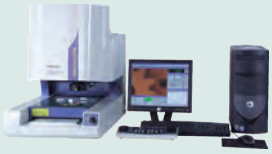
Vision Measuring Systems

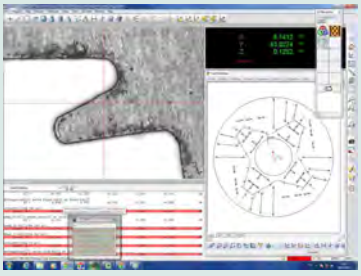
Manual 2D Vision Measuring Systems Quick Image
Page 628



Manual and CNC Vision Measuring Systems Quick Scope
Page 630

3D CNC Vision Measuring Systems Quick Vision
Page 634

3D CNC Multisensor Measuring Systems Quick Vision
Page 640



Accessories for Quick Vision Systems
Page 645

3D CNC Measuring Sysems for Micro Geometries
Page 647

Accessories for Vision Systems
Page 649

Mitutoyo

Quick Image

Series 361

This non-contact 2D vision measuring system brings you a new concept in 2D vision measuring instruments. It offers several unique features to improve the efficiency of your measurements, including:

- Long focal depth and wide field of view.
- Double telecentric optical system.
- Mega-pixel colour CCD camera.
- Large-quadrant LED ring light.

QI-A 2010B

QI-B 4020B

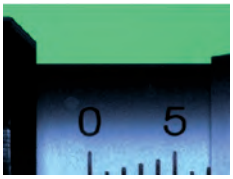
QI-A models

Model	QI-A1010B	QI-A2010B	QI-A2017B	QI-A3017B	QI-A4020B
No.	**361-822-1EU**	**361-823-1EU**	**361-824-1EU**	**361-825-1EU**	**361-826-1EU**
Travelling range X-, Y-axis [mm]	100 x 100	200 x 100	200 x 170	300 x 170	400 x 200
Travelling range Z-axis [mm]	100	100	100	100	100
Stage glass size [mm]	170 x 170	242 x 140	260 x 230	360 x 230	440 x 232
Max. stage loading kg	10	10	20	20	15
Mass kg	70	74	140	148	154

QI-B models

Model	QI-B1010B	QI-B2010B	QI-B2017B	QI-B3017B	QI-B4020B
No.	**361-832-1EU**	**361-833-1EU**	**361-834-1EU**	**361-835-1EU**	**361-836-1EU**
Travelling range X-, Y-axis [mm]	100 x 100	200 x 100	200 x 170	300 x 170	400 x 200
Travelling range Z-axis [mm]	100	100	100	100	100
Stage glass size [mm]	170 x 170	242 x 140	260 x 230	360 x 230	440 x 232
Max. stage loading kg	10	10	20	20	15
Mass kg	70	74	140	148	154

Field of view with QI-A 0.2X magnification



Field of view with QI-B 0.5X magnification

Specifications

Measuring Mode	High-resolution mode and Normal mode
Optical system working distance	90 mm
Optical system depth of focus	**High-resolution mode** : ±0,6 mm (QI-A and B) **Normal mode** : ±11 mm (QI-A) ±1,8 mm (QI-B)
Accuracy (1)	$U_{1(x,y)} = (5+8L/100)$ µm **L** = measured length (mm) (1)According to Mitutoyo inspection method
Optical system magnification	**QI-A models** : 0.2X **QI-B models** : 0.5X
CCD camera	1.3 Megapixels colour CCD camera
Illumination	- Contour - Coaxial - 4-quadrant LED ring light

Optional accessories

No.	Description
937179T.	Footswitch
12AAJ088.	Reinforced footswitch

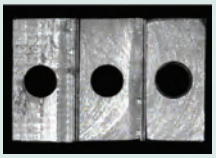


Image of a stepped block using the double telecentric objective showing the orthographic view produced.

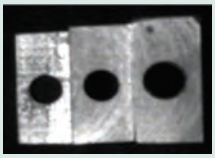


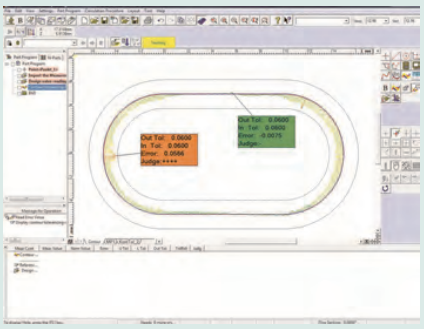
Image of the same object using a standard objective

Refer to the Quick Image brochure

Software for Quick Image Systems

Specifications

QIPAK	MEASURLINK
Additional software	(refer to the Measurlink page)
(optional)	
	QS CAD-IMPORT/EXPORT
	FORMPAK-QV [1]

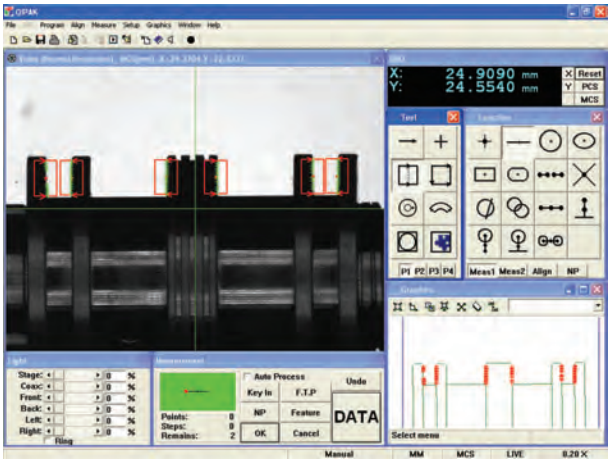


[1] FORMPAK-QV
Simple and easy-to-use 2D contour analysis.
Graphic reports (geometry or scanning) edition.
Allows measurement by comparison.
For more information refer to FORMTRACEPAK.

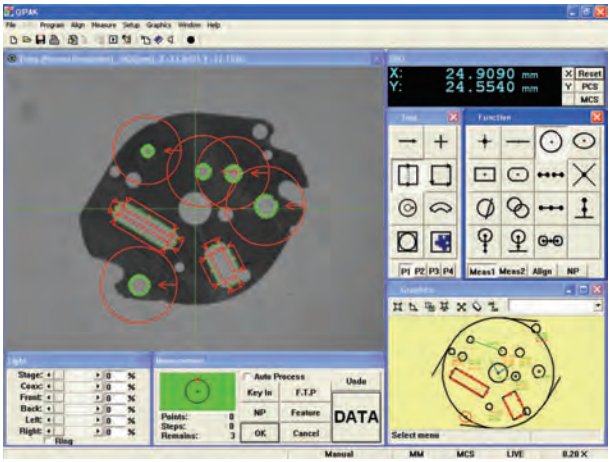
QIPAK

- Single mouse-click edge-detection tools; very easy to use.
- Template tools for comparative analysis.
- Video image capture.
- Stage navigation function gives improved measurement cycles.

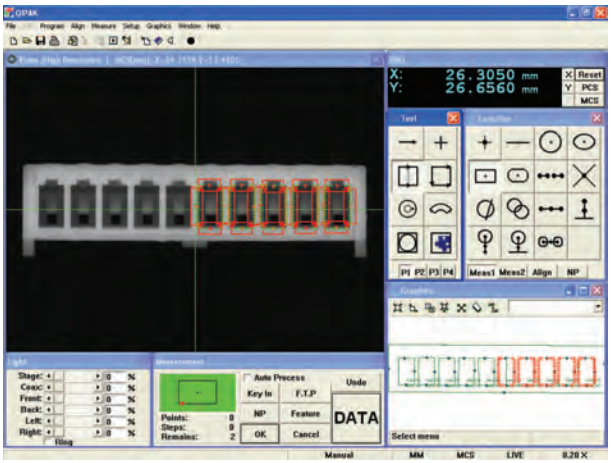
No.	Type
QIPAK	Software for Quick Image Systems



Example 1 screen layout QIPAK



Example 2 screen layout QIPAK



Example 3 screen layout QIPAK

Mitutoyo

Manual Quick Scope QS-L Series

Series 359

This manual vision measuring system is an excellent surface observation system which you can use on a wide variety of workpieces.
The Quick Scope offers you the following benefits:

- 0,1 µm resolution and 150 mm Z-axis range.
- Power zoom enabling you to change magnification change quickly and easily.
- Fine illumination capability enabling you to change lighting to match your workpiece requirements.
- A quick release system on the stage, so you can switch instantly between coarse and fine movement.
- Quick navigation function allowing you to repeat measurements quickly.
- An auto-focus function available for QS-L AFB models.

QS-L 2010 Zoom AF

QS-L 2010 models
- Range : 200 x 100 x 150 mm

Type	QS-L Zoom	QS-L Zoom AF
No.	**359-710-1D**	**359-703D**
Model	QS-L2010ZB	QS-L2010ZAFB
Sensor type	Colour CMOS 3 Megapixels	Colour CCD
AF (motorized Z-axis)	-	Yes
Objective lens	Zoom type	Zoom type
Magnification (optical system)	0.75X -> 5.25X	0.5X -> 3.5X
Magnification (48 cm monitor)	30X -> 208X	28X -> 193X
Z-axis measurement	Manual with software assisted contrast level	Motorized with AF
Max. stage loading kg	10	10
Mass kg	72	66

QS-L 3017 models
- Range : 300 x 170 x 150 mm

Type	QS-L Zoom	QS-L Zoom AF
No.	**359-711-1D**	**359-704D**
Model	QS-L3017ZB	QS-L3017ZAFB
Sensor type	Colour CMOS 3 Megapixels	Colour CCD
AF (motorized Z-axis)	-	Yes
Objective lens	Zoom type	Zoom type
Magnification (optical system)	0.75X -> 5.25X	0.5X -> 3.5X
Magnification (48 cm monitor)	30X -> 208X	28X -> 193X
Z-axis measurement	Manual with software assisted contrast level	Motorized with AF
Max. stage loading kg	20	20
Mass kg	140	134

Specifications

Accuracy[1]	$E_{1(x,y)}$= (2,5+2L/100) µm **L**=measured length (mm) [1]According to Mitutoyo inspection method
Illumination	- Contour - Coaxial - Ring Light

Optional accessories

No.	Description
937179T.	Footswitch
12AAJ088.	Reinforced footswitch
02AKN020.	Calibration chart

Refer to the Optical Accessories page for Quick Scope / Quick Vision for more information on calibration charts.

