

Non-Stop CNC Vision Measuring System

QUICK VISION STREAM SERIES

Catalog No. E4295-361

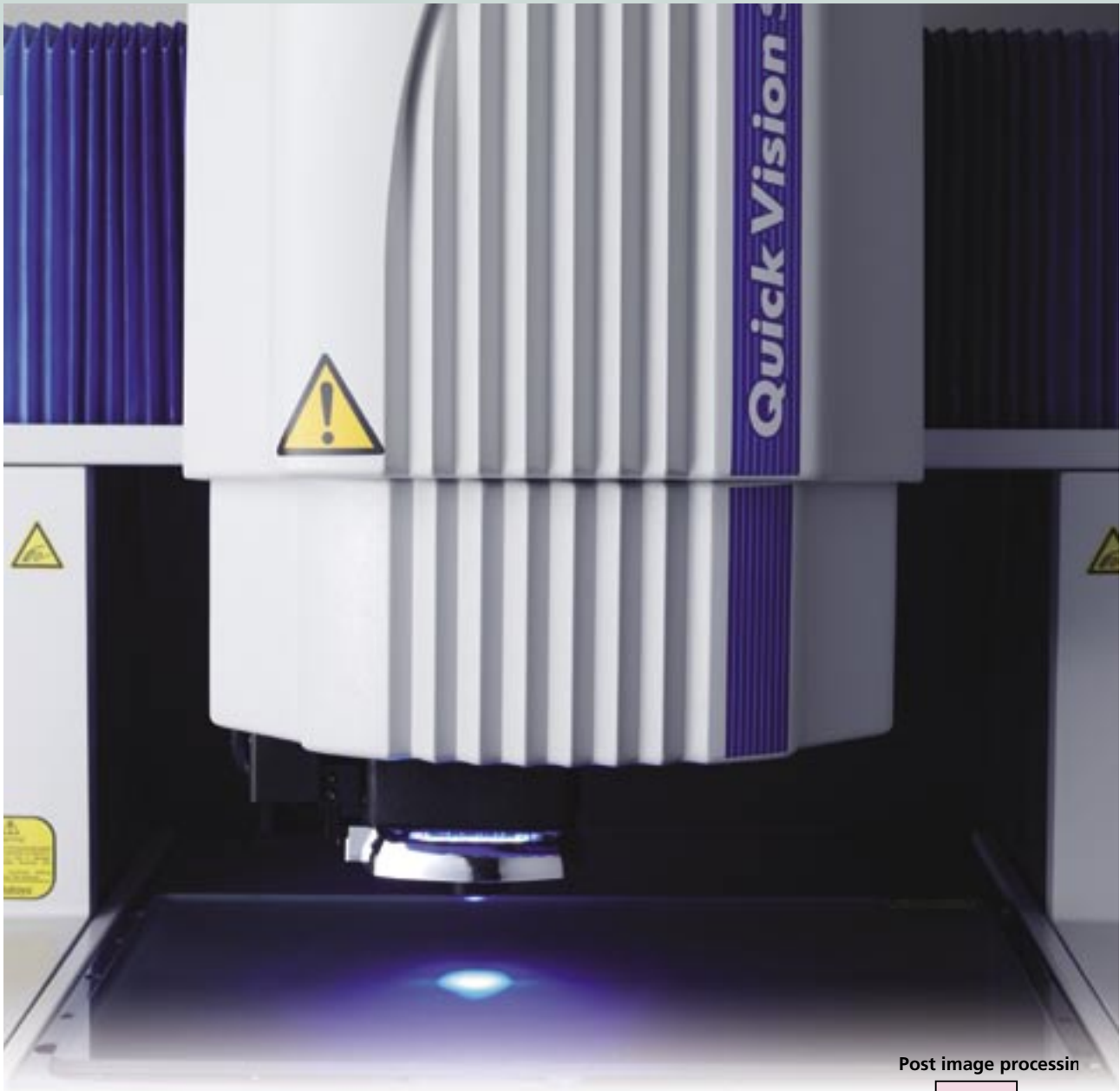


Stroboscopic illumination system and post image processing technology boost measurement efficiency.

