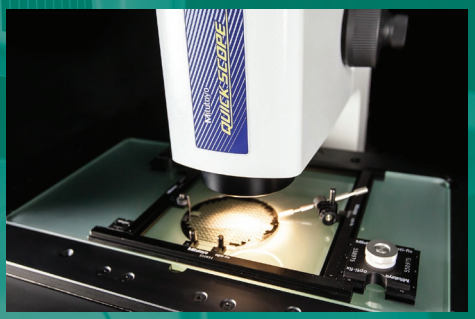
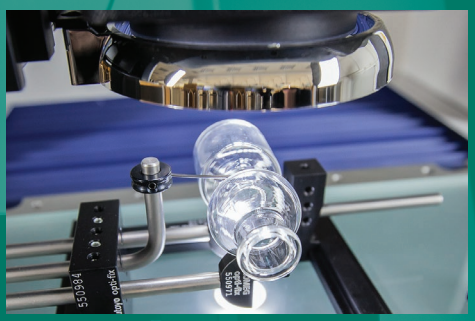
VISION MEASURING SYSTEMS

Quick Image

Quick Scope



Quick Vision



Contents

Mitutoyo

Quick Image

SERIES 361 – Manual 2D Vision Measuring System

- A high-resolution manual 2D Vision Measuring System featuring double-telecentric, fixed-magnification optics with 4-quadrant LED ring lighting and megapixel colour CCD camera providing highly efficient, cost-effective measurement.
- Simple operation with One-Click measurement.
- Deep focal depth and wide field of view objectives.
- Ideal for applications requiring distortion-free imaging with accurate measurement capability for workpieces with multi-level surfaces.
- QI-A models provide the widest field of view while the higher magnification QI-B models offer easier measurement of very small workpieces.
- Excellent repeatability is achieved even at low magnification, and the ability to switch between deep focal depth and high resolution modes for higher accuracy enhances operability.
- Five stages are available up to the largest that provides a 400 x 200 mm XY measuring range for large or multiple workpiece applications.
- Quick-release handles enable the stage to be moved rapidly but with fine feed always available, thus saving time when measuring longer dimensions and dramatically improving productivity.

QI-A2010C

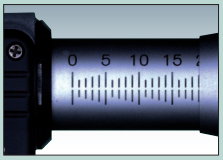
Technical Data

Measurement modes:	High-resolution/normal
Camera type:	3 megapixel 1/2 inch colour CCD
Optical system	
Working distance:	90 mm
Magnification*	0.2X (QI-A), 0.5X (QI-B)
Field of view:	32 x 24 mm (QI-A), 12.8 x 9.6 mm (QI-B)
Depth of focus:	High-resolution mode: ±0.6 mm Normal mode: ±11 mm (QI-A), ±1.8 mm (QI-B)
Illumination:	Contour, surface and 4-quadrant LED

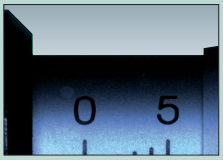
* Double telecentric system.

Optional Accessories

Code No.	Description
937179T	Footswitch
12AAJ088	Reinforced footswitch



Field of view with 0.2X magnification (QI-A).



Field of view with 0.5X magnification (QI-B).

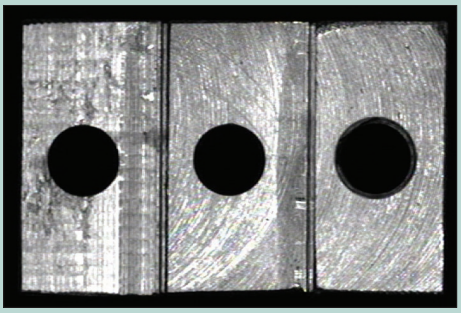


Image of a stepped block through the double telecentric objective showing the orthographic view produced.

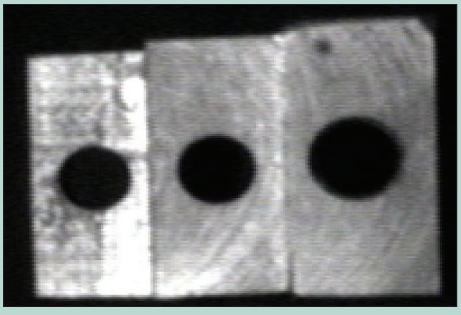


Image of the same object using a standard objective.

Specifications

Model		QI-A1010C	QI-A2010C	QI-A2017C	QI-A3017C	QI-A4020C
Code No.		**361-840A**	**361-841A**	**361-842A**	**361-843A**	**361-844A**
Measuring range	X:Y	100:100 mm	200:100 mm	200:170 mm	300 :170 mm	400:200 mm
	Z	100 mm				
Accuracy	Within the screen	±2 µm (high-resolution mode), ±4 µm (normal mode)				
	E1XY	±(3.5+0.02L) µm L = measured length (mm)				
Repeatability within the screen (2σ)		1 µm (high-resolution mode), 2 µm (normal mode)				
Stage glass size		170 x 170 mm	242 x 140 mm	260 x 230 mm	360 x 230 mm	440 x 232 mm
Max. stage loading		10 kg	10 kg	20 kg	20 kg	15 kg
Mass		70 kg	74 kg	140 kg	148 kg	154 kg

Model		QI-B1010C	QI-B2010C	QI-B2017C	QI-B3017C	QI-B4020C
Code No.		**361-845A**	**361-846A**	**361-847A**	**361-848A**	**361-849A**
Measuring range	X:Y	100:100 mm	200:100 mm	200:170 mm	300:170 mm	400:200 mm
	Z	100 mm				
Accuracy	Within the screen	±1.5 µm (high-resolution mode), ±3 µm (normal mode)				
	E1XY	±(3.5+0.02L) µm L = measured length (mm)				
Repeatability within the screen (2σ)		0.7 µm (high-resolution mode), 1 µm (normal mode)				
Stage glass size		170 x 170 mm	242 x 140 mm	260 x 230 mm	360 x 230 mm	440 x 232 mm
Max. stage loading		10 kg	10 kg	20 kg	20 kg	15 kg
Mass		70 kg	74 kg	140 kg	148 kg	154 kg

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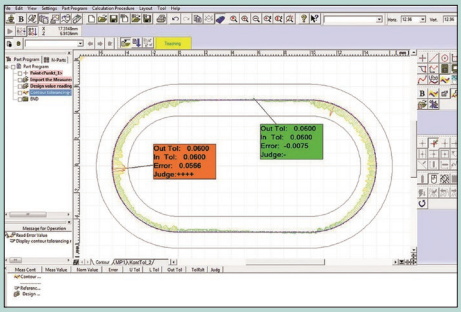
QIPAK

Software for Quick Image Systems

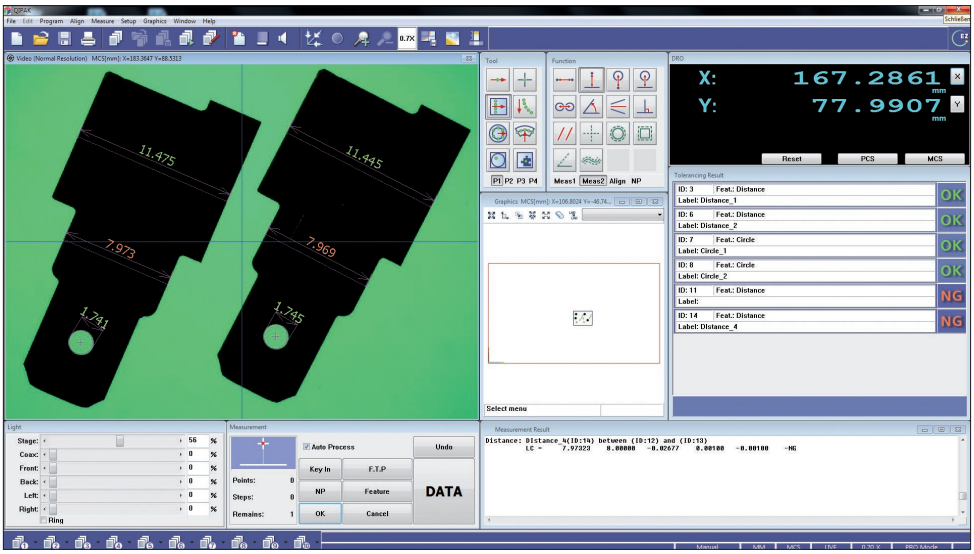
- One-click measurement with a quick pass/fail decision-making function enhances productivity.
- One-click edge-detection tools make this software very easy to use.
- Template tools for comparative analysis.
- Video image capture.
- Stage navigation function gives improved measurement cycles.

Optional Additional Software

- QS CAD-IMPORT/EXPORT
- MeasurLink
  This software provides statistical arithmetic processing of measurement results. (See page A-05 for details).
- FORMTRACEPAK-AP
  Simple and easy-to-use 2D contour analysis. Graphic reports for geometry or profile. Allows measurement by comparison.



FORMTRACEPAK-AP sample screenshot.



QIPAK layout: Pro Mode.

QIPAK layout: Easy Mode.

K

Quick Scope QS-L

SERIES 359 – Manual 3D Vision Measuring System

- A high-resolution manual 3D Vision Measuring System featuring power-zoom optics, colour CMOS or CCD camera, adaptive lighting and a Quick Navigation function for repetitive measurements to provide efficient and cost-effective operation.
- A Z-axis measurement range of 150 mm is standard on all models.
- Power zoom enables quick and easy magnification changing, with auto-focus provided on QS-L Zoom AF models.
- 0.1 µm resolution.
- Halogen coaxial, stage and ring lighting provides versatile surface and contour illumination to match workpiece requirements.
- Three stages are available up to the largest that provides a 400 x 200 mm XY measuring range for large or multiple workpiece applications.
- Quick-release handles enable the stage to be moved rapidly but with fine feed always available, thus saving time when measuring longer dimensions and dramatically improving productivity.

QS-L3017 Zoom AF

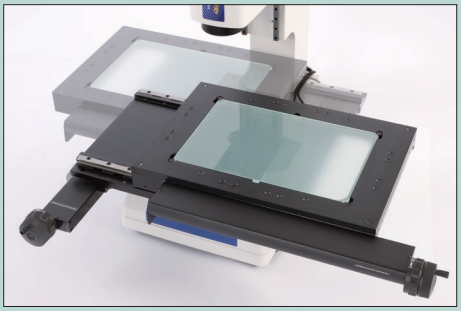
Technical Data

Resolution:	0.1 µm
Scale type:	Linear encoder
Measuring accuracy (20°C)*	
XY:	±(2.5+2L/100) µm
Z:	QS-L models: ±(5+4L/100) µm QS-L AF models: ±(5+0.6L/100) µm
Illumination	
Surface:	Halogen coaxial light, halogen ring light
Contour:	Halogen stage light
Max. workpiece height:	150 mm
Control unit	
Dimensions:	Zoom: 310 x 330 x 102.5 mm Zoom AF: 186 x 452 x 381 mm
Mass:	Zoom: 5 kg Zoom AF: 14 kg

* Using 2.5X or 3.0X zoom magnification (QS-L Zoom AF models), L = measured distance between two arbitrary points (mm).