Quick Scope brochure on request

Manual Quick Scope QS-L Series

QS-L 4020 models
- Range : 400 x 200 x 150 mm

Type	QS-L Zoom	QS-L Zoom AF
No.	**359-712-1D**	**359-705D**
Model	QS-L4020ZB	QS-L4020ZAFB
Sensor type	Colour CMOS 3 Megapixels	Colour CCD
AF (motorized Z-axis)	-	Yes
Objective lens	Zoom type	Zoom type
Magnification (optical system)	0.75X -> 5.25X	0.5X -> 3.5X
Magnification (48 cm monitor)	30X -> 208X	28X -> 193X
Z-axis measurement	Manual with software assisted contrast level	Motorized with AF
Max. stage loading kg	15	15
Mass kg	146	140

QS-L 3017 Zoom AF

CNC Quick Scope QS Series

Series 359

With this CNC vision measuring system you can meet a variety of measurement needs.
The Quick Scope offers you the following benefits:

- You can configure the QS lighting for different measurement needs thanks to the surface, contour and fibre-optic ring light illumination.
- The powerful, Windows® based QSPAK software is easy to use and offers you a wide spectrum of measuring and analysis capabilities.
- You can make use of a range of functions including zoom, auto-focus, part program generation, one-click edge detection, graphic display, 48 different macros and a pattern matching function for several common part features.
- You can control the stage with your mouse, through the optional joystick box or the multi-function control box.

QS-250 Zoom CNC

QS-250Z

Type	QS-250 Zoom
No.	**359-508-9EU**
Range (X, Y, Z-axis) with Vision Head	200 x 250 x 100 mm
Accuracy[1]	$E_{1(x,y)}$= (2,5+0,6L/100) µm **L**=measured length (mm)
Sensor type	Colour CCD
Objective lens	Zoom type
Magnification (optical system)	0.5X -> 3.5X
Magnification (48 cm monitor)	28X -> 193X
AF (motorized Z-axis)	Yes
Z-axis measurement	Motorized with AF
Stage glass size [mm]	269 x 311 mm
Max. stage loading kg	10
Mass kg	76

[1]According to Mitutoyo inspection method

Specifications

Illumination	- Contour - Coaxial - Ring Light

Optional accessories

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

Refer to the Optical Accessories page for Quick Scope / Quick Vision for more information on calibration charts.

Control box 2

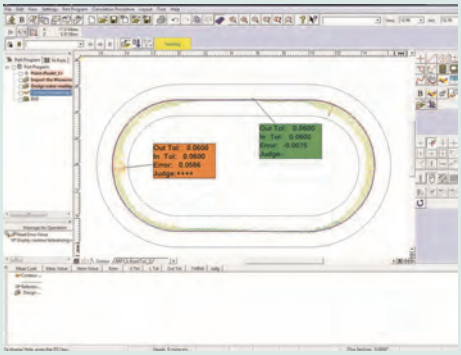
Joystick XYZ

Quick Scope brochure on request

Software for Quick Scope Systems

Specifications

QIPAK Additional software (optional)	MEASURLINK (refer to the Measurlink page) QS CAD-IMPORT/EXPORT FORMPAK-QV(1) EASYPAG (only for QS CNC)

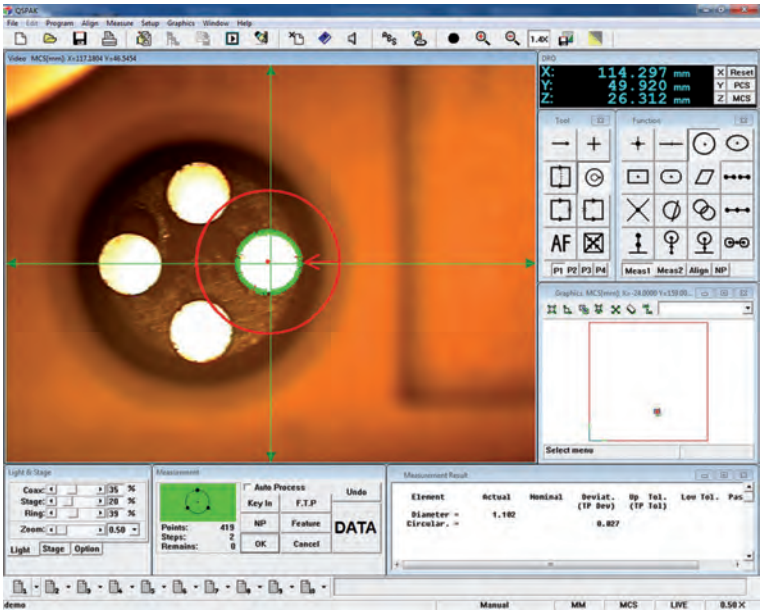


(1) FORMPAK-QV
Simple and easy-to-use 2D contour analysis.
Graphic reports (geometry or scanning) edition.
Allows measurement by comparison.
For more information refer to FORMTRACEPAK.

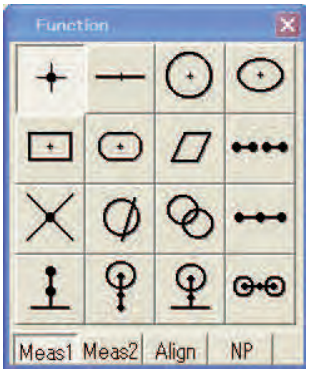
QSPAK

- Single mouse-click edge-detection tools that you will find very easy to use.
- Template tools for comparative analysis.
- Video image capture.
- Stage navigation function for CNC machines giving you improved measurement cycles.

No.	Type
QSPAK	Software for Quick Scope systems



Example screen layout QSPAK



Measurement item commands

Coordinate system creation commands

Mitutoyo

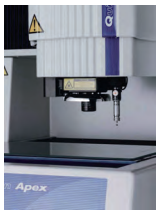
Quick Vision ELF Series

Series 363

You will find this CNC Vision Measuring System ideal for installations anywhere that you have limited space, due to its controller-integrated compact design.
The Quick Vision ELF offers you the following benefits:

- On a small footprint, this series offers you full functionallity including programmable ringlight (PRL) and power turret.
- The pattern focus enables you to make measurements in the Z-axis with the Auto Focus tools (refer to QV-ACCEL) on low contrast, transparent or mirrored surfaces.
- Models with code no. ***-***-2SEU have accuracy specifications conforming to ISO 10360-7 (on request) and temperature compensation.

Quick Vision ELF 202 (QV-E202P1L)

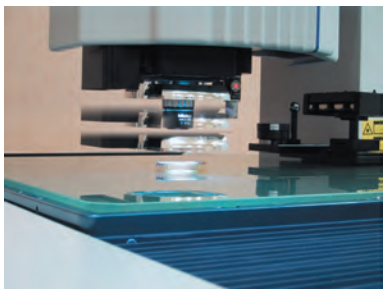


Touch Probe option

Remark:
Code numbers ending with 2SEU are for machines conform ISO 10360-7 specifications and temperature compensation function (manual)

Type	QV-E202P1L-C	QV-E202L1L-C	QVT1-E202P1L-C	QVT1-E202L1L-C
No.	**363-105-1EU 363-105-2SEU**	**363-106-1EU 363-106-2SEU**	**364-105-1EU 364-105-2SEU**	**364-106-1EU 364-106-2SEU**
Laser Auto Focus (TTL) (2)	-	●	-	●
LAF Repeatability (σ)	-	0.4	-	0.4
Touch Probe Option (2) (TP)	-	-	●	●

(2) **Factory Option**



PRL = Programmable Ring Light
Fine control of angle and direction provides illumination for optimal measurement. You can set the angle 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.

Specifications

Range (X, Y, Z-axis) with Vision Head	250 x 200 x 200 mm
Resolution	0.1 µm
Accuracy (1)	$E_{1(x,y)}$ = (2+0.3L/100) µm $E_{1(z)}$ = (3+0.5L/100) µm L = measured length (mm) (1) According to Mitutoyo inspection method
Illumination (White LED)	- Contour - Coaxial - 4-quadrant PRL **(PRL : see Programmable Ring Light on this page)**
Optical system	Programmable Power Turret (PPT) 1X ; 2X ; 6X
Stage glass size	311 x 269 mm
Max. stage loading	15 kg
Mass	205 kg

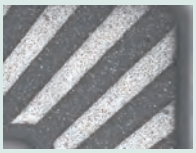
Additional Specifications

Factory option	**- Series 364 (TP)** Touch Probe option **- Laser Auto Focus (LAF)** Refer to Quick Vision Accessories
Additional objective lenses	Refer to the Optical Accessories page for Quick Scope / Quick Vision

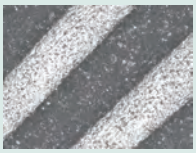
Optional accessories

No.	Description
02ATP623.	Machine stand for QV-ELF
02AKN020.	Calibration chart
02ATN695.	Calibration chart with holder

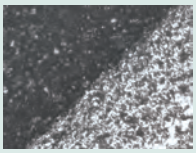
Refer to the Optical Accessories page for Quick Scope / Quick Vision for more information on calibration charts.



1X tube lens and 2.5X objective Field of View : 2.5 x 1.88 mm



2X tube lens and 2.5X objective Field of View : 1.25 x 0.94 mm



6X tube lens and 2.5X objective
Field of view: 0.41 x 0.31 mm
Programmable power turret (PPT) - 1X ; 2X ; 6X
The three tube lens selection provides three magnification levels while using the same objective lens. Replacement lenses allow a wide range of magnifications to support a variety of measurements.

Quick Vision brochure on request

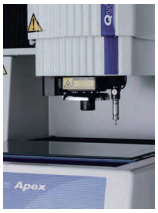
Quick Vision APEX / HYPER Series

Series 363

This CNC Vision Measuring System is a floor-standing CNC vision measuring machine which offers you the following benefits:

- Four-colour LED coaxial lighting.
- Programmable 4-quadrant, 4-colour LED ring light.
- Pattern focus function (refer to Quick Vision ACCEL page).
- Accuracy specifications conforming to ISO 10360-7 standard (on request).
- Temperature compensation as standard feature.

Quick Vision Apex 302 PRO



Touch Probe option

Specifications

Optical system	Programmable Power Turret (PPT)
Magnification	1X ; 2X ; 6X
Illumination	**LED:** - Contour (White) - Coaxial (RGB) - 4 quadrant PRL (RGB) PRL: Refer to QV-ELF page for details)
Sensor Type	**QV PRO Models:** High sensitivity CCD B&W 380.000 pixels **QV PRO3 Models:** High Sensitivity CCD Colour 270.000 pixels
Factory option	**- For QV APEX and QV HYPER** Laser Auto Focus (LAF) Touch probe (TP) - Series 364. **- For QV APEX** Colour CCD camera. **Laser Auto Focus (LAF)** Refer to the Quick Vision Accessories page for details.
Additional objective lenses	Refer to the Optical Accessories page for Quick Scope / Quick Vision

Optional accessories

No.	Description
Calibration charts	
02AKN020.	Calibration chart
02ATN695.	Calibration chart with holder
Machine stands	
02ATN332.	Machine Stand for QV-302
02ATN333.	Machine Stand for QV-404
02ATN334.	Machine Stand for QV-606

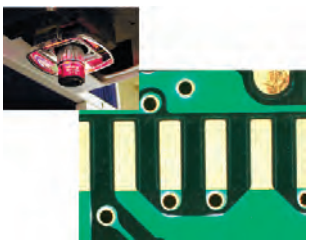
Refer to the Optical Accessories page for Quick Scope / Quick Vision for more information on calibration charts.