Mitutoyo

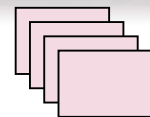
Don't stop at the measurement point!

Stroboscopic illumination system & post image processing technology

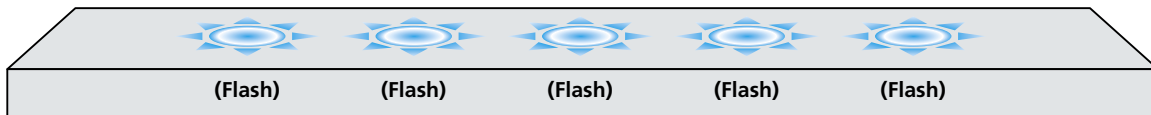


STREAM MODE

Post image processing



Workpiece moves continuously



Competence

Non-stop vision measurement

Drastic Improvement in Throughput

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. By eliminating the time needed to accelerate, decelerate and then hold the stage motionless while a measurement is made achieves a drastic improvement in productivity.

Measurement Throughput Comparison between QV STREAM and the Conventional System

STREAM PLUS series:

more than 5 times

STREAM series: 3 times

* Comparison of measurement throughput using a Mitutoyo sample workpiece with that of Mitutoyo conventional systems



STREAM Mode

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

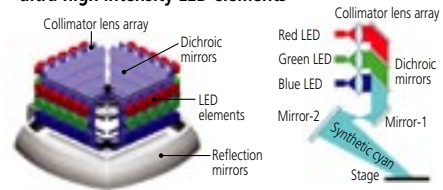
Stroboscopic illumination

Newly Developed Illumination System

It was the development of a high-intensity LED flash illuminator that enabled non-stop vision measurement to be realized. At the precise moment the stage reaches a measurement point 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

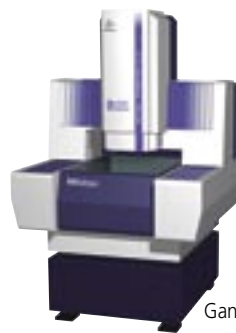


Choice of models



Moving stage type

- Quick Vision STREAM Plus (stream mode: 40mm/s)
Standard Type
Hybrid Type1
Hybrid Type2
- Quick Vision STREAM (stream mode: 5mm/s)
Standard Type
Hybrid Type1
Hybrid Type2

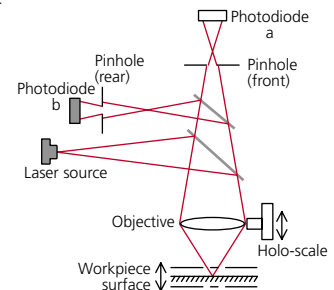


Gantry type

- Quick Vision ACCEL STREAM Plus (stream mode: 40mm/s)
Standard Type
Hybrid Type1
- Quick Vision ACCEL STREAM (stream mode: 5mm/s)
Standard Type
Hybrid Type1

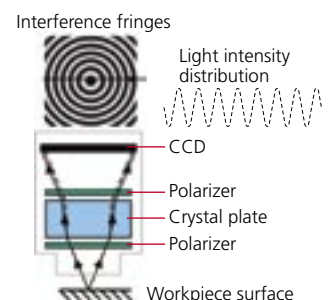
Features of Hybrid Type1

- This type uses a focusing method that suppresses effects due to surface reflection coefficient variation to provide high measurement reproducibility.
- A proprietary laser holoscale reads displacement to enable high-accuracy, high-resolution measurement.
- The double pinhole method with minimum directivity has been adopted as the measurement principle. This method suppresses the influence of diffused light and hence allows stable data collection even on ceramic or machined surfaces.



Features of Hybrid Type2

- This type is equipped with a non-contact laser probe that uses the interference fringe principle to make scanning measurements that are unaffected by workpiece surface inclination angle up to 85°.
- Optimal for form measurement of workpieces with low reflection coefficient, such as plastic or rubber molded parts.
- Single-point measurements are possible.
- The principle of operation is that a CCD camera detects interference fringes generated by emitting a laser beam through a crystal plate and polarizer system onto a surface and the distance from that surface is obtained by analyzing the number of fringes.