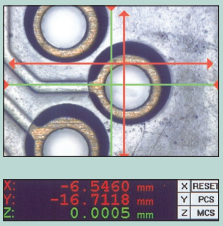
Optional Accessories

Code No.	Description
937179T	Footswitch
12AAJ088	Reinforced footswitch

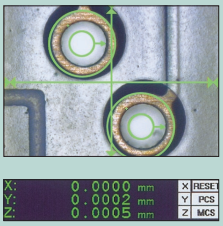


Quick release mechanism for rapid stage positioning.

Guided stage navigation for repeat measurements



Step 1: Not in position.



Step 2: In position.

Specifications

Model		QS-L 2010 Zoom	QS-L 2010 Zoom AF
Code No.		**359-710-1D**	**359-703D**
Measuring range (X : Y : Z)		200 : 100 : 150 mm	
Camera type		Colour CMOS	Colour CCD
Stage glass size		250 x 150 mm	
Max. stage loading		10 kg	
Main unit	Dimensions (W x D x H)	624 x 769 x 722 mm	624 x 705 x 722 mm
	Mass	72 kg	66 kg

Model		QS-L 3017 Zoom	QS-L 3017 Zoom AF
Code No.		**359-711-1D**	**359-704D**
Measuring range (X : Y : Z)		300 : 170 : 150 mm	
Camera type		Colour CMOS	Colour CCD
Stage glass size		370 x 240 mm	
Max. stage loading		20 kg	
Main unit	Dimensions (W x D x H)	682 x 916 x 837 mm	682 x 852 x 837 mm
	Mass	140 kg	134 kg

Model		QS-L 4020 Zoom	QS-L 4020 Zoom AF
Code No.		**359-712-1D**	**359-705D**
Measuring range (X : Y : Z)		400 : 200 : 150 mm	
Camera type		Colour CMOS	Colour CCD
Stage glass size		440 x 240 mm	
Max. stage loading		15 kg	
Main unit	Dimensions (W x D x H)	757 x 931 x 837 mm	757 x 860 x 837 mm
	Mass	146 kg	140 kg

Quick Scope QS

SERIES 359 – CNC Vision Measuring System

- A 3D CNC Vision Measuring System offering an attractive performance-to-cost ratio with a choice of illumination options to suit almost any small or medium-sized workpiece measurement task.
- The powerful, Windows-based QSPAK software is easy to use and features a wide spectrum of measuring and analysis capabilities.
- Wide ranging functionality includes zoom, auto-focus, part program generation, one-click edge detection tools, graphic display, 48 time-saving macros and a pattern matching function for several common part features.
- Halogen coaxial, stage and ring lighting provides versatile surface and contour illumination to match workpiece requirements.
- Stage movement is controlled by the mouse, the optional joystick or from the optional multi-function control box.

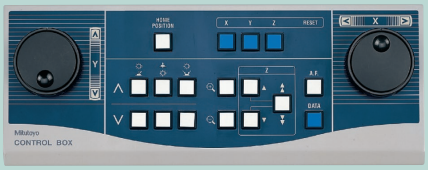
Technical Data

Resolution: 0.1 µm
Scale type: Linear encoder
Measuring accuracy (20ºC)*
XY: ±(2.5+0.6L/100) µm
Z: ±(5.0+0.6L/100) µm
Illumination
Surface: Halogen coaxial light, halogen ring light
Contour: Halogen stage light
Max. workpiece height: 100 mm

* Zoom lens 2.5X magnification, L = measured distance between two arbitrary points (mm).

Optional Accessories

Code No.	Description
937179T	Footswitch
12AAJ088	Reinforced footswitch
02ATD415	Joystick XYZ
02APW610	Control box 2
02AKN020	Calibration chart



Control box 2

QS-250 Zoom

Specifications

Model	**QS-250 Zoom**
Code No.	**359-508-10Y**
Measuring range (X : Y : Z)	200 : 250 : 100 mm
Camera type	Colour CCD
Stage glass size	269 x 311 mm
Max. stage loading	10 kg
Dimensions (W x D x H)	465 x 815 x 663 mm
Mass	76 kg

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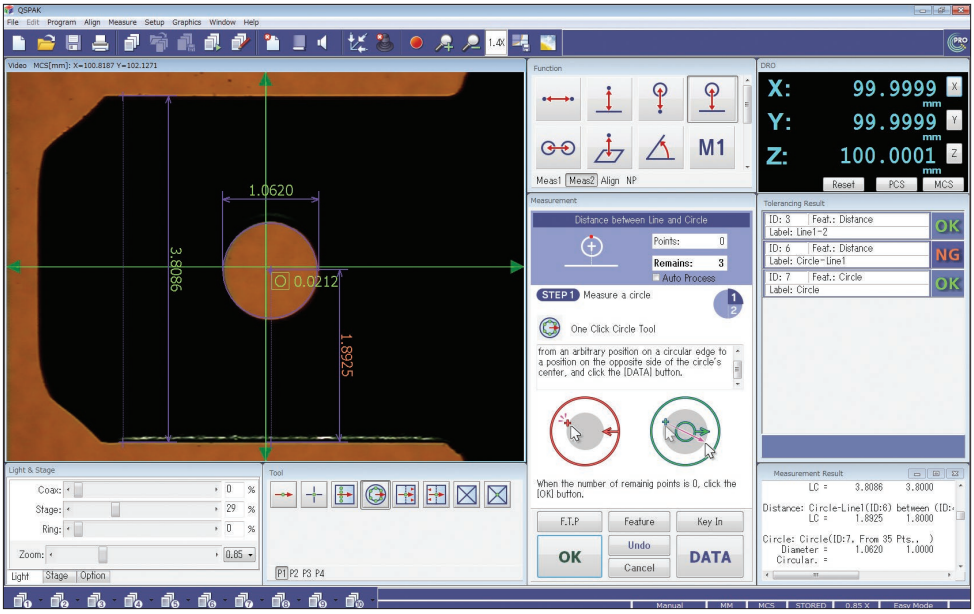
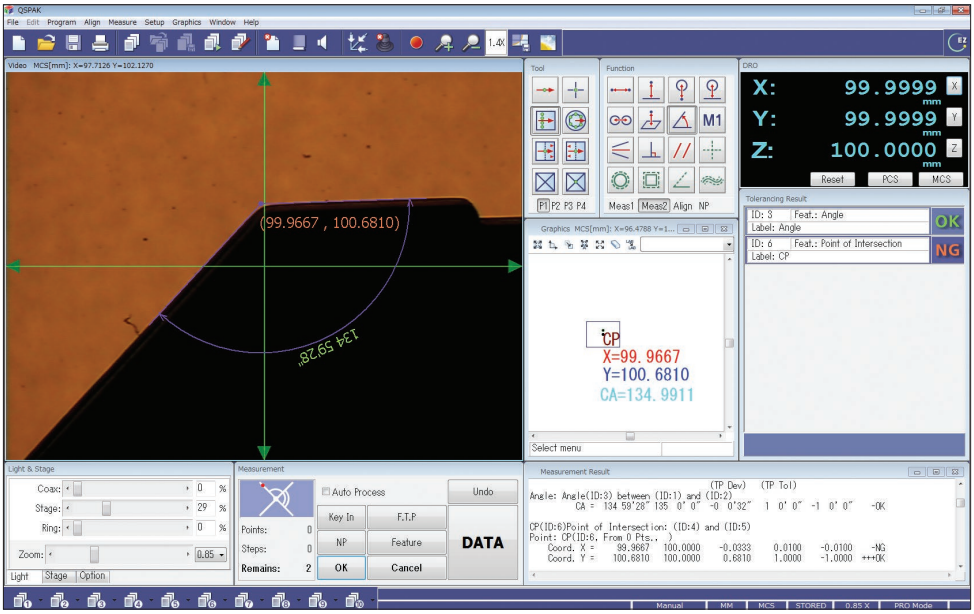
QSPAK

Software for Quick Scope Systems

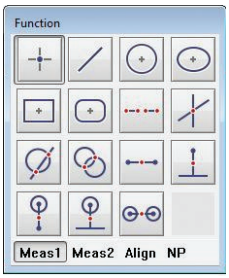
- Easy to use, one-click edge detection tools.
- Template tools for comparative analysis.
- Video image capture.
- Stage navigation function for CNC machines delivers improved measurement cycles.

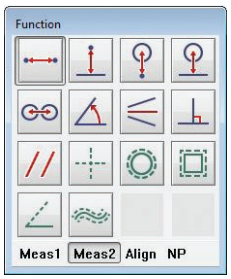


QSPAK layout: Easy Mode.



QSPAK layout: Pro Mode.





Measurement item commands.

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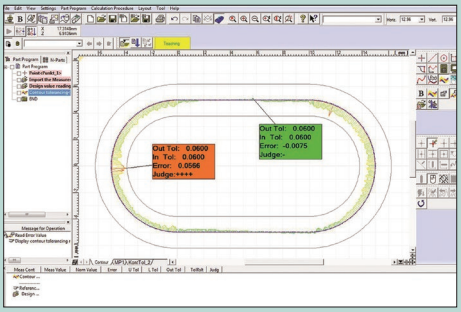
Optional Additional Software

- QS CAD-IMPORT/EXPORT
- MeasurLink
  This software provides statistical arithmetic processing of measurement results. (See page A-05 for details).
- EASYPAG (only for QS CNC)
  This software creates measurement procedure programs using 2D CAD data. This allows users to reduce program creation man-hours and shorten lead times.
- FORMTRACEPAK-AP
  Simple and easy-to-use 2D contour analysis. Graphic reports for geometry or profile. Enables measurement by comparison.



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Quick Vision Active

SERIES 363 – CNC Vision Measuring System

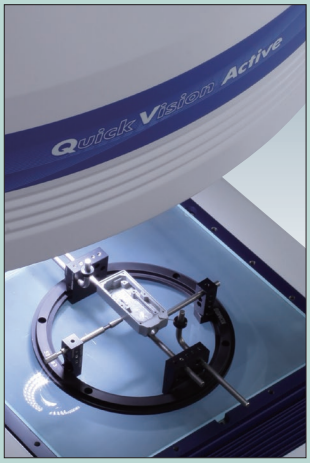
- This CNC vision measuring system combines the flexibility of a high quality zoom lens with the speed of a state-of-the-art digital colour camera.
- Programmable LED stage and coaxial lighting.
- Programmable 4-quadrant LED ring lighting.
- High-resolution and high-speed CMOS colour camera.
- High-quality 7-step zoom optics with interchangeable lenses.
- Compact design using a fixed bridge, moving table for the ultimate in rigidity.
- Powerful, user-friendly QVPAK software.
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera.

Technical Data

Resolution:	0.1 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant fixed white LED

Optional Accessory

Code No.	Description
02ATN695	Calibration chart with holder



Optional Opti-fix clamping system.

1X, 1.5X and 2X interchangeable lens.

QV-L202Z1L-D

Specifications

Model		QV Active 202	QV Active 404
Code No.		363-109Y	363-110Y
Measuring range (X : Y : Z)		200 : 200 : 150 mm	400 : 400 : 200 mm
Camera type		Colour CMOS	
Accuracy*	E_{1XY}	±(2.0+0.3L/100) µm	
	E_{1Z}	±(3.0+0.5L/100) µm	
	E_{2XY}	±(2.5+0.4L/100) µm	
Magnification changing system		Zoom optical system with 8 positions; standard 1.5X magnification lens	
Stage glass size		311 x 269 mm	466 x 480 mm
Max. stage loading		10 kg	20 kg
Dimensions (W x D x H)		570 x 767 x 845 mm	776 x 1303 x 1004 mm
Mass (main unit)		120 kg	275 kg

* Inspected to a Mitutoyo standard. L = Measured length (mm).