Refer to the Quick Vision brochure

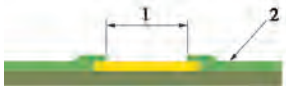
RGB illumination

Changing the illumination colour to red, green, blue or white (synthesized) allows detection of edges which could not be detected with conventional white light.

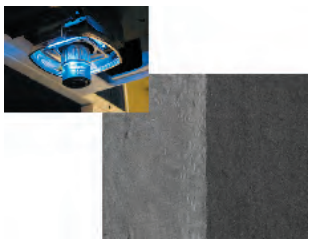
Application examples of RGB Colour Illumination :



Dimension of resist aperture on a printed circuit board



1 Resist aperture dimension
2 Resist



Boundary between chrome and gold-plated surfaces

Mitutoyo

Quick Vision APEX / HYPER Series

Series 363

Quick Vision brochure on request

Quick Vision 302
Range : 300 x 200 x 200 mm

Type	Quick Vision APEX 302 PRO	Quick Vision APEX 302 PRO3	Quick Vision HYPER 302 PRO
No.	**363-111-2SEU**	**363-113-1EU**	**363-114-2SEU**
Model	QV-X302P1L-C	QV-X302P3N-C	QV-H302P1L-C
Resolution µm	0.1	0.1	0.02
Accuracy(1)	$E_{1(x, y)} = (1,5+0,3L/100)$ $E_{1(z)} = (1,5+0,4L/100)$ $E_{2(xy)} = (2+0,4L/100)$	$E_{1(x, y)} = (1,5+0,3L/100)$ $E_{1(z)} = (1,5+0,4L/100)$ $E_{2(xy)} = (2+0,4L/100)$	$E_{1(x, y)} = (0,8+0,2L/100)$ $E_{1(z)} = (1,5+0,2L/100)$ $E_{2(xy)} = (1,4+0,3L/100)$
Max. stage loading kg	20	20	15
Mass kg	360	360	360

(1) According to Mitutoyo inspection method **L** = measured length (mm)

Quick Vision 404
Range : 400 x 400 x 250 mm

Type	Quick Vision APEX 404 PRO	Quick Vision APEX 404 PRO3	Quick Vision HYPER 404 PRO
No.	**363-131-2SEU**	**363-133-1EU**	**363-134-2SEU**
Model	QV-X404P1L-C	QV-X404P3N-C	QV-H404P1L-C
Resolution µm	0.1	0.1	0.02
Accuracy(1)	$E_{1(x, y)} = (1,5+0,3L/100)$ $E_{1(z)} = (1,5+0,4L/100)$ $E_{2(xy)} = (2+0,4L/100)$	$E_{1(x, y)} = (1,5+0,3L/100)$ $E_{1(z)} = (1,5+0,4L/100)$ $E_{2(xy)} = (2+0,4L/100)$	$E_{1(x, y)} = (0,8+0,2L/100)$ $E_{1(z)} = (1,5+0,2L/100)$ $E_{2(xy)} = (1,4+0,3L/100)$
Max. stage loading kg	40	40	30
Mass kg	579	579	579

(1) According to Mitutoyo inspection method **L** = measured length (mm)

Quick Vision 606
Range : 600 x 650 x 250 mm

Type	Quick Vision APEX 606 PRO	Quick Vision APEX 606 PRO3	Quick Vision HYPER 606 PRO
No.	**363-151-2SEU**	**363-153-1EU**	**363-154-2SEU**
Model	QV-X606P1L-C	QV-X606P3N-C	QV-H606P1L-C
Resolution µm	0.1	0.1	0.02
Accuracy(1)	$E_{1(x, y)} = (1,5+0,3L/100)$ $E_{1(z)} = (1,5+0,4L/100)$ $E_{2(xy)} = (2+0,4L/100)$	$E_{1(x, y)} = (1,5+0,3L/100)$ $E_{1(z)} = (1,5+0,4L/100)$ $E_{2(xy)} = (2+0,4L/100)$	$E_{1(x, y)} = (0,8+0,2L/100)$ $E_{1(z)} = (1,5+0,2L/100)$ $E_{2(xy)} = (1,4+0,3L/100)$
Max. stage loading kg	50	50	40
Mass kg	1,450	1,450	1,450

(1) According to Mitutoyo inspection method **L** = measured length (mm)

Quick Vision Apex 606 PRO

Quick Vision STREAM PLUS Series

Series 363

This CNC vision measuring system enables you to carry out measurements at lightning speed. The Quick Vision Stream Plus offers you the following benefits:

- Non-stop measurement in your production environment thanks to high-tech lighting options.
- Combining quadricolour and stroboscopic lighting, it captures and processes all the workpiece images you need to make accurate and rapid measurements.

Specifications

Resolution	0.1 µm
CCD camera	High-sensitivity B&W, progressive scan CCD
Accuracy (1)	$E_{1(x,y)}$ = (1,5+0,3L/100) µm $E_{1(z)}$ = (1,5+0,4L/100) µm $E_{2(xy)}$ = (2+0,4L/100) µm L = measured length (mm) (1) According to Mitutoyo inspection method
Illumination	Hi-intensity LED (stroboscopic and continuous illumination, switchable) : - Contour (Blue) - Coaxial (RGB & W) - 4-quadrant PRL (RGB & W) **(PRL : refer to the QV-ELF page)** Pattern focus function **(Pattern focus : refer to the QV-ACCEL page)**
Magnification change system	Programmable Power Turret (PPT) 1X ; 2X ; 6X

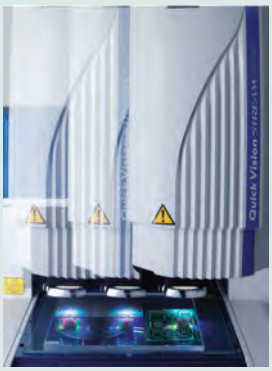
Additional Specifications

Factory option	**- Laser Auto Focus (LAF)** (Refer to Quick Vision Accessories for details)
Additional objective lenses	Refer to the Optical Accessories page for Quick Scope / Quick Vision

Optional accessories

No.	Description
Calibration charts	
02AKN020.	Calibration chart
02ATN695.	Calibration chart with holder
Machine stands	
02ATN332.	Machine Stand for QV-302
02ATN333.	Machine Stand for QV-404
02ATN334.	Machine Stand for QV-606

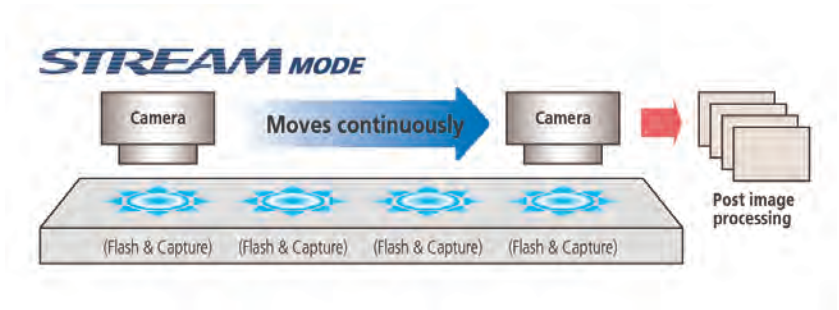
Refer to the Optical Accessories page for Quick Scope / Quick Vision for more information on calibration charts.



Non-stop vision measurement

Refer to the Quick Vision brochure

Quick Vision STREAM PLUS 606 PRO



STREAM Mode

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

Type	Quick Vision STREAM PLUS 302	Quick Vision STREAM PLUS 404	Quick Vision STREAM PLUS 606
No.	**363-116-1EU**	**363-136-1EU**	**363-156-1EU**
Range (X, Y, Z-axis) with Vision Head	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Max. measuring speed	40 mm/s	40 mm/s	40 mm/s
Max. drive speed (X-, Y-, Z-axis)	300 mm/s	**XY :** 400 mm/s **Z :** 300 mm/s	**XY :** 400 mm/s **Z :** 300 mm/s

Other features are identical to QV-APEX

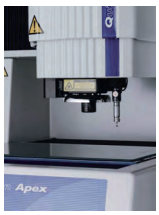
Mitutoyo

Quick Vision ACCEL Series

Series 363

This CNC vision measuring system is a moving-bridge type structure.
The Quick Vision ACCEL offers you the following benefits:

- The moving-bridge type structure results in a fixed stage. This means that the workpiece fixture can be designed more simply, which in turn means you need significantly fewer man-hours for fixture fabrication and inspection.
- The system comes complete with a machine stand.
- Your factory options are Laser Auto Focus (LAF) and Touch Probe (TP).



Touch Probe option

Quick Vision ACCEL 1212 PRO3

Model PRO	QV ACCEL 808 PRO	QV ACCEL 1010 PRO	QV ACCEL 1212 PRO	QV ACCEL 1517 PRO3
No.	**363-312EU**	**363-332EU**	**363-352EU**	**363-372EU**
Model PRO3	QV ACCEL 808 PRO3	QV ACCEL 1010 PRO3	QV ACCEL 1212 PRO3	QV ACCEL 1517 PRO3
No.	**363-314EU**	**363-334EU**	**363-354EU**	**363-374EU**
Range (X, Y, Z-axis) with Vision Head	800 x 800 x 150 mm	1000 x 1000 x 150 mm	1250 x 1250 x 100 mm	1500 x 1750 x 100 mm
Max. drive speed X, Y-axis mm/s	400	400	300	300
Accuracy E1(x,y) (3)	(1,5+0,3L/100) µm	(1,5+0,3L/100) µm	(2,2+0,3L/100) µm	(2,2+ 0,3L/100) µm
Stage glass size [mm]	883 x 958	1186 x 1186 mm	1440 x 1440 mm	1714 x 1968 mm
Max. stage loading kg	10	30	30	30
Mass kg	2,570	2,950	3,600	4,500

(3) According to Mitutoyo inspection method **L** = measured length (mm)
For a description of PRO and PRO3 models, refer to QV-APEX

Quick Vision brochure on request

Specifications

Resolution	0,1 µm
High-sensitivity CCD camera	**PRO models** : B&W **PRO3 models** : Colour
Contour illumination	**PRO models** : LED, White **PRO3 models** : Halogen (cold light)
Coaxial illumination	**PRO models** : LED, RGB **PRO3 models** : Halogen (cold light)
4-quadrant PRL (1) illumination	**PRO models** : LED, RGB **PRO3 models** : Halogen (cold light) **(1) PRL : refer to the QV-ELF page**
Pattern Focus (2)	**(2) Refer to the QV-ACCEL page**
Magnification change system	Programmable Power Turret (PPT) 1X ; 2X ; 6X

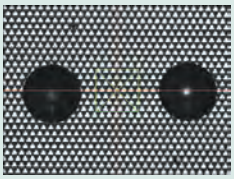
Additional Specifications

Factory option	**- Touch Probe (TP)** Series 364- **Laser Auto Focus (LAF)** Refer to Quick Vision accessories
Additional objective lenses	Refer to the Optical Accessories page for Quick Scope / Quick Vision

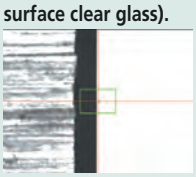
Optional accessories

No.	Description
02AKN020.	Calibration chart
02ATN695.	Calibration chart with holder

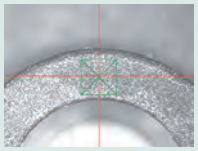
Refer to the Optical Accessories page for Quick Scope / Quick Vision for more information on calibration charts.