Quick Vision STREAM PLUS

Quick Vision STREAM



QV STREAM PLUS302

Observation Unit

B&W CCD camera

Programmable power turret

Pattern focus unit

Laser focus unit

LED Illumination Unit

Hi-intensity surface illumination

Hi-intensity contour illumination

Hi-intensity programmable ring light

Standard programmable ring light

QV STREAM PLUS

QV STREAM

Laser Unit

Laser head (LI-HU) B&W camera

Hybrid Type 1

Laser head

Hybrid Type 2

Control Unit

QV controller

QV remote box

LI-HU display unit

Hybrid Type 1 & 2

LI-HU display unit

Hybrid Type 1

Software

QVPAK

Computer

CPU
Frame grabber
Motion controller

Mouse

Keyboard

Monitor

Optional accessory (not available for Hybrid Type 1 & 2)

Specifications

Model		QV STREAM PLUS 302 QV STREAM 302	QV STREAM PLUS 404 QV STREAM 404	QV STREAM PLUS 606 QV STREAM 606	
Measuring range (XxYxZ-axis)	Normal mode (camera)	300x200x200mm	400x400x250mm	600x650x250mm	
	Normal mode (laser)	Hybrid Type 1	176x200x200mm	276x400x250mm	476x650x250mm
		Hybrid Type 2	162x195x200mm	262x395x250mm	462x645x250mm
STREAM mode (camera)		300x200x200mm (300x200x50mm) ⁻¹	400x400x250mm (400x400x50mm) ⁻¹	600x650x250mm (600x650x50mm) ⁻¹	
Resolution		0.1µm			
Scale type		Reflective linear encoder			
Image detection method		B&W progressive scan CCD camera			
Illumination system	Surface illumination ⁻²	Continuous (composite white, R, G, B) / stroboscopic (B) hi-intensity LED illumination, switchable			
	Contour illumination ⁻²	Continuous (B) / stroboscopic (B) hi-intensity LED illumination, switchable			
	Programmable ring light ^{-2, -3}	Continuous (composite white, R, G, B) / stroboscopic (B) Hi-intensity LED illumination, switchable Continuous (composite white, R, G, B) standard LED illumination			
Observation unit		Programmable power turret			
Measuring accuracy L=Measured length (mm), at 20°C±1°C	E1xy	(1.5+3L/1000)µm	(1.5+3L/1000)µm	(1.5+3L/1000)µm	
	E1z	Camera	(3.0+4L/1000)µm	(3.0+4L/1000)µm	
		Laser (Hybrid Type 1 & 2)	(2.5+4L/1000)µm	(2.5+4L/1000)µm	
	Ezxy	(2.5+4L/1000)µm	(2.5+4L/1000)µm	(2.5+4L/1000)µm	
Maximum measuring speed (X-axis, Y-axis, Z-axis)		300mm/s			
Maximum measuring speed in STREAM mode		40mm/s, 5mm/s			
Stage glass size		399x271mm	493x551mm	697x758mm	
Maximum stage loading		20kgf	40kgf	50kgf	
Dimensions ⁻⁴	Standard & Hybrid Type 1	784x860x1535mm	1040x1220x1765mm	1310x1861x1821mm	
	Hybrid Type 2	784x860x1598mm	1040x1220x1765mm	1310x1861x1821mm	
Main unit mass ⁻⁴		283kg	662kg	1848kg	
Air supply for Hybrid Type 1 & 2		0.4MPa			

-1: When using in surface illumination

-2: Only one illumination (surface / contour / programmable ring light) is available in the STREAM mode.

-3: 4-quadrant lighting or 1-quadrant lighting is available in the STREAM mode.

-4: Including machine stand

Optional Accessories

Touch probe system, Refer to page 9.

- PH6 set: **02ANT840**
- PH1 set: **02ANT860**
- MCR rack/2-port: **02ANT30A**
- MCR20 rack/3-port: **02ANT30B**
- MCR mounting plate: **02ANT770**
- Calibration ring: **02ANL920**
- Master ball stand: **02ANT720**

Machine stand

Calibration plate, Refer to page 10.

- For Hybrid Type 1: **02AND770**
- For Hybrid Type 2: **02AKQ520**
- For Hybrid Type 2: **02AKQ550**^{*1}

Laser focus unit^{*2}, Refer to page 10.