K

Mitutoyo

Quick Vision Apex/Hyper

SERIES 363 – Standard and High-Accuracy CNC Vision Measuring Systems

- 3D CNC Vision Measuring Systems offering a choice of accuracy specification up to the 1.0 µm class (measuring 100 mm) and high functionality.
- Programmable LED stage and coaxial lighting.
- Programmable 4-quadrant LED ring lighting provides the flexibility in lighting direction, angle and intensity that results in maximum surface contrast for best imaging resolution and accuracy.
- Pattern focus function.
- Accuracy specifications conforming to ISO 10360-7 standard are available (on request).
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera.
- 3D topography measurements are possible with the optional PFF functionality.
- Temperature compensation is a standard feature.

QV Apex 302 Pro

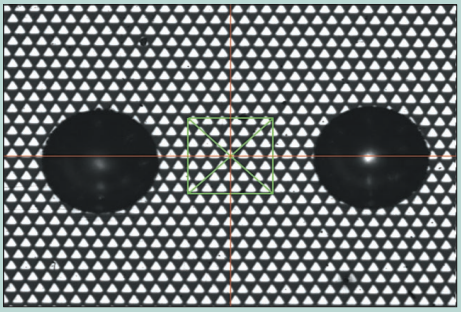
QV Hyper 404 Pro

Technical Data

Resolution:	0.1 µm (Apex), 0.02 µm (Hyper)
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED

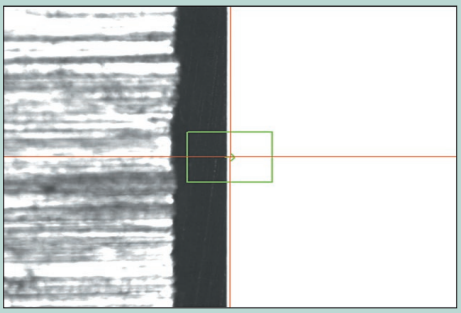
Optional Accessory

Code No.	Description
02ATN695	Calibration chart with holder



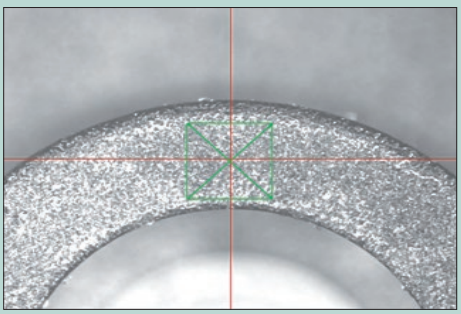
Pattern focus

An image of the pattern focus reticule is obtained from the surface of low contrast transparent objects or highly reflective surfaces and brought to focus. This technique is useful for measuring the height of surfaces that would otherwise be difficult to measure optically.



Edge focus

Robust edge detection methods for use with multiple lighting techniques are available with edge focus.



Surface focus

Surface focus can be selected for each unique material type and texture. A single Z measurement is extracted in this example.

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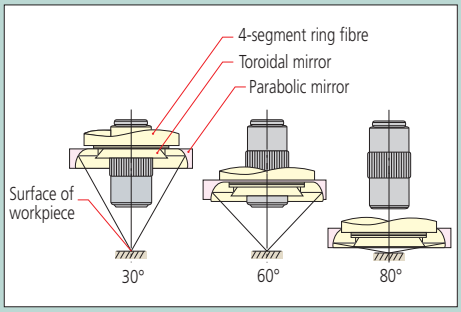
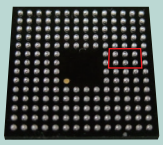
Touch Probe option (see page K-17 for details).



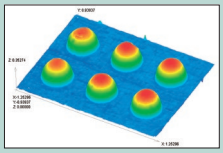
Programmable Ring Light (PRL)
Fine control of angle and direction provides optimum illumination for optical measurement. The angle can be set in the range from 30° to 80°. This type of illumination is effective for enhancing the edge of inclined surfaces or very small steps. Illumination can be controlled independently from back or front, right or left. Measurement with edge enhancement is possible if a shadow is formed by illuminating from only one direction.

Optional PFF function (Points From Focus)

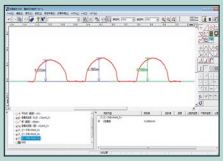
- PFF enhances the functionality of standard QV models with 3D topography measurements.
- No additional sensor necessary.
- High scanning range in Z axis from 2.7 mm up to 40.6 mm depending on the objective lens in use and in wide range mode.



Workpiece to be measured with PFF.



3D analysis of PFF measurement.



2D analysis of PFF measurement.

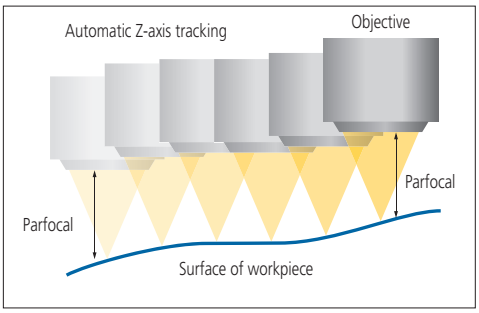
Specifications

Model		QV Apex 302 PRO	QV Apex 302 PRO3	QV Hyper 302 PRO
Code No.		**363-170SY**	**363-171Y**	**363-173SY**
Resolution		0.1 µm	0.1 µm	0.02 µm
Measuring range (X : Y : Z)		300 : 200 : 200 mm		
Accuracy*1	E_{1XY}	±(1.5+0.3L/100) µm		±(0.8+0.2L/100) µm
	E_{1Z}	±(1.5+0.4L/100) µm		±(1.5+0.2L/100) µm
	E_{2XY}	±(2+0.4L/100) µm		±(1.4+0.3L/100) µm
Camera type		B&W CCD	Colour CCD	B&W CCD
Stage glass size		399 x 271 mm		
Max. stage loading		20 kg		15 kg
Main unit	Dimensions (W x D x H)	859 x 951 x 1609 mm		
	Mass	360 kg		

Model		QV Apex 404 PRO	QV Apex 404 PRO3	QV Hyper 404 PRO
Code No.		**363-180SY**	**363-181Y**	**363-183SY**
Resolution		0.1 µm	0.1 µm	0.02 µm
Measuring range (X : Y : Z)		400 : 400 : 250 mm		
Accuracy*1	E_{1XY}	±(1.5+0.3L/100) µm		±(0.8+0.2L/100) µm
	E_{1Z}	±(1.5+0.4L/100) µm		±(1.5+0.2L/100) µm
	E_{2XY}	±(2+0.4L/100) µm		±(1.4+0.3L/100) µm
Camera type		B&W CCD	Colour CCD	B&W CCD
Stage glass size		493 x 551 mm		
Max. stage loading		40 kg		30 kg
Main unit	Dimensions (W x D x H)	1027 x 1407 x 1778 mm		
	Mass	579 kg		

Model		QV Apex 606 PRO	QV Apex 606 PRO3	QV Hyper 606 PRO
Code No.		**363-190SY**	**363-191Y**	**363-193SY**
Resolution		0.1 µm	0.1 µm	0.02 µm
Measuring range (X : Y : Z)		600 : 650 : 250 mm		
Accuracy*1	E_{1XY}	±(1.5+0.3L/100) µm		±(0.8+0.2L/100) µm
	E_{1Z}	±(1.5+0.4L/100) µm		±(1.5+0.2L/100) µm
	E_{2XY}	±(2+0.4L/100) µm		±(1.4+0.3L/100) µm
Camera type		B&W CCD	Colour CCD	B&W CCD
Stage glass size		697 x 758 mm		
Max. stage loading		50 kg		40 kg
Main unit	Dimensions (W x D x H)	1309 x 1985 x 1794 mm		
	Mass	1450 kg		

*1 Inspected to a Mitutoyo standard. L = Measured length (mm).



Tracking Auto Focus (TAF)*2:
The TAF feature allows continuous focussing in response to changes in workpiece height. This results in improved measurement throughput.

*2 Factory-fit option.

Laser source	Semiconductor laser (peak wavelength: 690 nm)				
Laser safety	Class 2 (JIS C6802:2011, EN/IEC 60825-1:2007)				
Autofocus system	Objective coaxial autofocussing (knife-edge method)				
Applicable objectives	QV-HR1X	QV-SL1X	QV-HR2.5X	QV-SL2.5X	QV-5X
Tracking range	6.3 mm (±3.15 mm)		1 mm (±0.5 mm)		0.25 mm (±0.125 mm)

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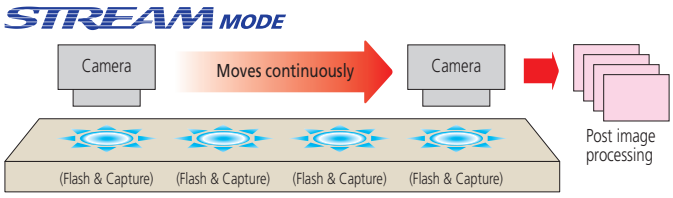
Quick Vision STREAM PLUS

SERIES 363 – Standard and High-Accuracy CNC Vision Measuring Systems

- A 3D CNC Vision Measuring System offering accuracy in the 1.8 µm class (measuring 100 mm).
- This advanced machine is hugely productive on most workpieces because of its high-intensity-LED stroboscopic image-capturing technique that operates while the stage is moving.
- Programmable ring lighting enables achievement of maximum surface contrast for best imaging resolution, and hence accuracy, on the more problematic workpiece.
- The fixed bridge, moving table design is used for the ultimate in rigidity.
- A programmable power turret provides control of magnification for optimal viewing.

QV STREAM PLUS 606



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Specifications

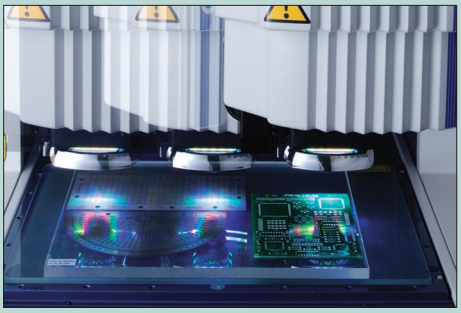
Model		QV STREAM PLUS 302	QV STREAM PLUS 404	QV STREAM PLUS 606
Code No.		**363-172Y**	**363-182Y**	**363-192Y**
Measuring range (X : Y : Z)		300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
Camera type		High-sensitivity B&W, progressive scan CCD		
Accuracy*1	E_{1XY}	±(1.5+0.3L/100) µm		
	E_{1Z}	±(1.5+0.4L/100) µm		
	E_{2XY}	±(2.0+0.4L/100) µm		
Illumination*2	Coaxial light*3	Colour LED		
	Transmitted light	Blue LED		
	Programmable ring light*3	Colour LED		
Magnification change system		Programmable power turret		
Max. drive speed (X/Y/Z-axis)		300 mm/s	XY: 400 mm/s, Z: 300 mm/s	
Max. measuring speed		40 mm/s		
Stage glass size		399 x 271 mm	493 x 551 mm	697 x 758 mm
Max. stage loading		20 kg	40 kg	50 kg
Dimensions (W x D x H)		859 x 951 x 1609 mm	1027 x 1407 x 1778 mm	1309 x 1985 x 1794 mm
Mass*4		360 kg	579 kg	1450 kg

*1 Determined by Mitutoyo's inspection method. L is the measured length (mm).
*2 Only one of the illumination functions (reflected, transmitted, or PRL illumination) can be set in STREAM mode. The 4-way PRL illumination can be set to flood lighting (4-direction lighting) or single-direction lighting.
*3 Cyan illumination only while using STREAM mode.
*4 Including machine stand.