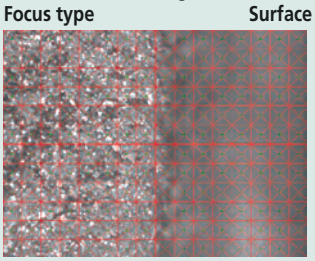
Auto Focus Tool : type Pattern Focus (focusing for option difficult surfaces such as mirrors, polished surface clear glass).



Auto Focus Tool : Edge Focus type



Auto Focus Tool : Surface Focus type



Auto Focus Tool : Multi-point Auto Focus type

Quick Vision ULTRA

Series 363

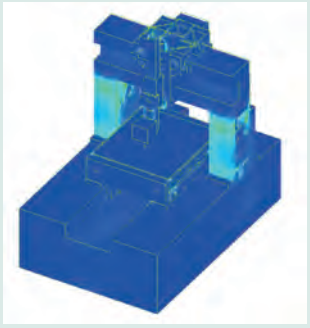
This CNC vision measuring system gives you ultra-high accuracy.
The Quick Vision ULTRA offers you the following benefits:

- Axial translation straightness is maximised through the use of a precision air-bearing linear guide system.
- High resolution (0,01 µm) scales, manufactured at an ultra-precision facility located 11 m underground, are used on all axes.
- The scales are made from glass that has a virtually zero thermal expansion coefficient, so your measuring accuracy has minimal variation in changing temperatures.
- The base structure was designed using Finite Element Method analysis; this gives you the optimal stiffness/weight ratio combined with excellent geometrical stability, in terms of axial straightness/ perpendicularity, with changing temperatures.
- Accuracy specification conforming to ISO 10360-7 are available (on request).

Quick Vision ULTRA 404 PRO

Additional Specifications

Factory option	**- Laser Auto Focus (LAF)** Refer to Quick Vision Accessories page
Additional objective lenses	Refer to Objective page for Quick Scope / Quick Vision



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

Ultra-precision scale manufacturing facility 11 metres underground

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

Quick Vision brochure on request

Type	Quick Vision ULTRA 404 PRO
No.	**363-511-2SEU**
Range (X, Y, Z-axis) with Vision Head	400 x 400 x 200 mm
Accuracy (1)	$E_{1(x,y)}$ = (0,25+0,1L/100) µm $E_{1(z)}$ = (1,5+0,2L/100) µm $E_{2(xy)}$ = (0,5+0,2L/100) µm L = measured length (mm)
Resolution µm	0.01
Magnification change system	Programmable Power Turret (PPT) 1X ; 2X ; 6X
Dimensions (W x D x H) (2) mm	1200 x 1735 x 1910
CCD camera	High-sensitivity CCD B&W 380,000 pixels
Max. drive speed (X-, Y-, Z-axis)	150 mm/s
Illumination	Halogen (Cold light via optical fibre) - Contour - Coaxial - 4-quadrant PRL (PRL : refer to the QV-ELF page)
Max stage loading [kg]	40
Stage glass size [mm]	493 x 551
Mass (2) kg	2,025

(1) According to Mitutoyo inspection method.
(2) Including machine stand

Mitutoyo

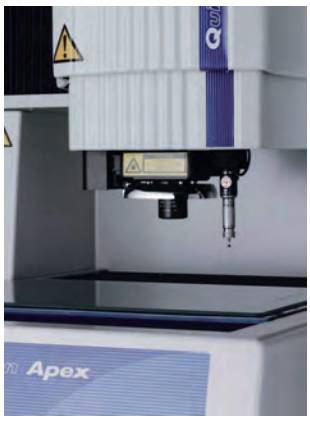
Quick Vision TP Series

Series 364

This touch probe is available in a range of options.
These include:

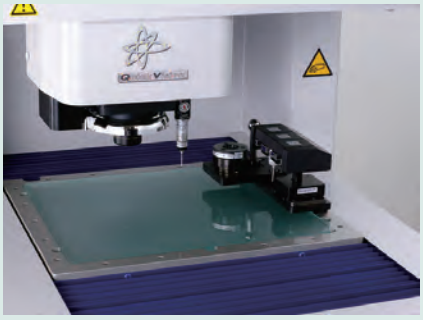
- A factory fitted option.
- Availability for Quick Vision-ELF ; Quick Vision-APEX ; Quick Vision-HYPER ; Quick Vision-ACCEL.
- The Quick Vision-TP system allows you to carry out both non-contact and contact measuring.
- Compatible with Renishaw Touch Probe TP 20 or TP 200.
- An optional fully equipped MCR20 rack where you can store probe modules.

Quick Vision-ELF with Touch Probe option



Touch Probe

Quick Vision-APEX with Touch Probe option



Glass stage of a Quick Vision-ELF with Touch Probe and change rack

Quick Vision Accel models

QV-APEX and HYPER models

Quick Vision-ELF models

Refer to the Quick Vision brochure

Quick Vision HYBRID Type 1 Series

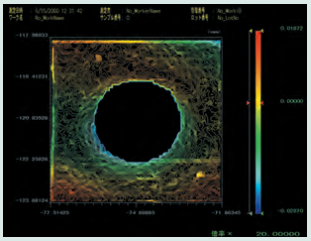
Series 365 - CNC Vision Measuring System

This CNC vision measuring system is a multi-sensor machine.
The Quick Vision HYBRID Type 1 offers you the following benefits:

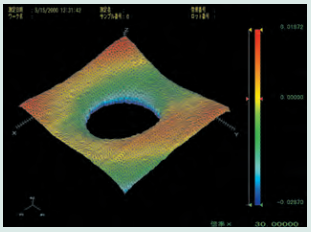
- It allows you to make vision measurements with a CCD camera, and carry out high-speed scanning, by applying a vision measurement unit in parallel with a non-contact displacement sensor.
- The focusing point method minimises the difference in the measuring face reflectance and gives you high measurement reproducibility.
- The double pinhole method (less directivity) is employed as the measurement principle.

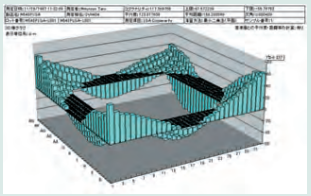
Specifications

Factory option	**- Colour CCD camera** With halogen illumination

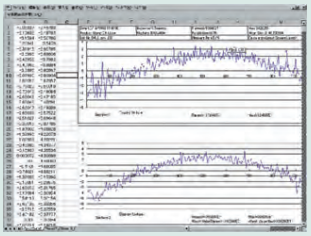


Curved-form analysis (MSHAPE-QV)
2D / 3D contour lines display
2D / 3D unfiltered profile display
Shadowgraph display
Curved plane analysis
Unfiltered profile analysis, etc.





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



Quick Vision H1 APEX 404 PRO

Quick Vision Hybrid system - Type 1

The scanning laser system for Quick Vision HYBRID 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. The double pinhole detection method is adopted to prevent measurement being affected by the colour, reflection factor, etc., of the surface.

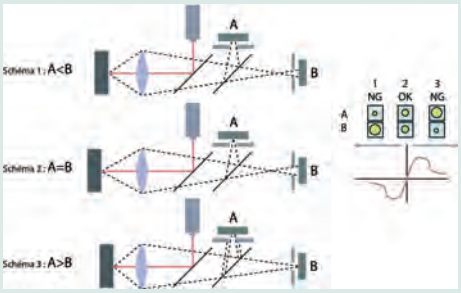
Available for Quick Vision APEX ; Quick Vision STREAM PLUS ; Quick Vision HYPER and Quick Vision ACCEL models.

Quick Vision brochure on request

Mitutoyo

Quick Vision HYBRID Type 1 Series

Series 365 - CNC Vision Measuring System



QV-Hybrid Type 1 : Laser principle, double pinhole method

Quick Vision ACCEL-based

Accuracy when using vision sensor: Same as standard Quick Vision ACCEL

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,3L/100) µm [1]

Type	Quick Vision H1 ACCEL 808	Quick Vision H1 ACCEL 1010	Quick Vision H1 ACCEL 1212	Quick Vision H1 ACCEL 1517
No.	**365-313EU**	**365-333EU**	**365-353EU**	**365-373EU**
Range - Vision	800 x 800 x 150 mm	1000 x 1000 x 150 mm	1250 x 1250 x 100 mm	1500 x 1750 x 100 mm
Range - Non-contact Displacement Sensor (Type 1)	680 x 800 x 150 mm	880 x 1000 x 150 mm	1130 x 1250 x 100 mm	1380 x 1750 x 100 mm

Quick Vision APEX-based

Accuracy when using vision sensor: Same as standard Quick Vision APEX

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,3L/100) µm [1]

Type	Quick Vision H1 APEX 302	Quick Vision H1 APEX 404	Quick Vision H1 APEX 606
No.	**365-111-2SEU**	**365-131-2SEU**	**365-151-2SEU**
Range - Vision	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Range - Non-contact Displacement Sensor (Type 1)	180 x 200 x 200 mm	280 x 400 x 250 mm	480 x 650 x 250 mm

Quick Vision HYPER-based

Accuracy when using vision sensor: Same as standard Quick Vision HYPER

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,2L/100) µm [1]

Type	Quick Vision H1 HYPER 302	Quick Vision H1 HYPER 404	Quick Vision H1 HYPER 606
No.	**365-114-2SEU**	**365-134-2SEU**	**365-154-2SEU**
Range - Vision	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Range - Non-contact Displacement Sensor (Type 1)	180 x 200 x 200 mm	280 x 400 x 250 mm	480 x 650 x 250 mm

Quick Vision STREAM PLUS-based

Accuracy when using vision sensor: Same as standard Quick Vision STREAM PLUS

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,3L/100) µm [1]

Type	Quick Vision H1 STREAM PLUS 302	Quick Vision H1 STREAM PLUS 404	Quick Vision H1 STREAM PLUS 606
No.	**365-115-1EU**	**365-135-1EU**	**365-155-1EU**
Range - Vision	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Range - Non-contact Displacement Sensor (Type 1)	180 x 200 x 200 mm	280 x 400 x 250 mm	480 x 650 x 250 mm

Other features similar to those of corresponding QV series

[1] According to Mitutoyo inspection method

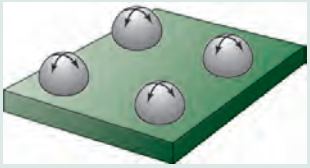
L = measured length (mm)

Quick Vision HYBRID Type 3 Series

Hybrid Type 3 system

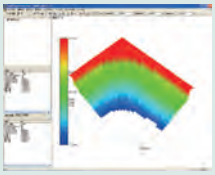
The Quick Vision Hybrid Type 3 is a machine which allows vision measurement with both a CCD camera and high-speed scanning by applying a vision measurement unit in parallel with a non-contact displacement sensor.