Objective, Refer to page 10.

- QV-1x: **02ALA400**
- QV-2.5x: **02ALA410**
- QV-5x: **02ALA420**
- QV-SL1x: **02ALA150**
- QV-SL2.5x: **02ALA170**
- QV-0.5x: **02ALG000**^{*3}
- QV-10x: **02ALG010**^{*3}
- QV-25x: **02ALG020**^{*3}

Calibration chart: **02AKN020**, Refer to page 10.

*1: For the objectives of QV-0.5x, QV-10x and QV-25x.

*2: Not available for Hybrid Type 1 and 2.

*3: Only for Hybrid Type 2

Quick Vision ACCEL STREAM PLUS

Quick Vision ACCEL STREAM



**QV ACCEL
STREAM PLUS404**



**QV ACCEL
STREAM 606**

Observation Unit

- B&W CCD camera
- Programmable power turret
- Pattern focus unit
- Laser focus unit

LED Illumination Unit

- Hi-intensity surface illumination
- Hi-intensity contour illumination
- Hi-intensity programmable ring light (QV STREAM PLUS)
- Standard programmable ring light (QV STREAM)

Laser Unit

- Laser head (LI-HU) B&W camera (Hybrid Type 1)

Control Unit

- QV controller
- QV remote box
- LI-HU display unit (Hybrid Type 1)

Software

- QVPAK

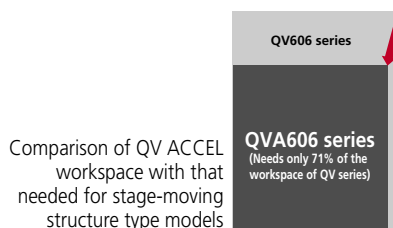
Computer

- CPU
- Frame grabber
- Motion controller
- Mouse
- Keyboard
- Monitor

Optional accessory (not available for Hybrid Type 1 & 2)

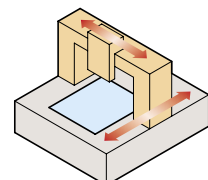
Space-saving Design

Thanks to the space-saving design of the QV ACCEL series, savings in workspace of 16% for QVA404 and 29% for QVA606 have been attained in comparison with that needed for the QV series.



Optimal for Measuring a Light and Thin, or Short Life-cycle Workpiece

The stationary stage of the QV ACCEL series adopts the moving-bridge structure that not only allows simplification of workpiece holding fixtures and reduction of manufacturing time, but is also optimal for measuring a light and thin, or short life-cycle workpiece.



Moving-bridge structure

Specifications

Model		QV ACCEL STREAM PLUS 404 QV ACCEL STREAM 404	QV ACCEL STREAM PLUS 606 QV ACCEL STREAM 606
Measuring range (XxYxZ-axis)	Normal mode (camera)	400x400x150mm	600x650x150mm
	Normal mode (laser, Hybrid Type 1)	280x400x150mm	480x650x150mm
	STREAM mode (camera)	400x400x150mm (400x400x50mm) ⁻¹	600x650x150mm (600x650x50mm) ⁻¹
Resolution		0.1µm	
Scale type		Reflective linear encoder	
Image detection method		B&W progressive scan CCD camera	
Illumination system	Surface illumination ⁻²	Continuous (composite white, R, G, B) / stroboscopic (B) hi-intensity LED illumination, switchable	
	Contour illumination ⁻²	Continuous (B) / stroboscopic (B) hi-intensity LED illumination, switchable	
	Programmable ring light ^{-2, -3}	Continuous (composite white, R, G, B) / stroboscopic (B) Hi-intensity LED illumination, switchable Continuous (composite white, R, G, B) standard LED illumination	
Observation unit		Programmable power turret	
Measuring accuracy L=Measured length (mm), at 20°C±1°C	E1xy	(1.5+3L/1000)µm	(1.5+3L/1000)µm
	E1z	Camera	(3.0+4L/1000)µm
		Laser (Hybrid Type 1)	(2.5+4L/1000)µm
	E2xy	(2.5+4L/1000)µm	(2.5+4L/1000)µm
Repeatability (X, Y-axes)	Short length	3σ=0.2µm	
	Long length	3σ=0.7µm	
Maximum measuring speed		300mm/s (X-axis, Y-axis), 150mm/s (Z-axis)	
Maximum measuring speed in STREAM mode		40mm/s, 5mm/s	
Stage glass size		493x511mm	697x751mm
Maximum stage loading		10kgf	10kgf
Dimensions ⁻⁴		982x1095x1578mm	1183x1336x1578mm
Main unit mass ⁻⁴	Standard	665kg	958kg
	Hybrid Type 1	670kg	963kg
Air supply for Hybrid Type		0.4MPa	

