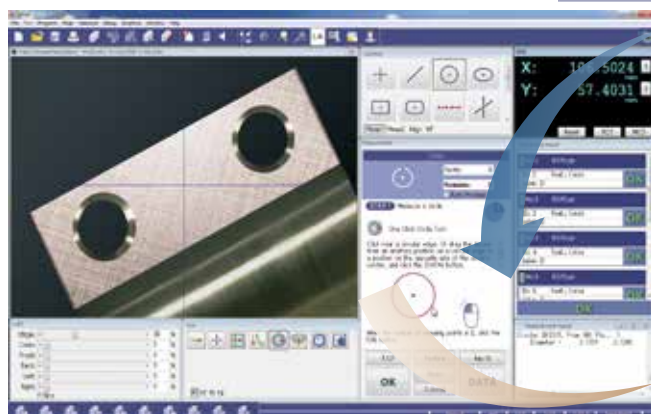

Program launcher icons

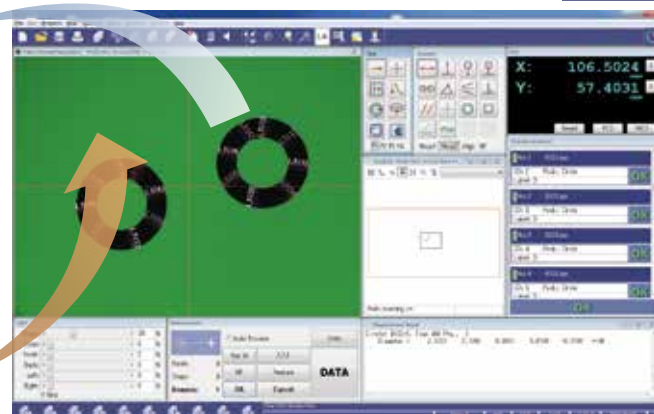Automatic measurement procedure program storage window

Standard software
QIPAK

QIPAK (two modes) provides powerful assistance

EZ mode
(Simple measurement mode)
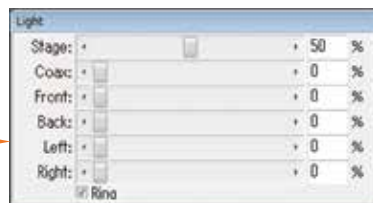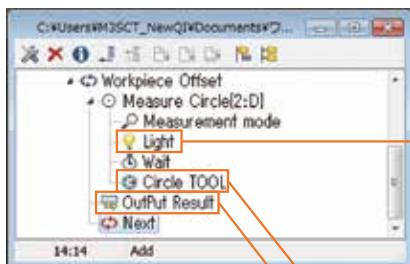

PRO mode
(General purpose measurement mode)

Simple execution and editing of measurement procedure programs

Smart editor
This function allows XY-stage target position, illumination condition, etc., to be separately displayed as icons and labels in the list of part programs (automatic measurement procedure programs), thereby simplifying program editing.

Editing an illumination condition according to the dialog

Editing a circle tool on the video window

Editing design values and tolerances according to the dialog

Consistant measurements with the robust edge-detection

Outlier removal
Removes outliers caused by anomalies such as debris, burrs and chips.

Auto trace tool
The tool automatically detects the edges of unknown contours and obtains point cloud data.
Point cloud data lets you perform contour form analysis and design value comparison using FORMTRACEPAK-AP (optional).

Measurement examples

Progressive-die pressed parts
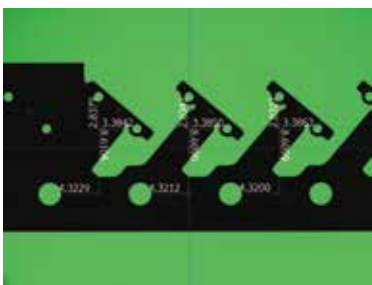
Measure the diameter and distances between each hole.

O-ring

Enhanced illumination is effective for low- reflectivity materials such as rubber and black resin. (Use ring illumination in high-resolution mode + enhanced illumination.)

Weatherstrip

Execute a pattern search to automatically find the position and complete measuring in one click.

Small-stepped workpiece
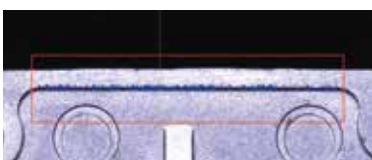
Measure and illuminate edges easily by using a single quadrant of the ring light, increasing workpiece contrast.

Stepped workpiece

Measure the workpiece with all features in focus with telecentric lens technology.