Available for Quick Vision APEX ; Quick Vision STREAM PLUS and Quick Vision HYPER models.

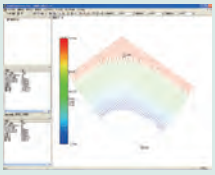


Measurement of BGA/CSP bump height

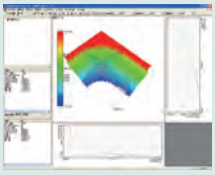
Form analysis of plastic molded parts having a slope.



Solid colour display



Shaped display



Extraction of arbitrary section

Series 365 - CNC Vision Measuring System

- The Quick Vision HYBRID type 3 is a multi-sensor machine that enables the topography of the surface and the thickness of transparent objects to be measured.
- The measuring range of the scanning sensor is 0-1200 µm.
- Effective even for high inclination angles both of mirrored surfaces and diffuse surfaces. Maximum tracking inclination angle : ±87° (diffuse surface).
- Achieves high resolution and high accuracy height measurement by the wavelength confocal method using axial chromatic aberration.

Quick Vision H3 HYPER 404 PRO

1: QV APEX-based

Accuracy when using vision sensor: Same as standard Quick Vision APEX

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,3L/100) µm[(1)]

Type	Quick Vision H3 APEX 302	Quick Vision H3 APEX 404	Quick Vision H3 APEX 606
No.	**365-211-1EU**	**365-231-1EU**	**365-251-1EU**
Range (X, Y, Z-axis) with Vision Head	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Range - Non-contact Displacement Sensor (Type 3)	176 x 200 x 200 mm	276 x 400 x 250 mm	476 x 650 x 250 mm

2: QV STREAM PLUS-based

Accuracy when using vision sensor: Same as standard Quick Vision STREAM PLUS

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,3L/100) µm[(1)]

Type	Quick Vision H3 STREAM PLUS 302	Quick Vision H3 STREAM PLUS 404	Quick Vision H3 STREAM PLUS 606
No.	**365-215-1EU**	**365-235-1EU**	**365-255-1EU**
Range (X, Y, Z-axis) with Vision Head	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Range - Non-contact Displacement Sensor (Type 3)	176 x 200 x 200 mm	276 x 400 x 250 mm	476 x 650 x 250 mm

3: QV HYPER-based

Accuracy when using vision sensor: Same as standard Quick Vision HYPER

Accuracy $E_{1(z)}$ when using non-contact displacement sensor: (1,5+0,2L/100) µm[(1)]

Type	Quick Vision H3 HYPER 302	Quick Vision H3 HYPER 404	Quick Vision H3 HYPER 606
No.	**365-214-1EU**	**365-234-1EU**	**365-254-1EU**
Range (X, Y, Z-axis) with Vision Head	300 x 200 x 200 mm	400 x 400 x 250 mm	600 x 650 x 250 mm
Range - Non-contact Displacement Sensor (Type 3)	176 x 200 x 200 mm	276 x 400 x 250 mm	476 x 650 x 250 mm

Other features are similar to those of corresponding Quick Vision series

(1) According to Mitutoyo inspection method

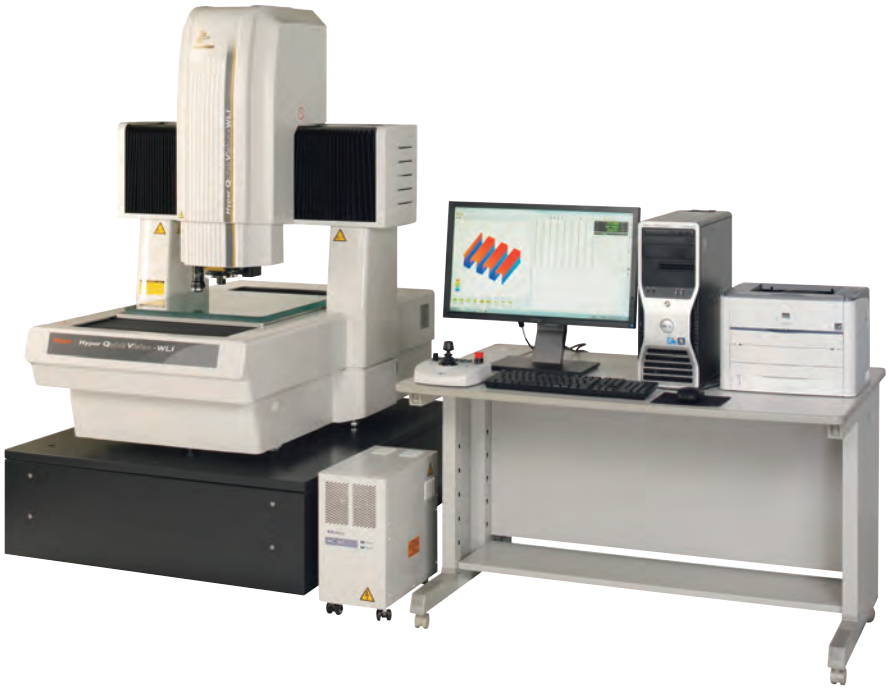
L = measured length (mm)

Mitutoyo

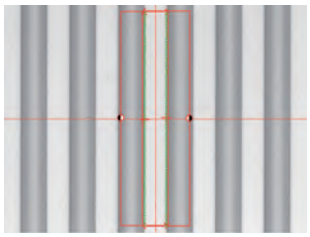
Quick Vision White Light Interferometer

Series 363

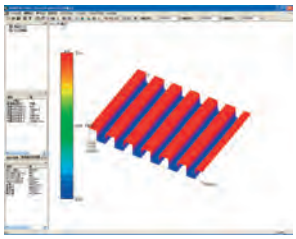
- Combined non contact measurements with vision system and White Light Interferometer (WLI)
- Easy alignment and positioning with vision sensor
- Full QVPAK functionality with Vision system
- Enhanced functionality with WLI-system for high resolution topography evaluation
- Measuring range (X,Y, Z-axis): 400 x 400 x 240 mm and 600 x 650 x 240 mm



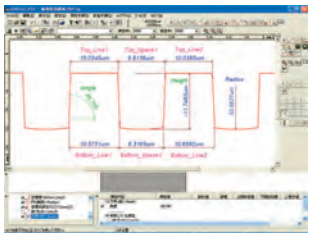
Quick Vision WLI 404 PRO



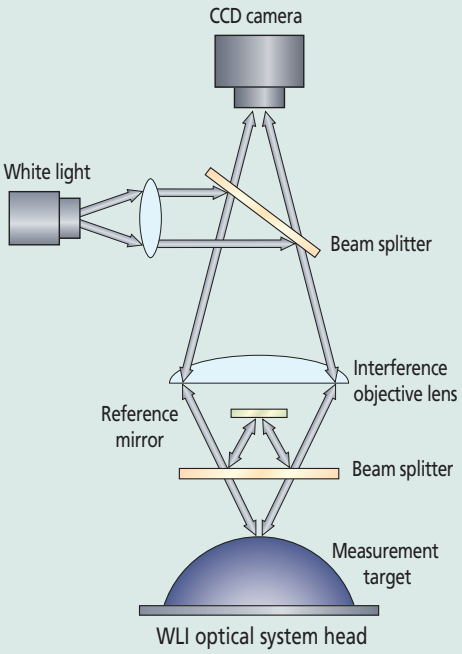
Video image of part



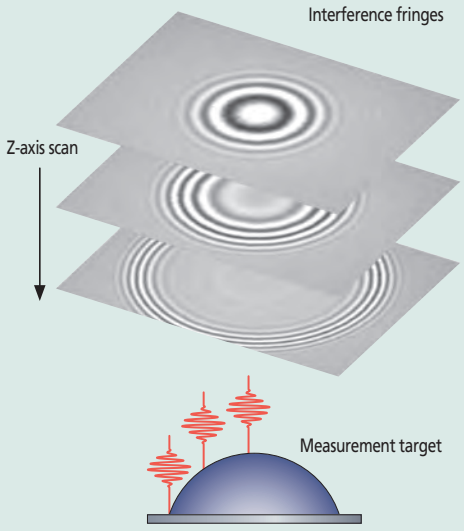
3D Analysis of measured part



2D Analysis of measured part



WLI optical system head



Interference fringes and intensity depiction

Specifications when using vision sensor are same as Quick Vision HYPER

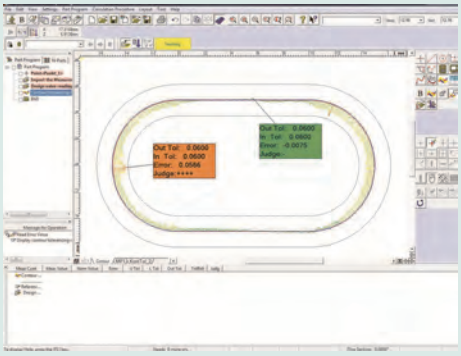
Type	QVD1-H404P1L-C	QVD1-H606P1L-C
No.	**363-701-1EU**	**363-711-1EU**
Range (X, Y, Z-axis) with Vision Head	400 x 400 x 240 mm	600 x 650 x 240 mm
Range with WLI Head	315 x 400 x 240 mm	515 x 650 x 240 mm
Tube Lens WLI Head	2x	2x
Repeatability WLI Head	$2\sigma \leq 0.2$ µm	$2\sigma \leq 0.2$ µm
Z-axis measuring range WLI Head	200 µm	200 µm
Max. stage loading kg	25	35

QV WLI Objective lenses
10X Field of View 0.32 x 0.24 mm
25X Field of View 0.128 x 0.096 mm

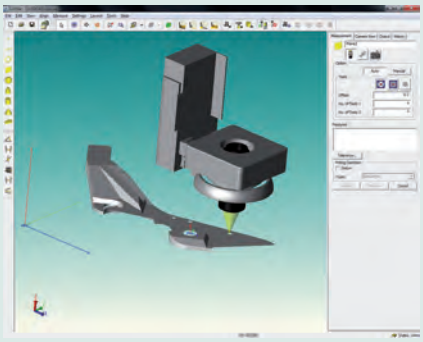
Software for Quick Vision Multisensor Systems

QVPAK

- QVPAK controls multiple sensors: CCD, Touch Probe, continuous scanning devices, special UMAP or LNP probes.
- Powerful mathematical algorithms are provided that help you to detect difficult edges via noise filters (similar to morphological filters) and advanced detection tools that take into account the texture of the target surface.
- Partprogramming 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 you various QVClients (standard), real assistants for users (programmation mode) or operators (production mode) such as QVSmartEditor and QVNavigator.
- QVPAK also offers various „QVClients“ (standard), real assistants for users (Programmation mode) or operators (Production mode), such as QVNavigator.