Technical Data

Resolution: 0.1 µm
Scale type: Linear encoder

Features



Non-stop vision measurement means extreme improvement in throughput*5:
Conventional vision measuring systems endlessly repeat the cycle of stage displacement, stage stop, measurement, stage start and stage displacement again. This mode of operation is a fundamental limitation on improving measurement throughput. In contrast, the Quick Vision Stream system uses an innovative image capture technique that avoids the need to repeatedly stop the stage so measurement can be continuous, but measuring accuracy is retained. Eliminating the time needed to accelerate, decelerate and then hold the stage motionless while a measurement is made achieves an extreme improvement in productivity.

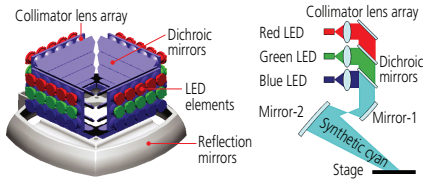
*5 Comparison of measurement throughput (using a Mitutoyo sample workpiece) with that of Mitutoyo conventional systems.

Measurement throughput comparison between QV STREAM and the conventional system:
STREAM PLUS series is more than 5 times faster.

STREAM mode:
The measurement mode of a non-stop vision measuring system is referred to as the STREAM mode.

Newly developed stroboscopic illumination system:
The development of a high-intensity LED flash illuminator made non-stop vision measurement possible. At the precise moment the camera reaches a measurement point on the workpiece the illuminator creates an extremely short, high-intensity flash that effectively freezes all motion. The illuminator turns on and off so fast that no image blur occurs and the image is captured in full and accurate detail. This innovative design takes full advantage of high-density, high-intensity LED arrays aided by collimating lenses and dichroic mirrors to produce ultra bright, directional and efficient illumination.

High-density mounting of ultra-high-intensity LED elements



Optional Accessories

Code No.	Description
02ATN695	Calibration chart with holder

Tracking Auto Focus (TAF), see previous page for details.*6

*6 Factory-fit option.

Quick Vision ACCEL

SERIES 363 – Large-Sized CNC Vision Measuring Systems

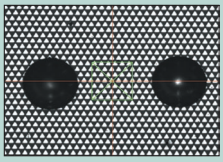
- A 3D CNC Vision Measuring System in the 1.8 - 2.5 µm accuracy class (measuring 100 mm).
- The primary focus is on measurement efficiency, with the moving-bridge design eliminating the need for a moving stage. This allows a more simplified design of the workpiece fixture, resulting in a significant reduction in the time required for fixture fabrication and inspection.
- A programmable power turret provides control of magnification for optimal viewing.
- The exceptionally rigid construction allows a drive speed in X and Y of 400 mm/s, approximately 30% faster than standard QV Apex models, therefore minimizing non-productive time during the measuring cycle.
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera. (See page K-17 for details.)

Technical Data

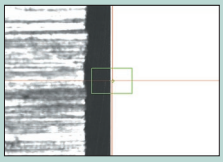
Resolution:	0.1 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED

Features

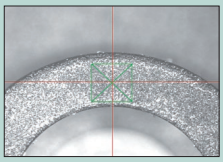
Image multi-auto focus:
The optimal focus can be selected for each surface texture and measured feature, realizing high repeatability and reliable edge detection.



Pattern focus.

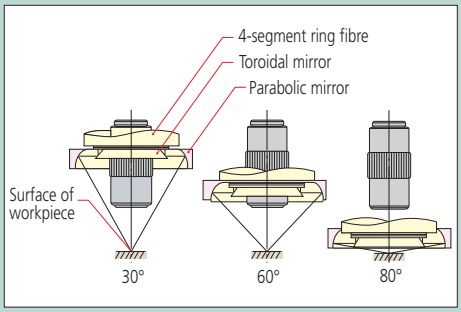


Edge focus.



Surface focus.

Programmable Ring Light (PRL):
Fine control of angle and direction provides optimum illumination for optical measurement. The angle can be set in the range from 30° to 80°. This type of illumination is effective for enhancing the edge of inclined surfaces or very small steps. Illumination can be controlled independently from back or front, right or left. Measurement with edge enhancement is possible if you form a shadow by illuminating from only one direction.



QV ACCEL 1212

Specifications

Model		QV ACCEL 808 PRO	QV ACCEL 1010 PRO	QV ACCEL 1212 PRO	QV ACCEL 1517 PRO
Code No.		**363-315Y**	**363-335Y**	**363-355Y**	**363-375Y**
Measuring range (X : Y : Z)		800 : 800 : 150 mm	1000 : 1000 : 150 mm	1250 : 1250 : 100 mm	1500 : 1750 : 100 mm
Camera type		B&W CCD			
Accuracy*	E_{1XY}	±(1.5+0.3L/100) µm		±(2.2+0.3L/100) µm	
	E_{1Z}	±(1.5+0.4L/100) µm		±(2.5+0.5L/100) µm	
	E_{2XY}	±(2.5+0.4L/100) µm		±(3.5+0.4L/100) µm	
Magnification changing system		Programmable power turret			
Max. drive speed	X/Y axes	400 mm/s		300 mm/s	
	Z-axis	150 mm/s			
Stage glass size		883 x 958 mm	1186 x 1186 mm	1440 x 1440 mm	1714 x 1968 mm
Max. stage loading		10 kg	30 kg	30 kg	30 kg
Dimensions (W x D x H)		1475 x 1860 x 1578 mm	1912 x 2141 x 1603 mm	2166 x 2370 x 1554 mm	2440 x 2898 x 1554 mm
Mass		2050 kg	2950 kg	3600 kg	4500 kg

Model		QV ACCEL 808 PRO3	QV ACCEL 1010 PRO3	QV ACCEL 1212 PRO3	QV ACCEL 1517 PRO3
Code No.		**363-316Y**	**363-336Y**	**363-356Y**	**363-376Y**
Measuring range (X : Y : Z)		800 : 800 : 150 mm	1000 : 1000 : 150 mm	1250 : 1250 : 100 mm	1500 : 1750 : 100 mm
Camera type		Colour CCD			
Accuracy*	E_{1XY}	±(1.5+0.3L/100) µm		±(2.2+0.3L/100) µm	
	E_{1Z}	±(1.5+0.4L/100) µm		±(2.5+0.5L/100) µm	
	E_{2XY}	±(2.5+0.4L/100) µm		±(3.5+0.4L/100) µm	
Magnification changing system		Programmable power turret			
Max. drive speed	X/Y axes	400 mm/s		300 mm/s	
	Z-axis	150 mm/s			
Stage glass size		883 x 958 mm	1186 x 1186 mm	1440 x 1440 mm	1714 x 1968 mm
Max. stage loading		10 kg	30 kg	30 kg	30 kg
Dimensions (W x D x H)		1475 x 1860 x 1578 mm	1912 x 2141 x 1603 mm	2166 x 2370 x 1554 mm	2440 x 2898 x 1554 mm
Mass		2050 kg	2950 kg	360 0 kg	4500 kg

* Determined by Mitutoyo's inspection method. L is the measured length (mm).

Mitutoyo

Quick Vision ULTRA

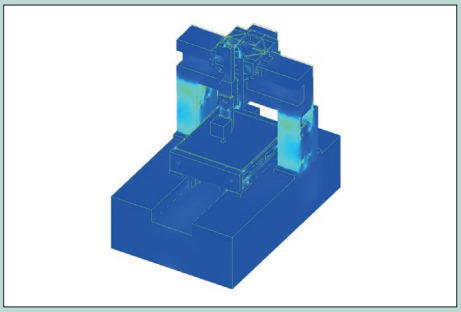
SERIES 363 – Ultra-High Accuracy CNC Vision Measuring System

- ULTRA QV404 PRO is an ultra-high accuracy CNC vision measuring system.
- This machine uses air bearings specially developed for use in high-accuracy 3D measuring machines on the X-, Y-, and Z-axes to provide a guide system with minimum straightness errors.
- Optimal design is achieved by using FEM (Finite Element Method) analysis to provide high rigidity of the main unit.
- An optical linear encoder featuring a resolution of 0.01 µm has been adopted for the all-important length measurement system. In order to minimize error caused by temperature fluctuations, the linear encoder scale is made of a special crystallized glass whose expansion coefficient is almost zero.
- This model supports ISO10360-7:2011 guaranteed accuracy (specifications on request).
- 3D topography measurements are possible with the optional PFF functionality.

ULTRA QV 404 PRO

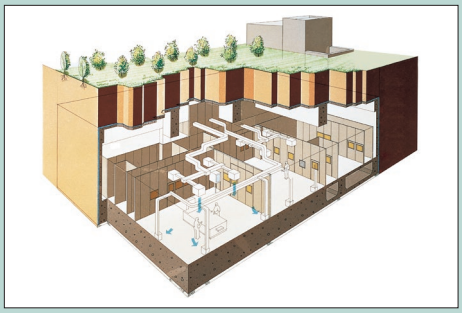
Technical Data

Resolution:	0.01 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	Halogen
Transmitted:	Halogen
Programmable ring light:	4-quadrant halogen



By using FEM (Finite-Element Method) analysis of the base design, the placement of stiffening ribs and beams has been determined for the Quick Vision Ultra to provide optimal structural rigidity.

The Quick Vision Ultra is equipped with a crystallized glass scale having a resolution of 0.01 µm and linear expansion coefficient of 0.08×10^{-6}/K. This virtually zero thermal expansion means the Quick Vision Ultra can minimize accuracy fluctuation resulting from thermal changes.



Mitutoyo's ultra-precision scale manufacturing facility eleven metres underground produces the exceptionally accurate scales for the Quick Vision Ultra.

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Specifications

Model		ULTRA QV 404 PRO
Code No.		**363-518SY**
Measuring range (X : Y : Z)		400 : 400 : 200 mm
Camera type		High-sensitivity B&W CCD
Accuracy*1	E_{1XY}	±(0.25+0.1L/100) µm
	E_{1Z}	±(1.5+0.2L/100) µm [(1.0+0.2L/100) µm: 10 - 60 mm]
	E_{2XY}	±(0.5+0.2L/100) µm
Magnification changing system		Programmable power turret
Max. drive speed (X/Y/Z-axis)		150 mm/s
Stage glass size		493 x 551 mm
Max. stage loading		40 kg
Dimensions (W x D x H)		1172 x 1735 x 1910 mm
Mass*2		2150 kg

*1 Determined by Mitutoyo's inspection method. L is the measured length (mm).
*2 Including machine stand.

Quick Vision HYBRID Type 1

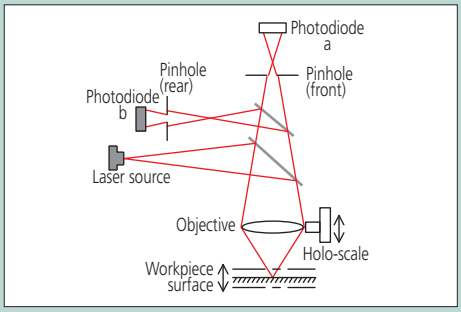
SERIES 365 – CNC Vision Measuring Systems equipped with a Non-Contact Displacement Sensor

- The Quick Vision Hybrid Type 1 is a complex machine which allows vision measurement with both a CCD camera and high-speed scanning by applying a vision measurement unit in parallel with a non-contact displacement sensor.
- The focussing point method minimizes the difference in the measuring face reflectance and achieves high measurement reproducibility.
- Capable of measuring detailed shapes at high resolution.