Optional application software

Easily handle sophisticated dimension and contour evaluations

Contour evaluation and analysis software: FORMTRACEPAK-AP

Data processing software for advanced form analysis that carefully reads point group date acquired via tools such as the auto trace tool.

- Contour measurement can easily be executed
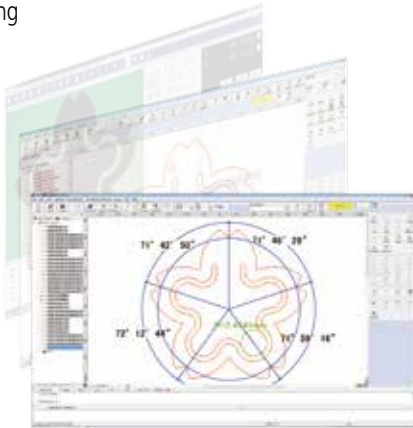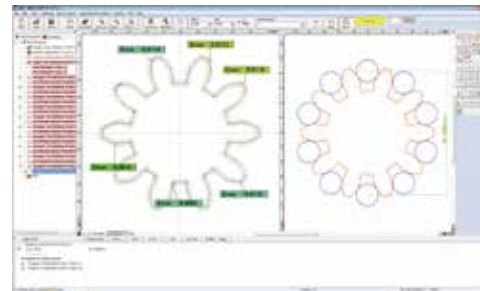- Resulting analysis can be observed quickly via color tolerancing

- Perform contour matching against the CAD data
- Define virtual circles of a given diameter enabling over-pin diameter analysis to be performed

Example of form analysis

Example of gear contour matching and an over-pin diameter analysis

Effective use of CAD models

Measurement support software: QS-CAD I/F

2-D CAD model data (DXF- or IGES-formatted) can be imported into QIPAK. Conversely, QIPAK measurement results can be converted into 2-D CAD model data. The design value for each measurement item is automatically entered. The graphics window makes the current location easy to identify, allowing the operator to quickly move the stage to a given point in the 2D CAD model.
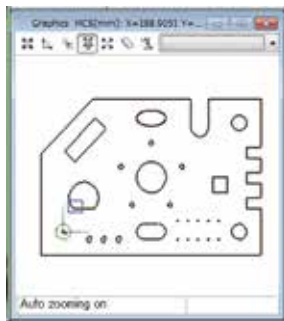
Early detection of process irregularities

Centralized process management software: MeasurLink

Statistical data can be displayed in real-time, making early detection of process irregularities possible. Early identification of an out-of-control situation enables rapid action to be taken.

Examples of remedial action
- Mold repair or cycle-timing change
- Cutting tool adjustment or replacement

Optional accessories

Holder with clamp

Application: Clamping of thin workpieces such as PCBs and pressed parts.
Order No.: **176-107**
Maximum clamp length: 35mm
Dimensions: 62(H)×152(W)×38(D)mm
Mass: 0.4Kg
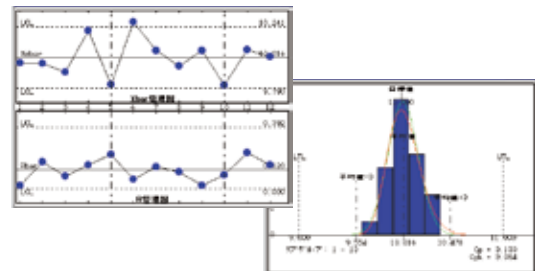
Note: An adapter set is required to suit a particular QI model. These are available to order (see below).

V-block with clamp

Application: Clamping of cylindrical objects
Order No.: **172-378**
Maximum supportable diameter: ø25mm
Center height from mounting face: 38-48mm
Dimensions: 117(H)×90(W)×45(D)mm
Mass: 0.8Kg

Note: An adapter set is required to suit a particular QI model. These are available to order (see below).

Swivel center support

Application: Clamping of the workpiece between centers for effective thread diameter and depth measurements.
Order No.: **172-197**
Can be set to an inclination angle of ±10°, in minimum increments of 1°
Maximum supportable dimensions:
When horizontally positioned: ø80×140 mm
When tilted at 10°angle: ø65×140mm
Mass: 2.5Kg

Note: An adapter set is required to suit a particular QI model. These are available to order (see below).

Stage adapter sets

Application: These are used when connecting some optional peripherals to the measuring device.
Order No.: Stage adapter : **176-304**
Stage adapter B : **176-310**
Dimensions (1piece): 50(W)×340(D)×15(H)mm
Note: The stage adapter B is 280 (D).
Mass: Stage adapter: 1.5Kg
Stage adapter B: 1.2Kg

		Stage size	
		1010 2010	2017 3017 4020
176-304	Stage adapter	—	○
176-310	Stage adapter B	○	—

Note: One set consists of two adapters.