(1) FORMPAK-QV
Simple and easy-to-use 2D contour analysis.
Graphic reports (geometry or scanning) edition.
Allows measurement by comparison.
For more information refer to FORMTRACEPAK.

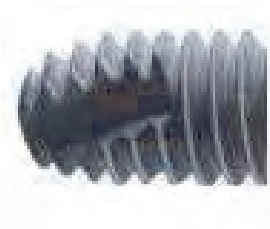


(2) QV 3D CAD-Online
Automatic program generation from 3D CAD files issued from a CAD system (must be associated with a converter).

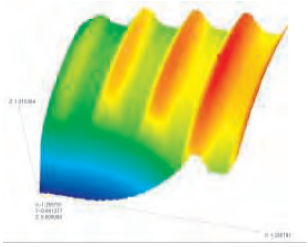
Vision Measuring Machines brochures on request

Optional PFF Function (factory option)

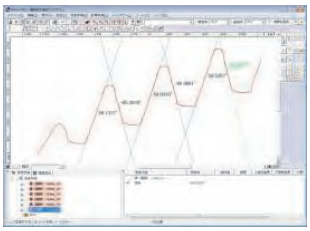
- PFF enhances the functionality of standard QV models with 3D topography measurements
- No additional sensor necessary
- High scanning range in Z axis from 2.7 mm upto 40.6 mm depending on the objective lens in use and in wide range mode



Workpiece to be measured with PFF

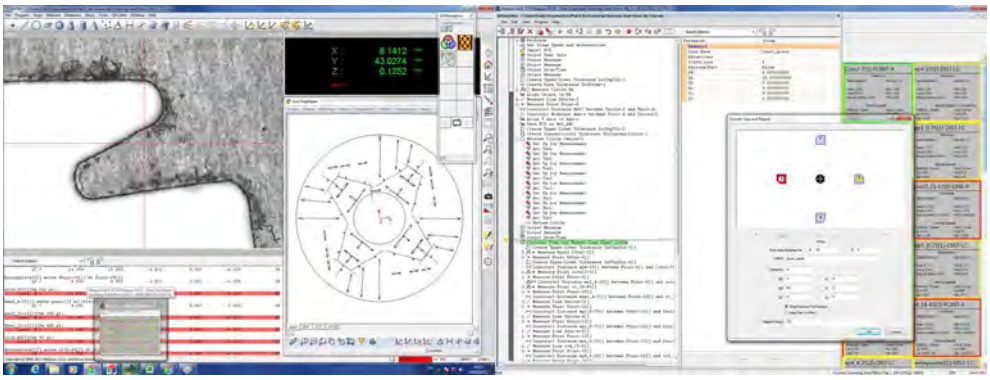


3D Analysis of PFF measurement



2D Analysis of PFF measurement

No.
QVPAK
QVPAK2000
QVPAK8000



Example of the QVPAK screen layout.

Accessories for Quick Vision Systems

Laser Auto Focus

Laser Auto Focus Function TTL (Through The Lens) (1)

For Quick Vision-ELF, Quick Vision-APEX, Quick Vision-HYPER, Quick Vision-STREAM PLUS, Quick Vision-ACCEL, Quick Vision-ULTRA

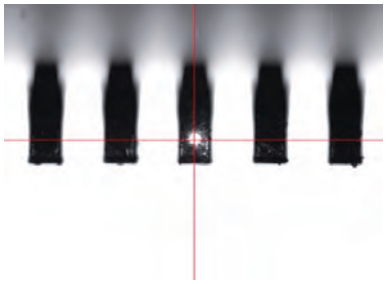
The system can be equipped with the Laser Auto Focus unit that allows stable, high-speed measurement in the Z-axis. This unit provides stable measurement results due to the double pin-hole method adopted in the detection system.

Specifications

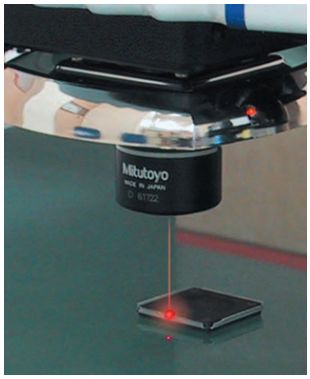
QV Index Head	Automatic multi-plane measurement is possible with the optional index table
Min. rotation angle	0.1 °
Max. rotation speed	10 rpm
Positioning Accuracy	±0.5°
Max. workpiece ø [mm]	140

Mitutoyo

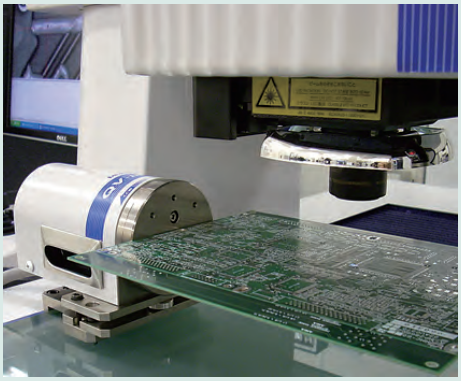
Accessories for Quick Vision Systems



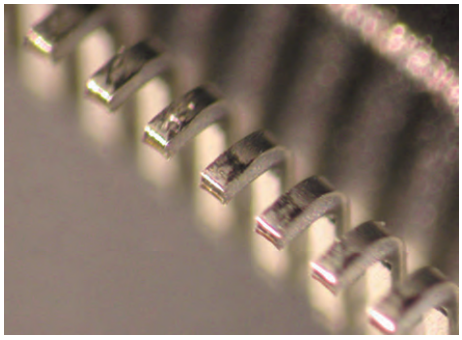
Laser spot of laser auto-focus system (LAF)



Coaxial laser auto-focus (LAF)



QV Index Head



Measurement example : Height of leads on a QFP package

LAF [1] (Laser Auto Focus)

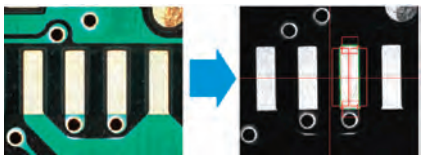
No.	Objective lens	LAF Repeatability (σ)	Measurement principle	Laser spot diameter [µm]
LAF	QV-HR2.5X	0.4	Double pinhole method	3

[1] Factory option

Other Accessories

Machine Stands

No.	Type of QV	Model
02ATP623	ELF	Machine stand for QV-ELF
02ATN332	APEX ; HYPER ; STREAM PLUS	Machine stand for QV-302
02ATN333	APEX ; HYPER ; STREAM PLUS	Machine stand for QV-404
02ATN334	APEX ; HYPER ; STREAM PLUS	Machine stand for QV-606



RGB colour filtering unit

The colour filtering unit function can be added to the vertical reflected illumination or programmable ring light in Quick Vision models that use a halogen light source and B/W CCD sensor only.
This function enhances the visibility of low-reflection surfaces on coloured workpieces, facilitating edge detection.
This function can also be retrofitted to a conventional Quick Vision.
In addition, a yellow filter enables vision measurement in the yellow light region, which provides high sensitivity.

UMAP Vision System Series

UMAP Probe Unit

UMAP Probes
(ultrasonic micro stylus probes)
Stylus ultrasonic micro-vibration and its amplitude-sensing enable UMAP probe to perform contact measurement of micro-features of parts.
5 choices of stylus tip diameter are available from 15 µm to 300 µm.

UMAP 101
ø15 µm
L = 0.2 mm

UMAP 103
ø30 µm
L = 2 mm

UMAP 107
ø70 µm
L = 5 mm

UMAP 110
ø100 µm
L = 10 mm

UMAP 130
ø300 µm
L = 16 mm

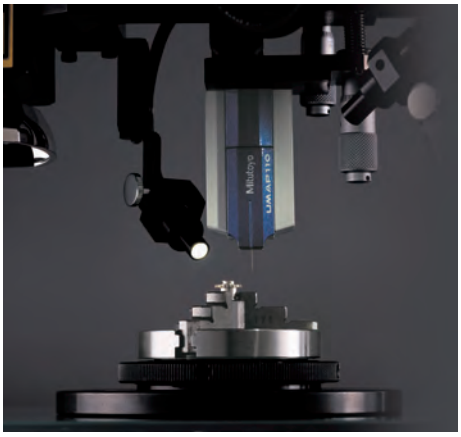
Refer to the UMAP Vision system brochure

UMAP : Ultra Micro Accurate Probe

The UMAP (Ultra Micro Accurate Probe) is a micro-form measuring system
The UMAP offers you the following benefits:

- Dual functions of high-accuracy contact and non-contact measurement in one machine.
- Contact (micro-stylus UMAP probe) and non-contact (vision probe) measuring probes are installed.
- You can measure micro-features of parts previously impossible to reach.
- Several diameters of micro-stylus are available from 15 µm to 300 µm.

Hyper UMAP 302 Type 2



Type 2 - QVPAK + CCD + UMAP Probe

Type	Hyper UMAP 302 Type 2	Ultra UMAP 404 Type 2
No.	**Hyper UMAP302 - T2**	**Ultra UMAP404 - T2**
Range (X-, Y-axis) (1)	245 x 200 mm	285 x 400 mm
Range (Z-axis) (1)	**- UMAP 101/103 :** 175 mm **- UMAP 107/110 :** 180 mm **- UMAP 130 :** 185 mm	**- UMAP 101/103 :** 175 mm **- UMAP 107/110 :** 180 mm **- UMAP 130 :** 185 mm
Accuracy (2)	$E_{1(x,y)}$ = (0,8+0,2L/100) µm $E_{1(Z)}$ = (1.5+0,2L/100) µm	$E_{1(x,y)}$ = (0,25+0,2L/100) µm $E_{1(Z)}$ = (1,5+0,2L/100) µm
Repeatability (σ)	**- UMAP 101/103/107 :** 0,1 µm **- UMAP 110/130 :** 0,15 µm	**- UMAP 101/103/107 :** 0,08 µm **- UMAP 110/130 :** 0,12 µm

(1) When using the UMAP system length (mm) (2) According to Mitutoyo inspection method **L** = measured

M-NanoCoord

This newly developed 3D CNC ultra-high resolution measuring system is capable of the most precise movements, giving you unsurpassed form measurement accuracy in the nanometre region. The M-NanoCoord offers you the following benefits:

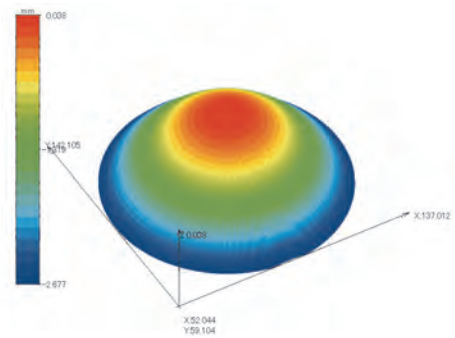
- Laser Holoscales with one nanometre resolution and virtually zero thermal expansion give you extreme measuring accuracy of (0,2+0,1L/100) µm.
- The fixed bridge, moving table construction and high-precision air bearings further improve the accuracy of your measurements.
- Particularly suitable for workpieces with very small dimensions, such as MEMS parts, integrated circuits, precision formed components, aspheric lenses.
- Every model of the M-NanoCoord Series has a newly developed ultra-high accuracy main unit with a vision probe as a standard accessory.
- Can be equipped with micro probe systems as a factory option.