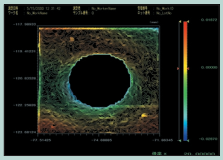
QV H1 APEX 404

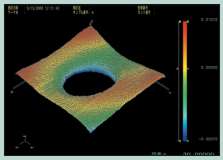
Features

- The focussing point method minimizes any difference in the measuring face reflectance and realizes high measurement reproducibility.
- The double pinhole method (less directivity) is employed as the measurement principle.

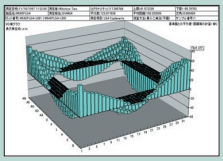


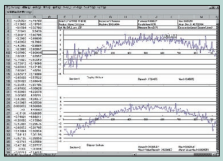
- Curved-form analysis (MSHAPE-QV).
- 2D/3D contour lines display.
- 2D/3D unfiltered profile display.
- Shadow graph display.
- Curved plane analysis.
- Unfiltered profile analysis, etc.





- Data processing (QV Graph).
- 3D bar chart display.
- 3D surface chart display.
- 2D continuous cross-section graph display.





The scanning laser system for Quick Vision HYBRID Type 1 adds 3D profiling capability. The laser probe with 0.01 µm resolution continuously scans the workpiece surface and gathers coordinate data, enabling the evaluation of surface contours, peak heights, etc.

Specifications

Model			QV H1 Apex 302	QV H1 Apex 404	QV H1 Apex 606
Code No.			365-170SY	365-180SY	365-190SY
Measuring range (X:Y:Z)	Vision		300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor		180:200:200 mm	280:400:250 mm	480:650:250 mm
Accuracy (Vision)*		E_{1XY}	±(1.5+0.3L/100) µm		
		E_{1Z}	±(1.5+0.4L/100) µm		
		E_{2XY}	±(2+0.4L/100) µm		
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(1.5+0.4L/100) µm		

Model			QV H1 Hyper 302	QV H1 Hyper 404	QV H1 Hyper 606
Code No.			365-173SY	365-183SY	365-193SY
Measuring range (X:Y:Z)	Vision		300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor		180:200:200 mm	280:400:250 mm	480:650:250 mm
Accuracy (Vision)*		E_{1XY}	±(0.8+0.2L/100) µm		
		E_{1Z}	±(1.5+0.2L/100) µm		
		E_{2XY}	±(1.4+0.3L/100) µm		
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(1.5+0.2L/100) µm		

Model			QV H1 STREAM PLUS 302	QV H1 STREAM PLUS 404	QV H1 STREAM PLUS 606
Code No.			365-172Y	365-182Y	365-192Y
Measuring range (X:Y:Z)	Vision		300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor		180:200:200 mm	280:400:250 mm	480:650:250 mm
Accuracy (Vision)*		E_{1XY}	±(1.5+0.3L/100) µm		
		E_{1Z}	±(1.5+0.4L/100) µm		
		E_{2XY}	±(2.0+0.4L/100) µm		
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(1.5+0.4L/100) µm		

Model			QV H1 ACCEL 808	QV H1 ACCEL 1010	QV H1 ACCEL 1212	QV H1 ACCEL 1517
Code No.			365-315Y	365-335Y	365-355Y	365-375Y
Measuring range (X:Y:Z)	Vision		800:800:150 mm	1000:1000:150 mm	1250:1250:100 mm	1500:1750:100 mm
	Non-contact displacement sensor		680:800:150 mm	880:1000:150 mm	1130:1250:100 mm	1380:1750:100 mm
Accuracy (Vision)*		E_{1XY}	±(1.5+0.3L/100) µm		±(2.2+0.3L/100) µm	
		E_{1Z}	±(1.5+0.4L/100) µm		±(2.5+0.5L/100) µm	
		E_{2XY}	±(2.5+0.4L/100) µm		±(3.5+0.4L/100) µm	
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(2.5+0.4L/100) µm		±(3.5+0.5 L/100) µm	

* Determined by Mitutoyo's inspection method. L is the measured length (mm).

Laser beam safety precautions

This system uses a low-power invisible laser beam (780 nm) which corresponds to CLASS 1 (invisible radiation) of IEC60825-1 for measurement. The CLASS 1 laser warning label as shown below is attached to the main unit.

CLASS 1 LASER PRODUCT

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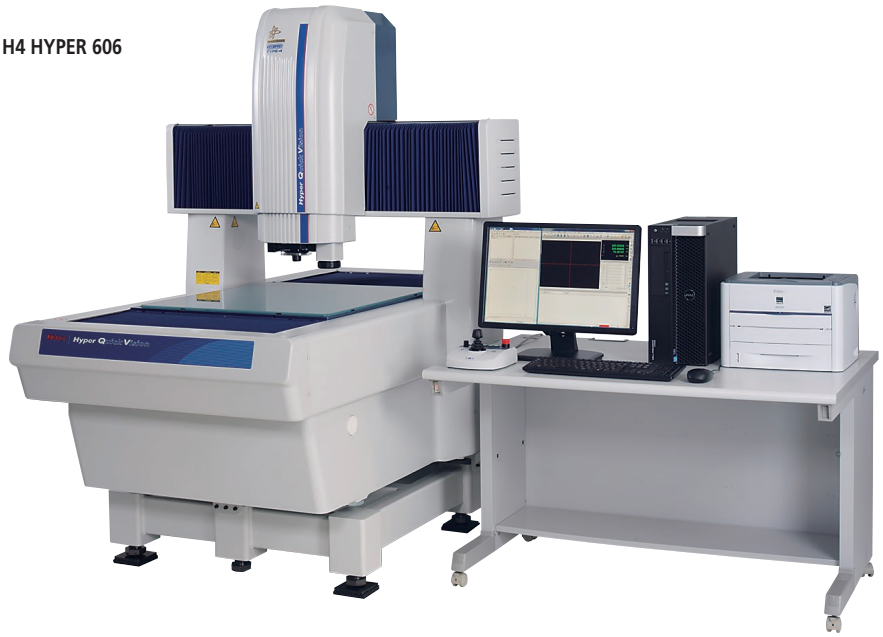
Mitutoyo

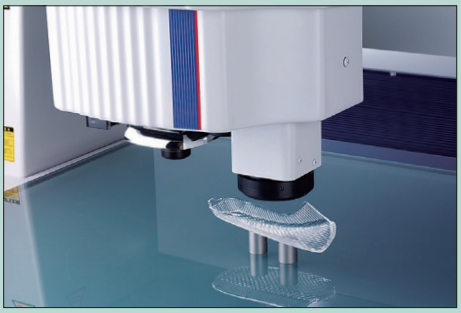
Quick Vision HYBRID Type 4

SERIES 365 – CNC Vision Measuring Systems equipped with a Non-Contact Displacement Sensor

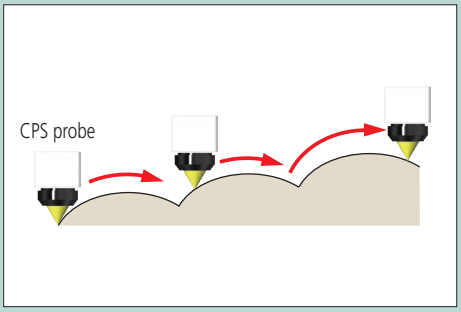
- The Quick Vision Hybrid Type 4 is a complex machine which enables vision measurement with both a CCD camera and high-speed scanning by applying a vision measurement unit in parallel with a non-contact displacement sensor.
- Measuring range of the scanning sensor is 0 - 1200 µm.
- Effective even for high inclination angles both of highly reflective surfaces and diffuse surfaces. Maximum measurable inclination angle: ±80° (diffuse surface).
- Achieves high-resolution and high-accuracy height measurement by the wavelength confocal method using axial chromatic aberration.
- Automatic light intensity control provides reliable measurements even when reflectance of the measured surface changes during measurement.
- Enables surface topography and the thickness of transparent objects to be measured.

QV H4 HYPER 606





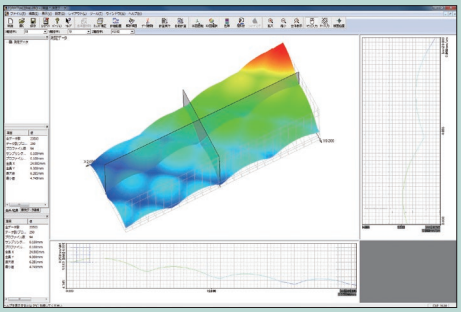
The Quick Vision Hybrid Type 4 is a machine which allows vision measurement with a CCD camera and high-speed scanning with a non-contact displacement sensor.



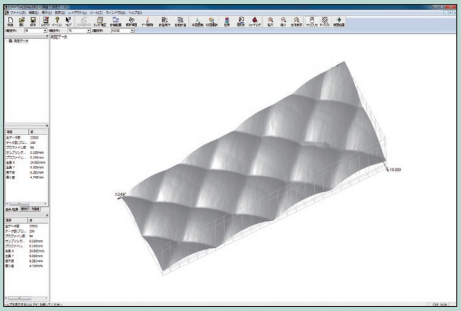
Scanning measurement with automatic movement in the Z-axis direction.

FORMTRACEPAK-PRO

Analysis example.



Colour-coded 3D display.



Shaded display.

Specifications

Model			QV H4 Apex 302	QV H4 Apex 404	QV H4 Apex 606
Code No.			365-413SY	365-433SY	365-453SY
Measuring range (X : Y : Z)	Vision		300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
	Non-contact displacement sensor		176 : 200 : 200 mm	276 : 400 : 250 mm	476 : 650 : 250 mm
Accuracy (Vision)*		E_{1XY}	±(1.5+0.3L/100) µm		
		E_{1Z}	±(1.5+0.4L/100) µm		
		E_{2XY}	±(2+0.4L/100) µm		
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(1.5+0.4L/100) µm		

Model			QV H4 Hyper 302	QV H4 Hyper 404	QV H4 Hyper 606
Code No.			365-416SY	365-436SY	365-456SY
Measuring range (X : Y : Z)	Vision		300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
	Non-contact displacement sensor		176 : 200 : 200 mm	276 : 400 : 250 mm	476 : 650 : 250 mm
Accuracy (Vision)*		E_{1XY}	±(0.8+0.2L/100) µm		
		E_{1Z}	±(1.5+0.2L/100) µm		
		E_{2XY}	±(1.4+0.3L/100) µm		
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(1.5+0.2L/100) µm		

Model			QV H4 STREAM PLUS 302	QV H4 STREAM PLUS 404	QV H4 STREAM PLUS 606
Code No.			365-415Y	365-435Y	365-455Y
Measuring range (X : Y : Z)	Vision		300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
	Non-contact displacement sensor		176 : 200 : 200 mm	276 : 400 : 250 mm	476 : 650 : 250 mm
Accuracy (Vision)*		E_{1XY}	±(1.5+0.3L/100) µm		
		E_{1Z}	±(1.5+0.4L/100) µm		
		E_{2XY}	±(2.0+0.4L/100) µm		
Accuracy (Non-contact displacement sensor)*		E_{1Z}	±(1.5+0.4L/100) µm		

* Determined by Mitutoyo's inspection method. L is the measured length (mm).