Foot switch

Standard type
Order No.: **937179T**

Rigid type
Order No.: **12AAJ088**

Application: Quick data entry while gripping the handle

Specifications

QI-A Series

Model No.		QI-A1010C	QI-A2010C	QI-A2017C	QI-A3017C	QI-A4020C
View field		1.26" x 0.94"(32×24mm)				
Measurement mode		High resolution mode/Normal mode				
Measuring range (X, Y axes)		3.94" x 3.94" (100×100mm)	7.87" x 3.94" (200×100mm)	7.87" x 6.69" (200×170mm)	11.81" x 6.69" (300×170mm)	15.75" x 7.87" (400×200mm)
Travel range (Z axis)		3.94"(100mm)				
Accuracy	Measurement accuracy within the screen*[1]	High resolution mode: ±2µm/Normal mode: ±4µm				
	Repeatability within the screen ($\pm 2\sigma$)*[2]	High resolution mode: ±1µm/Normal mode: ±2µm				
	Measurement accuracy (U1xy)*[1]	± (3.5+0.02L) µm, L: arbitrary measuring length (mm)				
Imaging device		3 megapixel, 1/2", color				
Monitor magnification*[3]		7.6X				
Optical system	Magnification (Telecentric Optical System)	0.2X				
	Working distance	3.54" (90mm)				
	Depth of focus	High resolution mode: ±0.6 mm/Normal mode: ±11mm				
Illumination		Transmitted light: Green LED telecentric illumination Co-axial light: White LED Ring light: quadrant white LED				
Effective stage glass size		6.69"x6.69" (170×170mm)	9.52"x5.5" (242×140mm)	10.24"x9.05 (260×230mm)	14.17"x9.06" (360×230mm)	17.32"x9.13 (440×232mm)
Maximum stage loading*[4]		Approx. 22lbs. (10Kg)		Approx. 44lbs. (20Kg)		Approx. 33lbs. (15Kg)
Power supply		100-240VAC, 50/60HZ				
Main unit mass		Approx. 154 lbs. (70Kg)	Approx. 163lbs. (74Kg)	Approx. 309lbs. (140Kg)	Approx. 326lbs. (148Kg)	Approx. 340lbs. (154Kg)
Accuracy guaranteed temperature		20±1ºC				

*1 Inspected to Mitutoyo standards by focus point position.
*2 The measuring accuracy is guaranteed to be accurate within the depth of focus.
*3 For 1X digital zoom (when using the 22-inch wide monitor)
*4 Does not include extremely offset loads and concentrated loads

QI-B Series

Model No.		QI-B1010C	QI-B2010C	QI-B2017C	QI-B3017C	QI-B4020C
View field		0.5" x 0.38" 12.8×9.6mm				
Measurement mode		High resolution mode/Normal mode				
Measuring range (X, Y axes)		3.94" x 3.94" (100×100mm)	7.87" x 3.94" (200×100mm)	7.87" x 6.69" (200×170mm)	11.81" x 6.69" (300×170mm)	15.75" x 7.87" (400×200mm)
Travel range (Z axis)		3.94"(100mm)				
Accuracy	Measurement accuracy within the screen*[1]	High resolution mode: ±1.5µm/Normal mode: ±3µm				
	Repeatability within the screen ($\pm 2\sigma$)*[2]	High resolution mode:±0.7µm/Normal mode: ±1µm				
	Measurement accuracy (U1xy)*[1]	± (3.5+0.02L) µm, L: arbitrary measuring length (mm)				
Imaging device		3 megapixel, 1/2", color				
Monitor magnification*[3]		18.9X				
Optical system	Magnification (Telecentric Optical System)	0.5X				
	Working distance	3.54" (90mm)				
	Depth of focus	High resolution mode: ±0.6 mm/Normal mode: ±1.8mm				
Illumination		Transmitted light: Green LED telecentric illumination Co-axial Light: White LED Ring light: quadrant white LED				
Effective stage glass size		6.69"x6.69" (170×170mm)	9.52"x5.5" (242×140mm)	10.24"x9.05 (260×230mm)	14.17"x9.06" (360×230mm)	17.32"x9.13 (440×232mm)
Maximum stage loading*[4]		Approx. 22lbs. (10Kg)		Approx. 44lbs. (20Kg)		Approx. 33lbs. (15Kg)
Power supply		100-240VAC, 50/60HZ				
Main unit mass		Approx. 154 lbs. (70Kg)	Approx. 163lbs. (74Kg)	Approx. 309lbs. (140Kg)	Approx. 326lbs. (148Kg)	Approx. 340lbs. (154Kg)
Accuracy guaranteed temperature		20±1ºC				