M-NanoCoord

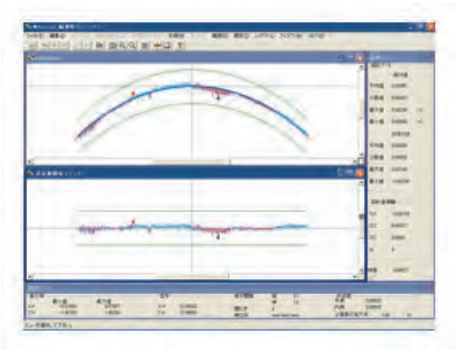
No.	Resolution [nm]	Range (X, Y, Z-axis) with Vision Head	Accuracy (1)
M-NanoCoord	1	200 x 200 x 100 mm	$E_{1(x,y)}$ = (0,2+0,1**L**/100) µm

(1) According to Mitutoyo inspection method **L** = measuring length (mm)

Example of an M-NanoCoord-LNP measurement application



Aspherical lens measurement result



Aspherical lens analysis by lens section comparison

Specifications

Main unit	**Structure** XY-plane guiding structure **Guiding method** Hydrostatic air bearing **Scales** Low-expansion laser holoscale
Vision Head	- Programmable Power Turret (PPT) - 4-quadrant LED (PRL) - High-sensitivity megapixel CCD camera
Factory options	**- UMAP Probes** Touch signal probe with a micro stylus (Refer the UMAP page for details) **UMAP 101** ø15µm ; L=0,2 mm **UMAP 103** ø30 µm ; L=2 mm **UMAP 107** ø70 µm ; L=5 mm **UMAP 110** ø100 µm ; L=10 mm **UMAP 130** ø300 µm ; L=16 mm **- LNP "Long-range Nano Probe"** Minute Form Probe

LNP Probe : Long range Nano Probe

LNP allows measurement of minute features on workpieces such as light guide plates, using a diamond stylus with tip radius of 2 µm (optional). LNP allows scanning measurement with steeply-inclined surfaces of ±80° and touch-probe measurement of ±90° by vibration-type contact scanning probe with ultra-low measuring force (min. measuring force : 10 µN).

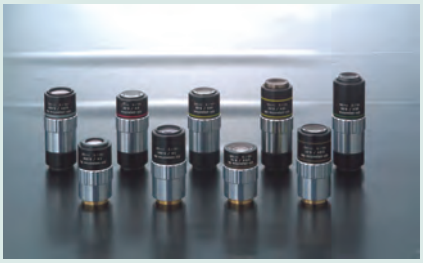
Objective Lenses and Calibration Charts

Objective Lenses and Calibration Charts

Additional Specifications

Remarks

- The monitor magnifications are approximate values.
- QV-10X, QV-25X : Depending on the workpiece the illumination may be insufficient at a turret lens magnification of 2X and 6X for QV models.
- QV-25X : The PRL illumination is restricted in its usable position.



Calibration Glass chart & Compensation glass chart with holder

A calibration or compensation chart is used to calibrate or compensate for the pixel size of the CCD sensor, autofocus accuracy and the optical axis offset at each magnification of the Programmable Power Turret (PPT) or of the zoom.

1: QV-Objective lens - Standard and SL (Long Working Distance) models

No.	Magnification	Model	Turret lens Mag. QV	Monitor Mag. QV	Working distance [mm]
02AKT199	0.5X	QV-SL0.5X	1X 2X 6X	16X 32X 96X	30.5
02ALA400	1X	QV-1X	1X 2X 6X	32X 64X 192X	34
02ALA150	1X	QV-SL1X	1X 2X 6X	32X 64X 192X	52.5
02ALA410	2.5X	QV-2.5X	1X 2X 6X	80X 160X 480X	34
02ALA170	2.5X	QV-SL2.5X	1X 2X 6X	80X 160X 480X	60
02ALA420	5X	QV-5X	1X 2X 6X	160X 320X 960X	33.5
02ALG010	10X	QV-SL10X	1X 2X 6X	320X 640X 1920X	30.5
02ALG020	25X	QV-25X	1X 2X 6X	800X 1600X 4800X	13

2: QV-Objective lens - HR models [1]

No.	NA [2]	Model	Turret lens Mag. QV	Monitor Mag. QV	Working distance [mm]
02AKT250	0.084	QV-HR1X	1X 2X 6X	32X 64X 192X	40.6
02AKT300	0.21	QV-HR2.5X	1X 2X 6X	80X 160X 480X	40.6
02AKT650	0.42	QV-HR10X	1X 2X 6X	320X 640X 1920X	20

[1] HR = High resolution
[2] NA = Numerical aperture

3: QV PFF - Objective lens models - for QV with PFF function only

No.	Model
02AKX895	QV-HR2.5X PFF
02AKX900	QV-5X PFF
02AKX905	QV-HR10X PFF
02AKX910	QV-25X PFF

4: QV WLI - Objective lens models - for QV-WLI models only

No.	Model
02ALT630	QV WLI A-10X
02ALT670	QV WLI A-25X

Other accessories

No.	Model
02AKN020	Calibration chart
02ATN695	Calibration chart with holder
02ATN697	Compensation chart with holder

Modular Clamping System OPTI-FIX

The modular clamping system for vision measuring systems

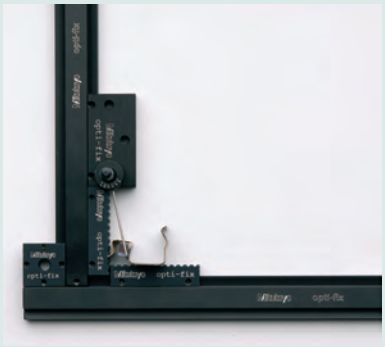
This modular and flexible clamping system is ideal for use with vision measuring systems including profile projectors, measuring microscopes and image analysis measuring machines.
OPTI-FIX offers you the following benefits:

- The system's highly compact components enable you to keep parts in the required position during measurement.
- It enables you to make reliable repeated measurements on a batch of parts, or measurements in particular positions.
- The system elements are assembled with dovetail joints.
- You are offered a choice of several kits.

No.	Model	Description
K551056	Opti-Set Start	- Comprising 16 elements - Construction of a right-angled frame of dimensions 250x100mm
K551057	Opti-Set Basic	- Comprising 26 elements - Construction of a frame of dimensions 200x100mm
K551059	Opti-Set Advanced	- Comprising 51 elements - Construction of a frame of dimensions 400x250mm - Allows aerial positioning of parts
K551060	Opti-Set Professional	- Comprising 115 elements - Construction of frame of dimensions 400x250mm - Complete and highly versatile kit
K551058	Opti-Set Rotation	- Comprising 23 elements - Construction of frame of dimensions 250x200mm - Including accessories for holding cylindrical parts
K550298	Opti-Set Round	- Comprising 18 elements allowing aerial positioning of complex parts - This kit is supplied in a case (see photo below)
K550989	Adjustable magnetic clamp	Only 3 clamps are necessary to hold the OPTI-FIX clamping system to the machine surface

Opti-Set Round

Holding a cylindrical part between clamping tips.



Toothed rule that lets light pass
Spring flange locking the part in the measurement position.

Batch measurement of identical parts placed against the right-angled frame.

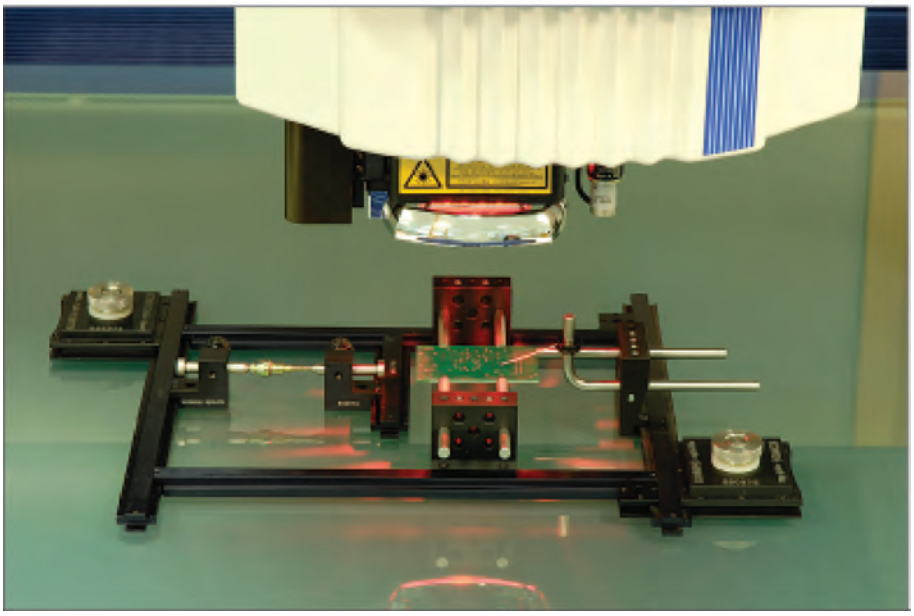
Refer to the OPTI-FIX brochure

Modular Clamping System OPTI-FIX

OPTI-FIX Clamping System

Mini-vice (internal-external)

Precision quick chuck



Electronic board raised to give clearance for the components on its underside. Placed directly on the glass stage of the machine without the OPTI-FIX clamping system, the electronic board would not lie flat. The set-up is held on the glass surface by 2 suction