Laser beam safety precautions

This system uses a low-power invisible laser beam (780 nm) which corresponds to CLASS 1 (invisible radiation) of IEC60825-1 for measurement. The CLASS 1 laser warning label as shown below is attached to the main unit.

CLASS 1 LASER PRODUCT

Hyper Quick Vision WLI

SERIES 363 – Non-Contact 3D Measuring System

- The Hyper Quick Vision WLI can measure coordinates and dimensions and assess micro-3D forms without contact.
- This machine is a high accuracy, dual-head vision measuring system equipped with a white light interferometer enabling high accuracy freeform surface measurement by using interference-fringe analysis.
- The standard vision measuring function can continuously perform coordinate, dimension and 3D shape measuring without interruption.
- The large work stage easily handles large-sized workpieces such as PCBs.
- Enhanced functionality with the WLI system for high-resolution topography evaluation such as surface roughness analysis.

Technical Data

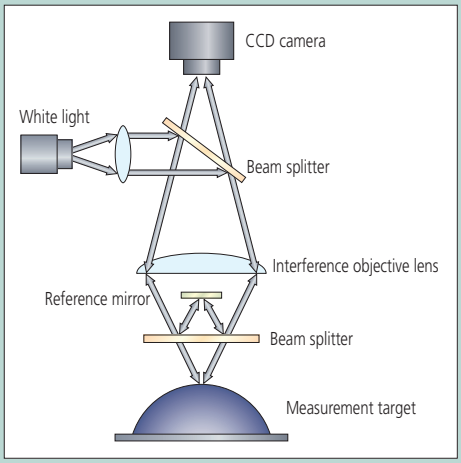
Resolution:	0.1 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED
Tube lens WLI head:	2X

Optional Accessories

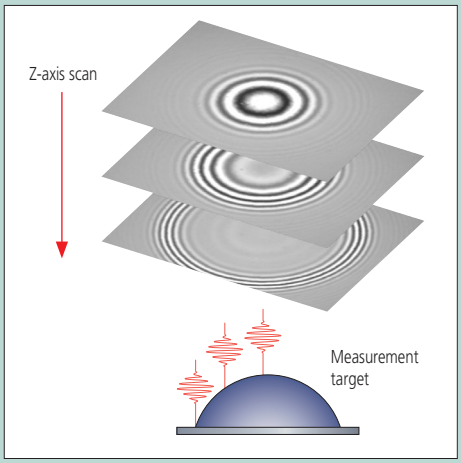
Code No.	Description
02ALT630	QV WLI 10X objective
02ALT600	QV WLI 25X objective
02ALY400	QV WLI 5X objective

10X objective

25X objective

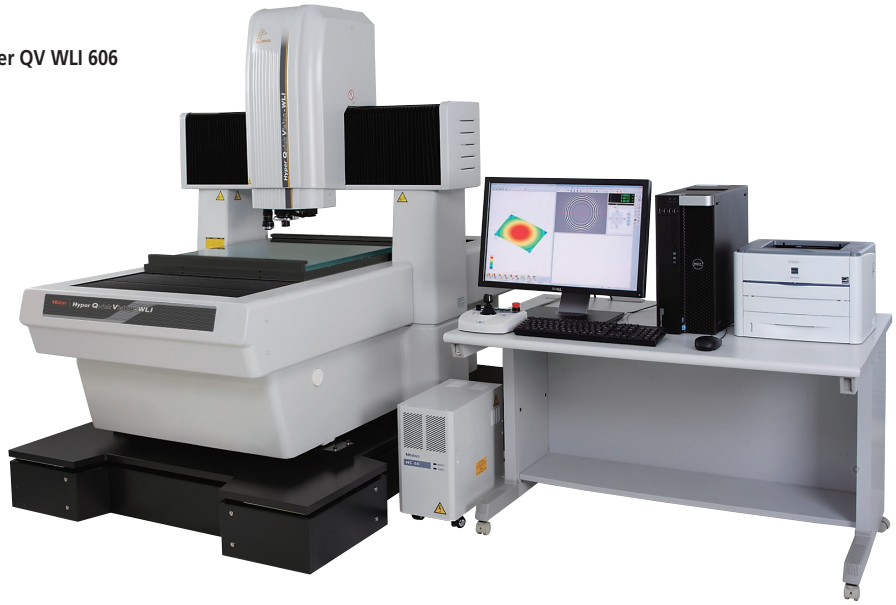


WLI optical system head.



Interference fringe production and measurement by WLI.

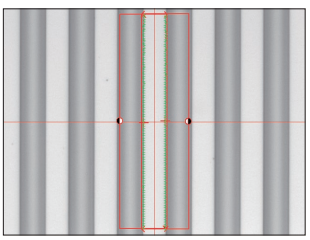
Hyper QV WLI 606



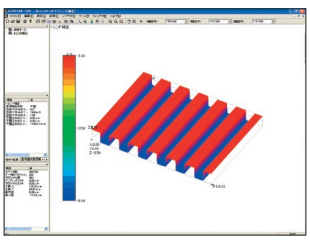
Specifications

Model		Hyper QV WLI 302	Hyper QV WLI 404	Hyper QV WLI 606
Code No.		**363-713SY**	**363-714SY**	**363-715SY**
Measuring range (X:Y:Z)	Vision measuring area	300:200:190 mm	400:400:240 mm	600:650:220 mm
	WLI measuring area*1	215:200:190 mm	315:400:240 mm	515:650:220 mm
Camera type		B&W CCD		
Accuracy*2	E_{1XY}	±(0.8+0.2L/100) µm		
	E_{1Z}	±(1.5+0.2L/100) µm		
	E_{2XY}	±(1.4+0.3L/100) µm		
WLI head tube lens		2X		
Magnification change system		Programmable power turret		
Repeatability (WLI head)		$2\sigma \leq 0.08\mu m$		
WLI head Z-axis scanning range*3		170 µm		
Max. stage loading		15 kg	25 kg	35 kg
Dimensions (W x D x H)		859 x 950 x 1606 mm	1027 x 1407 x 1781 mm	1309 x 1985 x 1792 mm
Mass*4		490 kg	1160 kg	2275 kg

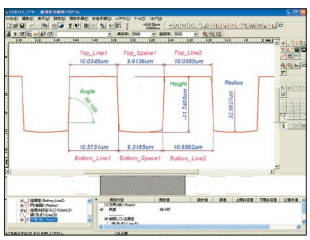
*1 Movable range of WLI optical head.
*2 Determined by Mitutoyo's inspection method. L is the measured length (mm).
*3 Applies to standard mode. Applicable to max. 200 µm by modifying scan pitch.
*4 Including machine stand.



Video image of part.



3D analysis of measured part.



2D analysis of measured part.

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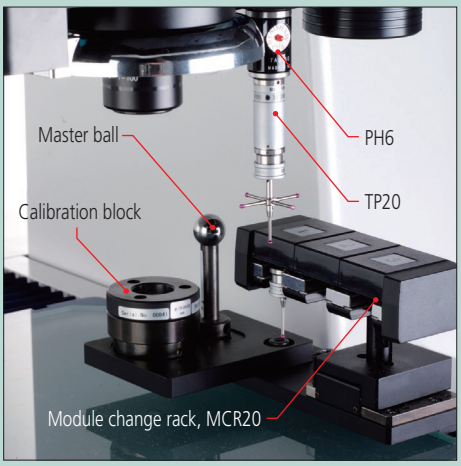
Quick Vision TP

SERIES 364 – CNC Vision Measuring System equipped with a Touch Trigger Probe

- An optional touch probe (TP) is available for the following QV models: Quick Vision ACTIVE, Quick Vision APEX, Quick Vision HYPER, Quick Vision ACCEL.
- The Quick Vision TP system enables both non-contact and contact measurements using the same machine.
- Compatible with Renishaw Touch Probes TP-20 and TP-200.
- The MCR20 rack supplied as a standard accessory for storing probe modules ready for use is a powerful aid for increasing the scope of application and improving productivity.



QV TP Apex 302

Specifications

Model		QV TP Active 202	QV TP Active 404
Code No.		364-109Y	364-110Y
Measuring range (X : Y : Z)*1	Vision	200 : 200 : 150 mm	400 : 400 : 200 mm
	Touch Trigger Probe	134 : 200 : 150 mm	334 : 400 : 200 mm
Accuracy (Touch Probe) E_{1XYZ}*2		±(2.4+0.3L/100) µm	

Model		QV TP Apex 302	QV TP Apex 404	QV TP Apex 606
Code No.		364-170SY	364-180SY	364-190SY
Measuring range (X : Y : Z)*1	Vision	300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
	Touch Trigger Probe	234 : 200 : 200 mm	334 : 400 : 250 mm	534 : 650 : 250 mm
Accuracy (Touch Probe) E_{1XYZ}*2		±(1.8+0.3L/100) µm		

Model		QV TP Hyper 302	QV TP Hyper 404	QV TP Hyper 606
Code No.		364-173SY	364-183SY	364-193SY
Measuring range (X : Y : Z)*1	Vision	300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
	Touch Trigger Probe	234 : 200 : 200 mm	334 : 400 : 250 mm	534 : 650 : 250 mm
Accuracy (Touch Probe) E_{1XYZ}*2		±(1.7+0.3L/100) µm		

Model		QV TP ACCEL 808	QV TP ACCEL 1010	QV TP ACCEL 1212	QV TP ACCEL 1517
Code No.		364-315SY	364-335SY	364-355SY	364-375SY
Measuring range (X : Y : Z)*1	Vision	800 : 800 : 150 mm	1000 : 1000 : 150 mm	1250 : 1250 : 100 mm	1500 : 1750 : 100 mm
	Touch Trigger Probe	734 : 800 : 150 mm	934 : 1000 : 150 mm	1184 : 1250 : 100 mm	1434 : 1750 : 100 mm
Accuracy (Touch Probe) E_{1XYZ}*2		±(1.8+0.3L/100) µm	±(3+0.4L/100) µm	±(6+0.7L/100) µm	

*1 When a module change rack, a master ball, and a calibration ring are mounted, the measurement ranges are smaller than those given in the table. Other specifications are the same as those for QV Active, QV Apex, Hyper QV, and QV ACCEL. Please contact our sales office for more details.
*2 Determined by Mitutoyo's inspection method. L is the measured length (mm).

Laser beam safety precautions

This system uses a low-power invisible laser beam (780 nm) which corresponds to CLASS 1 (invisible radiation) of IEC60825-1 for measurement. The CLASS 1 laser warning label as shown below is attached to the main unit.

CLASS 1 LASER PRODUCT

UMAP Vision System Type 2

SERIES 364 – Micro Form Measuring System

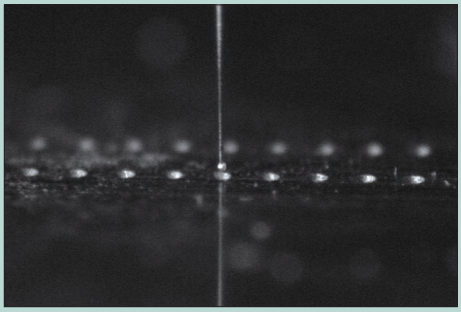
- The extremely small styli used by the Ultra Micro Accurate Probe (UMAP) system have made possible highly accurate measurement of minute features not previously possible with a contact method.
- Sophisticated, high-accuracy non-contact and contact measurement capabilities with one machine.
- This unit includes the UMAP probe and the non-contact type vision head. The combination of contact and non-contact measurement methods at this scale provides a solution for previously difficult (or even impossible) applications.