*1 Inspected to Mitutoyo standards by focus point position.
*2 The measuring accuracy is guaranteed to be accurate within the depth of focus.
*3 For 1x digital zoom (when using the 22-inch wide monitor)
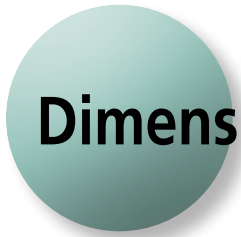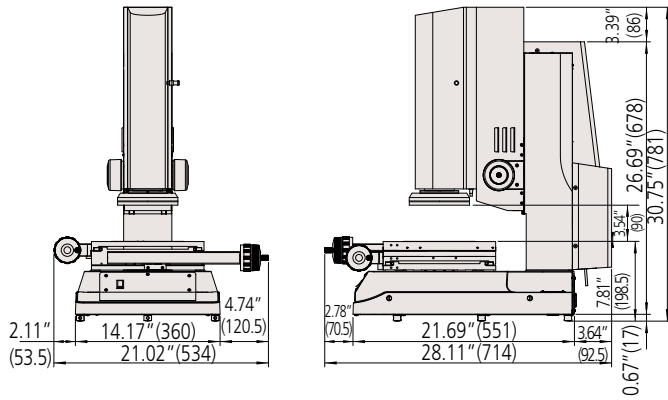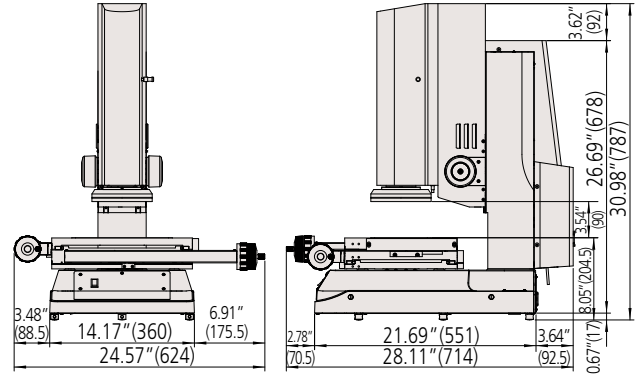*4 Does not include extremely offset loads and concentrated loads

Dimensions chart

Mitutoyo

QI-A1010C/B1010C

3.39" (86)
26.69" (678)
30.75" (781)
3.54" (90)
7.81" (198.5)
2.11" (53.5)
14.17" (360)
21.02" (534)
4.74" (120.5)
2.78" (70.5)
21.69" (551)
28.11" (714)
3.64" (92.5)
0.67" (17)

QI-A2010C/B2010C

3.62" (92)
26.69" (678)
30.98" (787)
3.54" (90)
8.05" (204.5)
3.48" (88.5)
14.17" (360)
24.57" (624)
6.91" (175.5)
2.78" (70.5)
21.69" (551)
28.11" (714)
3.64" (92.5)
0.67" (17)

QI-A2017C/B2017C

0.77" (19.5)
31.22" (793)
32.66" (829.5)
3.54" (90)
9.72" (247)
4.00" (101.5)
14.17" (360)
24.88" (632)
6.71" (170.5)
5.77" (146.5)
24.45" (621)
33.86" (860)
3.64" (92.5)
0.67" (17)

QI-A3017C/B3017C

0.77" (19.5)
31.22" (793)
32.66" (829.5)
3.54" (90)
9.72" (247)
4.00" (101.5)
14.17" (360)
26.85" (682)
8.86" (220.5)
5.77" (146.5)
24.45" (621)
33.86" (860)
3.64" (92.5)
0.67" (17)

QI-A4020C/B4020C

0.77" (19.5)
31.22" (793)
32.66" (829.5)
3.54" (90)
9.72" (247)
4.92" (125)
14.17" (360)
29.78" (756.5)
10.69" (271.5)
6.36" (161.5)
24.45" (621)
34.44" (875)
3.64" (92.5)
0.67" (17)

Coordinate Measuring Machines	Vision Measuring Systems	Form Measurement	Optical Measuring
Sensor Systems	Test Equipment and Seismometers	Digital Scale and DRO Systems	Small Tool Instruments and Data Management

**Whatever your challenges are,
Mitutoyo supports you from start to finish.**

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