Clamping jaw

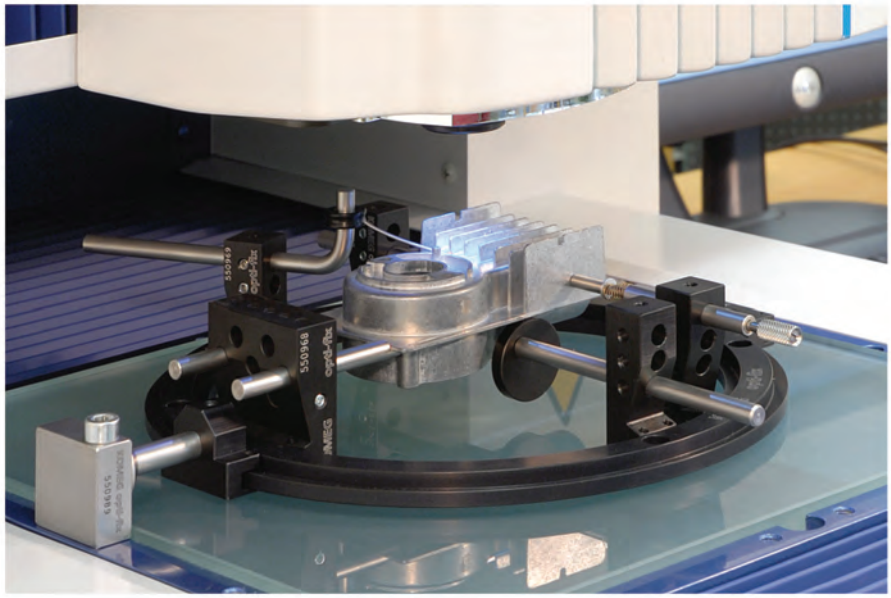
Jaw tip ø0-2

Jaw tip ø1-3

Jaw tip ø4-5

Perpendicular jaw tip

Opti-Fix brochure on request



Example of application for holding prismatic parts (without the OPTI-FIX clamping system, the part could not be positioned correctly). The set-up is held on the glass surface by a magnetic clamp attached to the stage frame.

Quick Guide to Precision Measuring Instruments

Vision Measuring Machines

Vision Measurement

Vision measuring machines mainly provide the following processing capabilities.

Edge detection

Detecting/measuring edges in the XY plane

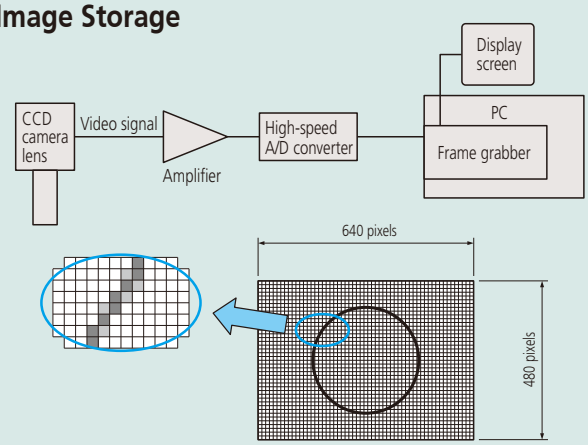
Auto focusing

Focusing and Z measurement

Pattern recognition

Alignment, positioning, and checking a feature

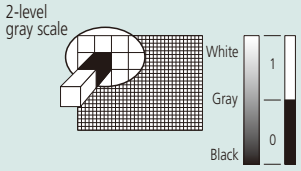
Image Storage



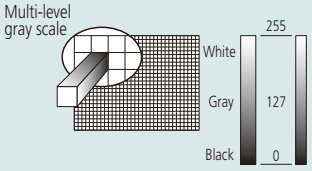
An image is comprised of a regular array of pixels. This is just like a picture on fine plotting paper with each square solid-filled differently.

Gray Scale

A PC stores an image after internally converting it to numeric values. A numeric value is assigned to each pixel of an image. Image quality varies depending on how many levels of gray scale are defined by the numeric values. The PC provides two types of gray scale: two-level and multi-level. The pixels in an image are usually displayed as 256-level gray scale.



Pixels in an image brighter than a given level are displayed as white and all other pixels are displayed as black.



Each pixel is displayed as one of 256 levels between black and white. This allows high-fidelity images to be displayed.

Difference in Image Quality

Difference between 2-level and 256-level gray-scale images

Sample image displayed in 2-level gray scale

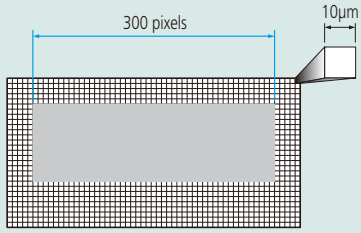
Sample image displayed in 256-level gray scale

Variation in Image Depending on Threshold Level

These three pictures are the same image displayed as 2-level gray scale at different slice levels (threshold levels). In a 2-level gray-scale image, different images are provided as shown above due to a difference in slice level. Therefore, the 2-level gray scale is not used for high-precision vision measurement since numeric values will change depending on the threshold level that is set.

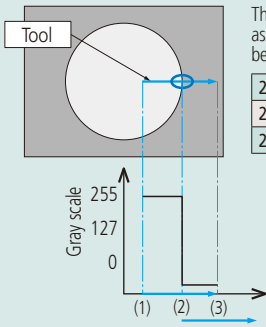
Dimensional Measurement

An image consists of pixels. If the number of pixels in a section to be measured is counted and is multiplied by the size of a pixel, then the section can be converted to a numeric value in length. For example, assume that the total number of pixels in the lateral size of a square workpiece is 300 pixels as shown in the figure below.
If a pixel size is 10µm under imaging magnification, the total length of the workpiece is given by 10µm x 300 pixels = 3000µm = 3mm.



Edge Detection

How to actually detect a workpiece edge in an image is described using the following monochrome picture as an example. Edge detection is performed within a given domain. A symbol which visually defines this domain is referred to as a tool. Multiple tools are provided to suit various workpiece geometries or measurement data.



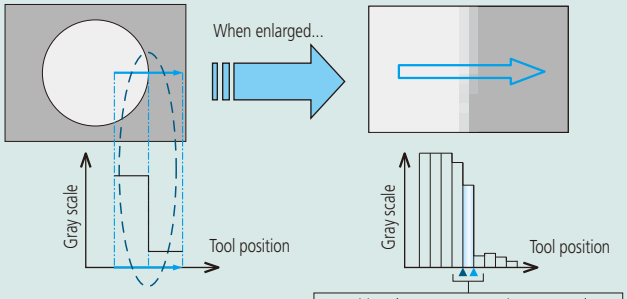
The edge detection system scans within the tool area as shown in the figure at left and detects the boundary between light and shade.

244	241	220	193	97	76	67	52	53	53
243	242	220	195	94	73	66	54	53	55
244	246	220	195	94	75	64	56	51	50

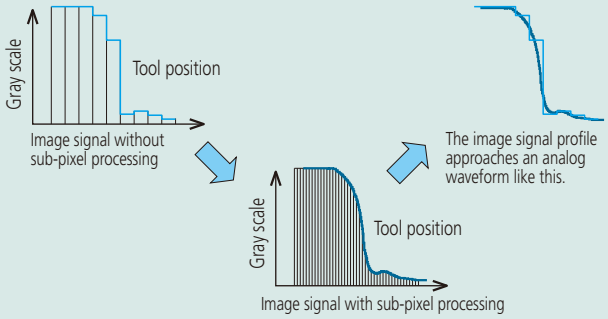
Example of numeric values assigned to pixels on the tool

(1) Scan start position
(2) Edge detection position
(3) Scan end position

High-resolution Measurement

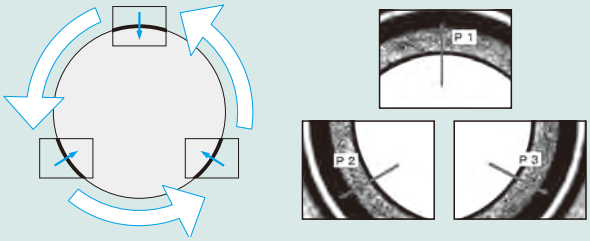


To increase the accuracy in edge detection, sub-pixel image processing is used.
An edge is detected by determining interpolation curve from adjacent pixel data as shown below.
As a result, it allows measurement with a resolution higher than 1 pixel.

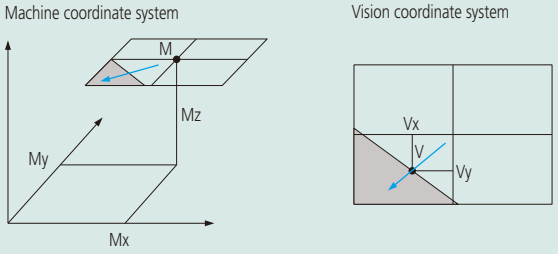


Measurement along Multiple Portions of an Image

Large features that cannot be contained on one screen have to be measured by precisely controlling the position of the CCD sensor and stage so as to locate each reference point within individual images. By this means the system can measure even a large circle, as shown below, by detecting the edge while moving the stage across various parts of the periphery.



Composite Coordinates of a Point



Measuring machine stage position
M = (Mx, My, Mz)

Detected edge position (from the center of vision)
V = (Vx, Vy)

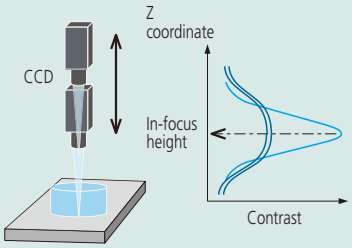
Actual coordinates are given by X = (Mx + Vx), Y = (My + Vy), and Z = Mz, respectively.

Since measurement is performed while individual measured positions are stored, the system can measure dimensions that cannot be included in one screen, without problems.

Principle of Auto Focusing

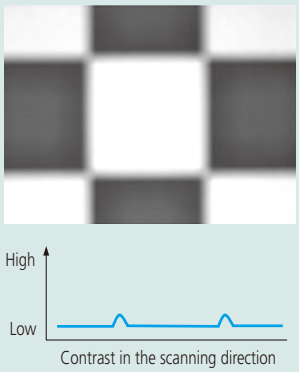
The system can perform XY-plane measurement, but cannot perform height measurement using only the CCD camera image. The system is commonly provided with the Auto Focus (AF) mechanism for height measurement. The following explains the AF mechanism that uses a common image, although some systems may use an AF laser.

The AF system analyzes an image while moving the CCD up and down in the Z axis. In the analysis of image contrast, an image in sharp focus will show a peak contrast and one out of focus will show a low contrast. Therefore, the height at which the image contrast peaks is the just-in-focus height.

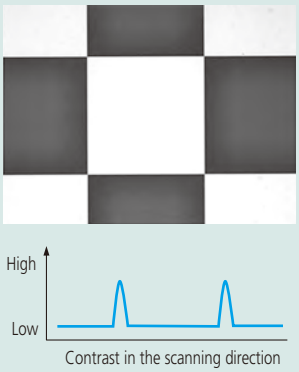


Variation in Contrast Depending on the Focus Condition

Edge contrast is low due to out-of-focus edges.



Edge contrast is high due to sharp, in-focus edges.



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