UMAP Probe

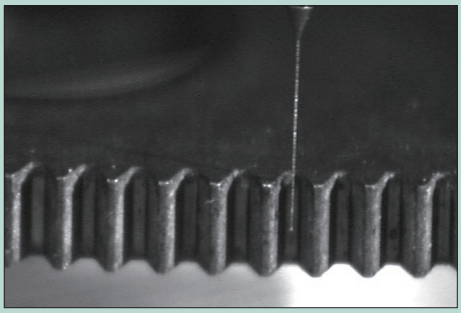
A stylus vibrating at an ultrasonic frequency enables the UMAP probe to sense contact with minute workpiece features. Five stylus tip diameters are available, from 15 to 300 µm.

Hyper UMAP 302 Type 2

Application Examples



Contour measurement of a ø0.125 hole.



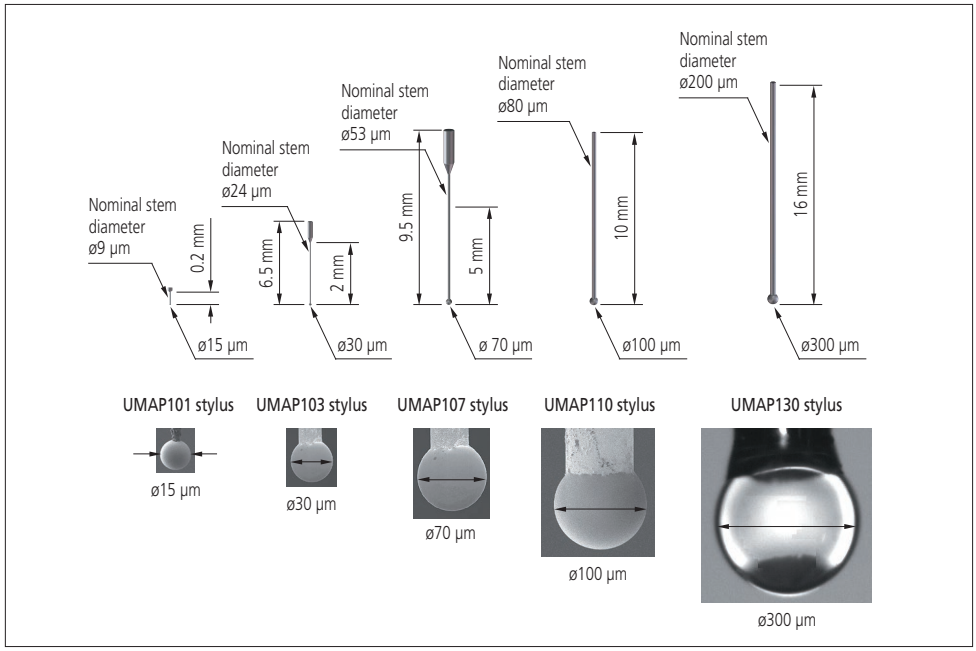
Measuring form accuracy of micro gear teeth.

Specifications

Model		Hyper UMAP 302 Type 2	ULTRA UMAP 404 Type 2
Code No.		364-713SY	364-717SY
Measuring range	X : Y	185 : 200 mm	285 : 400 mm
	Z (UMAP101/103)	175 mm	
	Z (UMAP107/110)	180 mm	
	Z (UMAP130)	185 mm	
Accuracy* (Vision)	E_{1XY}	±(0.8+0.2L/100) µm	±(0.25+0.1L/100) µm
	E_{1Z}	±(1.5+0.2L/100) µm	
Repeatability	UMAP 101/103/107	σ = 0.1 µm	σ = 0.08 µm
	UMAP 110/130	σ = 0.15 µm	σ = 0.12 µm

* Inspected to a Mitutoyo standard. L = Measured length (mm).

UMAP Stylus Dimensions



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M-NanoCoord

Micro Form Measuring System

- M-NanoCoord is an ultra-high accuracy CNC vision measuring system developed to target the micro-measurement field by applying specialised and highly sensitive sensors that enable accurate measurement of minute workpieces such as MEMS products, precision dies and moulds, and aspherical lenses.
- Vision capability is provided by the standard Quick Vision series head and this can be augmented by either of two optional, factory-fit, highly sophisticated contact sensors (UMAP or LNP).
- The extremely small styli used by the Ultrasonic Micro Probe (UMAP) have made possible highly accurate measurement of minute features not previously possible with a contact method, such as variation of diameter and straightness of a very small diameter hole.
- Touch-probe operation to a resolution of 0.25 nm over a range of 20 mm using a diamond stylus (2 µm radius) or a ruby ball (300 µm radius) in the Long-range Nano Probe (LNP) makes this sensor ideal for measurement of precision form, such as the optically polished surface of an aspherical lens.

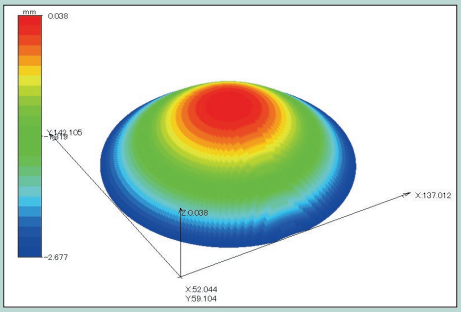
M-NanoCoord

Factory-Fit Options

UMAP Probe (Ultrasonic Micro Probe):
A system configured with this probe is especially suitable for measuring micro-sized holes. The stylus vibrates at an ultrasonic frequency and enables the UMAP probe to sense contact with minute workpiece features. Five stylus tip diameters are available, from 15 to 300 µm.

LNP Probe (Long-range Nano Probe):
LNP enables touch-probe measurement of minute workpiece features using either a conical diamond or ruby ball stylus and scanning measurement, including steeply inclined surfaces up to 80°, with the ruby ball. Measuring force is an ultra-low 10-750 µN.

Application Example (using the LNP probe)



Aspherical lens measurement result in terms of deviation from the designed profile.

Specifications

Model	M-NanoCoord
Resolution	1 nm
Measuring range (X : Y : Z)	200 : 200 : 100 mm
Camera type	High-sensitivity CCD
Accuracy (E_{1XY})*1	±(0.2+L/1000) µm
Magnification changing system	Programmable power turret
Illumination	4-quadrant LED programmable ring light
Structure	XY-plane guiding structure
Guide system	Hydrostatic air bearing
Scales	Low expansion laser holoscale

*1 Determined by Mitutoyo's inspection method. L is the measured length (mm).

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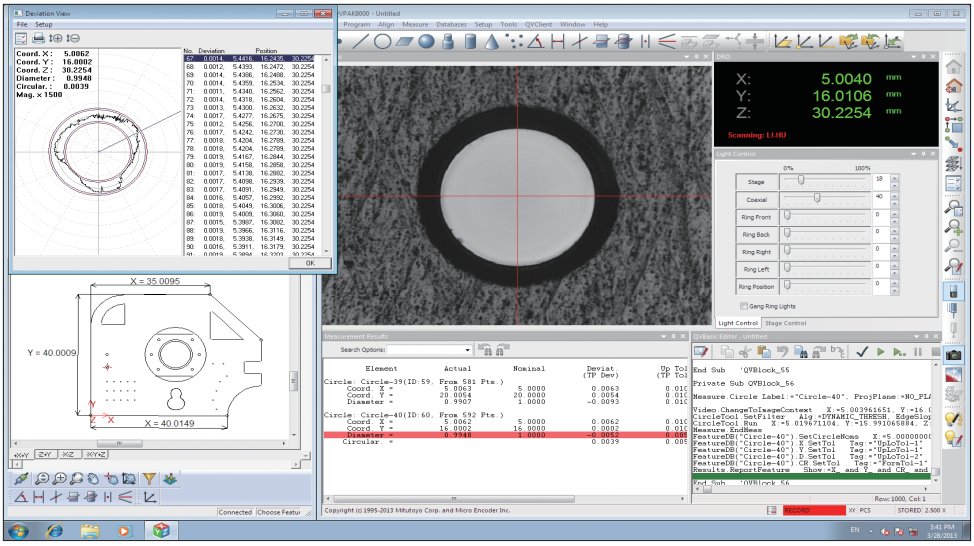
MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world metrology software
VISION

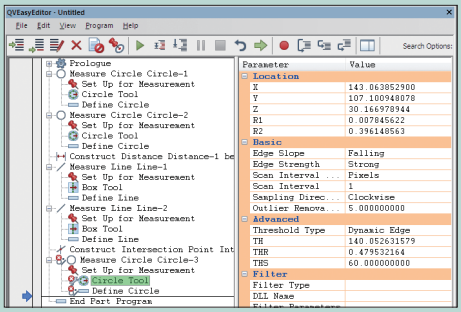
QVPAK

Software for Quick Vision Systems

- QVPAK controls multiple sensors: CCD cameras, Touch Probes, continuous scanning devices and special probes such as UMAP and LNP.
- Powerful mathematical algorithms are provided that help detect difficult edges via noise filters (similar to morphological filters) and advanced detection tools that take into account the texture of the target surface.
- Part programming and editing is made easy with the user-friendly Easy Editor.
- 3D graphic display or measuring planes display with the QVClient QVGraphic.
- QVPAK also offers various QVClients (standard), real assistants for users (programming mode) or operators (production mode) such as QVSmartEditor and QVNavigator.

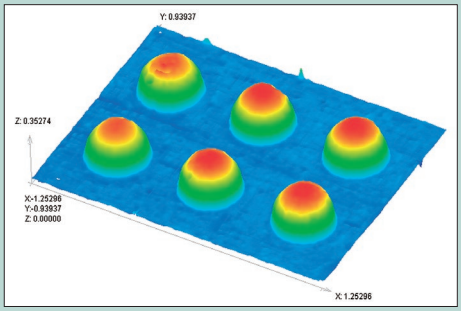


QV EasyEditor



QV EasyEditor is equipped as standard, and enables simple editing of part programs. This is the most powerful software that can be created by combining QV EasyEditor, which does not require specialized knowledge, and QV Basic Editor, which provides the full functions that satisfy software developers. This software enables users to simply correct errors occurring during program execution as well as to edit, insert, and delete part programs with ease, which reduces errors caused by variations of workpieces and man hours for program revision associated with design change.

Optional PFF Function (Points From Focus)

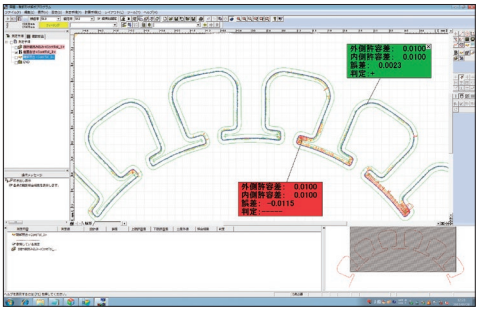


- PFF enhances the functionality of standard QV models with 3D topography measurements.
- No additional sensor necessary.
- High scanning range in Z axis from 2.7 mm up to 40.6 mm depending on the objective lens in use and in wide range mode.
- PFF is a retro-fit option for Quick Vision APEX/HYPER, Quick Vision ACCEL and Quick Vision ULTRA.
- Please contact your local Mitutoyo office for more detailed information.

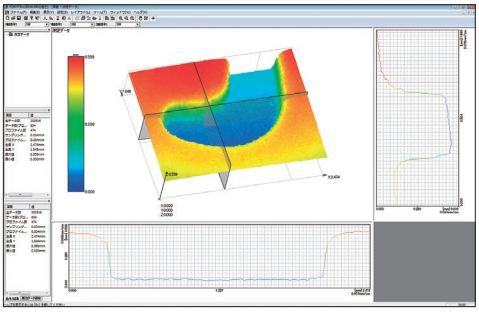
Optional Application Software

QV PartManager
Manages and controls part-programs operating on multiple workpieces arranged on the measuring stage.

FORMTRACEPAK-AP
Verifies designed values and performs form analysis on the basis of the contour data obtained via the QV auto trace tool, non-contact displacement sensor, PFF or WLI.

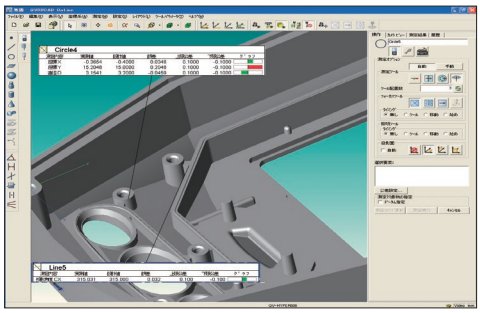


FORMTRACEPAK-PRO
Performs 3D form analysis using data obtained via a non-contact displacement sensor on a QV Hybrid series machine.



QV3DPAK
Generates 3D models from PFF (Points From Focus) or WLI (White Light Interferometer) data.

QV3DCAD-OnLine
Creates QVPAK measurement procedure programs using 3D CAD data. This allows a reduction of the man-hours needed to create part-programs and shortens lead times.



QV-CAD I/F
Displays CAD data in the graphic window to improve measurement operability.

EASYPAG PRO
Creates QVPAK measurement procedure programs using 2D CAD data. This allows users to reduce program creation man-hours and shorten lead times.

MeasureReportQV
Creates an inspection report from the QV measurement results.

MeasurLink
Enables statistical arithmetic processing of measurement results.

QVEio
This is a client application that can externally control QVPAK or provide the operating status of QVPAK by connecting a PLC or remote software on an external PC. QVEio can also connect an automatic transfer robot to a signal tower.

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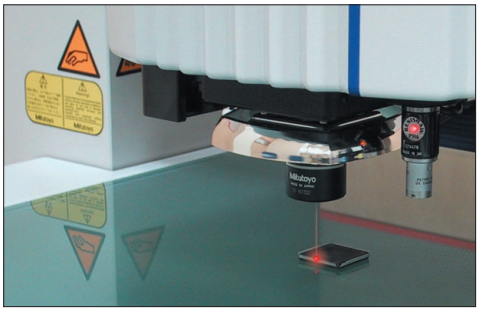
Optional Accessories

For Quick Vision Systems

Tracking Auto Focus (TAF)*[1]

- For Quick Vision Apex, Hyper, STREAM PLUS and ULTRA.
- The Tracking Auto Focus unit (TAF) allows stable, high-speed measurement in the Z direction due to the precision knife-edge method adopted in the detection system.
- The TAF function tracks the contours of the workpiece surface in the Z direction and enhances throughput compared with the normal measuring mode.
- TAF enables non-stop measurement when used on a Quick Vision Stream Plus system.

*[1] Factory-fit option



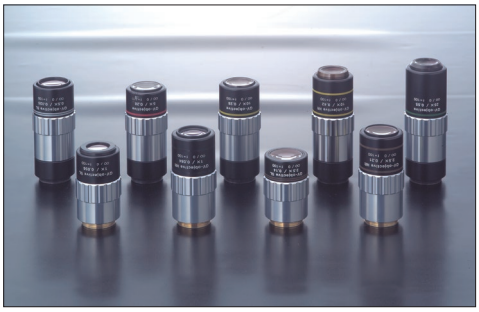
Coaxial laser Tracking Auto Focus (TAF).

Order No.	TAF-HR1X	TAF-SL1X	TAF-HR2.5X	TAF-SL2.5X	TAF-5X
Laser source	Semiconductor laser (peak wavelength: 690 nm)				
Laser safety	Class 2 (JIS C6802:2011, EN/IEC 60825-1:2007)				
Auto focus system	Objective coaxial autofocussing (knife-edge method)				
Applicable objectives	QV-HR1X	QV-SL1X	QV-HR2.5X	QV-SL2.5X	QV-5X
Tracking range*	±3.15 mm	±3.15 mm	±0.5 mm	±0.5 mm	±0.125 mm
Laser spot diameter	5.2 µm	8 µm	2.1 µm	3.1 µm	1.5 µm

* The tracking range depends on the surface texture and reflectance of a workpiece.

Objective Lenses

A wide choice of objectives enables magnification of the optical system to be specified over the range of 0.5 to 25X to provide the best match to the application. The longer working distance type is also available.



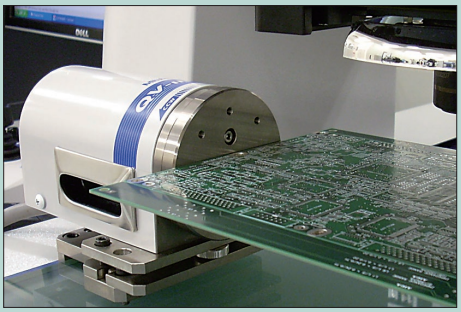
Objective	Order No.	Working distance	Turret lens magnification	Monitor magnification*[3]	Field of view
QV-SL0.5X	**02AKT199**	30.5 mm	1X	16X	12.54 x 9.4
			2X	32X	6.27 x 4.7
			6X	96X	2.09 x 1.56
QV-SL1X	**02ALA150**	52.5 mm	1X	32X	6.27 x 4.7
			2X	64X	3.13 x 2.35
			6X	192X	1.04 x 0.78
QV-SL2.5X	**02ALA170**	60 mm	1X	80X	2.49 x 1.88
			2X	160X	1.24 x 0.93
			6X	480X	0.41 x 0.31
QV-5X	**02ALA420**	33.5 mm	1X	160X	1.25 x 0.94
			2X	320X	0.62 x 0.47
			6X	960X	0.20 x 0.15
QV-SL10X	**02ALG010**	30.5 mm	1X	320X	0.62 x 0.47
			2X	640X	0.31 x 0.23
			6X	1920X	0.10 x 0.07
QV-25X	**02ALG020**	13 mm	1X	800X	0.25 x 0.18
			2X	1600X	0.10 x 0.07
			6X	4800X	0.04 x 0.03
QV-HR1X	**02AKT250**	40.6 mm	1X	32X	6.27 x 4.7
			2X	64X	3.13 x 2.35
			6X	192X	1.04 x 0.78
QV-HR2.5X	**02AKT300**	40.6 mm	1X	80X	2.49 x 1.88
			2X	160X	1.24 x 0.93
			6X	480X	0.41 x 0.31
QV-HR10X	**02AKT650**	20 mm	1X	320X	0.62 x 0.47
			2X	640X	0.31 x 0.23
			6X	1920X	0.10 x 0.07

*[3] Monitor magnifications are approximate values.

QV Index Head*[2]

Using the QV Index Head to rotate the workpiece makes it possible to automatically measure multiple surfaces without having to dismount and remount the workpiece.

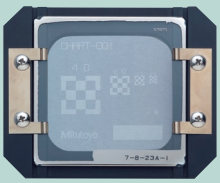
*[2] Available on 302, 404 and 606 models only.



Model	QV-INDEX
Minimum rotation angle	0.1°
Maximum rotation speed	10 rpm
Positional accuracy	±0.5°
Maximum workpiece diameter	140 mm
Maximum workpiece mass	2 kg

Calibration and Compensation Charts

These glass charts are used to compensate for differences in the pixel size of the CCD chip, autofocus accuracy and the optical axis offset at each magnification of the Programmable Power Turret (PPT).



Order No.	Description
02ATN695	Calibration chart with holder
02ATN697	Compensation chart with holder

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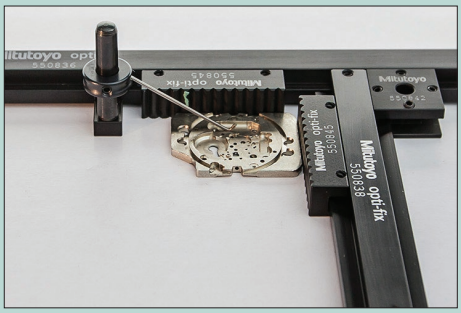
OPTI-FIX

The Modular Clamping System for Vision Measuring Systems

- The system's highly compact components are designed to enable firm retention of a workpiece in the required position during a measurement cycle without obstructing the target surface.
- Enables reliable, repeated measurements on a batch of parts or in particular positions.
- Dovetail joints are used to connect the clamping and support elements to the rails for ease of assembly and handling.
- A wide choice of set contents offers various configurations to enable adaptation to practically any part.

Application Examples

Holding a cylindrical part between centres.



Toothed location elements provide access to edges for the camera while one or more spring clips lightly clamp a part in the measurement position.

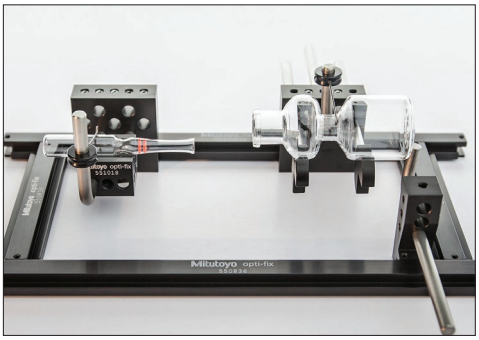
Batch measurement of identical parts simply located against connected rails.

Opti-Set Round

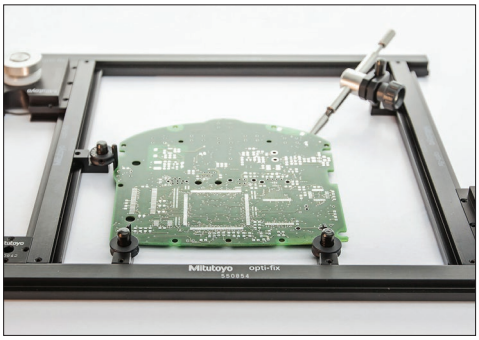
Specifications

Order No.	Set	Elements	Description
K551056	Opti-Set Start	16	Construction of a right-angled frame: 250 x 100 mm
K551056	Opti-Set Basic	26	Construction of a frame: 200 x 100 mm
K551056	Opti-Set Advanced	51	Construction of a frame: 400 x 250 mm (allows aerial positioning of parts)
K551056	Opti-Set Professional	115	Construction of a frame: 400 x 250 mm (complete and highly versatile kit)
K551056	Opti-Set Rotation	23	Construction of a frame: 250 x 200 mm (includes accessories for holding cylindrical parts)
K551056	Opti-Set Round	18	Allows aerial positioning of complex parts (supplied in a case)
K551056	Adjustable magnetic clamp	1	Holds OPTI-FIX clamping system to the stage*

* 3 clamps are required for this operation.



Dissimilar parts located and clamped ready for measurement within the same cycle.



Support and clamping of a PCB at three points to enable positive location of the irregular profile at the measurement position.

K