-1: When using surface illumination

-2: Only one illumination (surface / contour / programmable ring light) is available in the STREAM mode.

-3: 4-quadrant lighting or 1-quadrant lighting is available in the STREAM mode.

-4: Including machine stand

Optional Accessories

Touch probe system, Refer to page 9.

- PH6 set: **02ANT840**
- PH1 set: **02ANT860**
- MCR rack/2-port: **02ANT30A**
- MCR20 rack/3-port: **02ANT30B**
- MCR mounting plate: **02ANT770**
- Calibration ring: **02ANL920**
- Master ball stand: **02ANT720**

Machine stand

Calibration plate: **02AND770**, Refer to page 10.

Laser focus unit: Refer to page 10.
Objective, Refer to page 10.

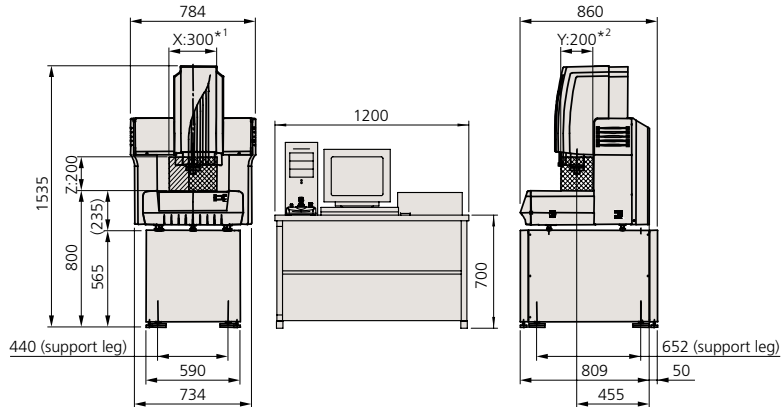
- QV-1x: **02ALA400**
- QV-2.5x: **02ALA410**
- QV-5x: **02ALA420**
- QV-SL1x: **02ALA150**
- QV-SL2.5x: **02ALA170**
- QV-0.5x: **02ALG000**
- QV-10x: **02ALG010**
- QV-25x: **02ALG020**

Calibration chart: **02AKN020**, Refer to page 10.

External Dimensions

QV STREAM PLUS and QV STREAM

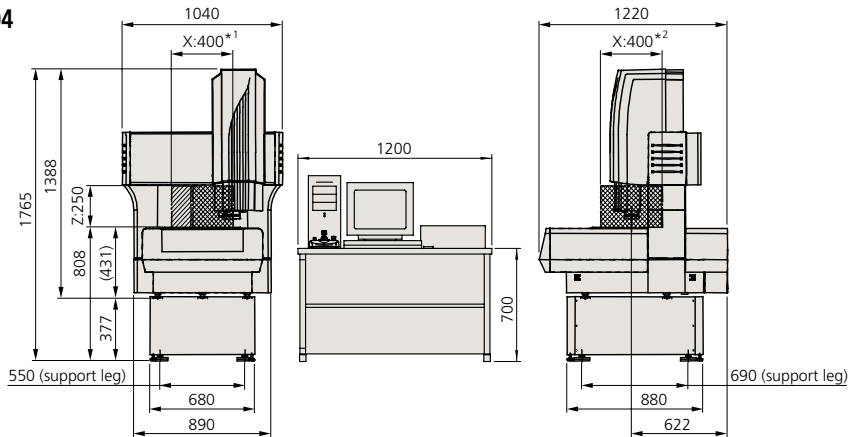
QV STREAM PLUS 302
QV STREAM 302



Unit: mm

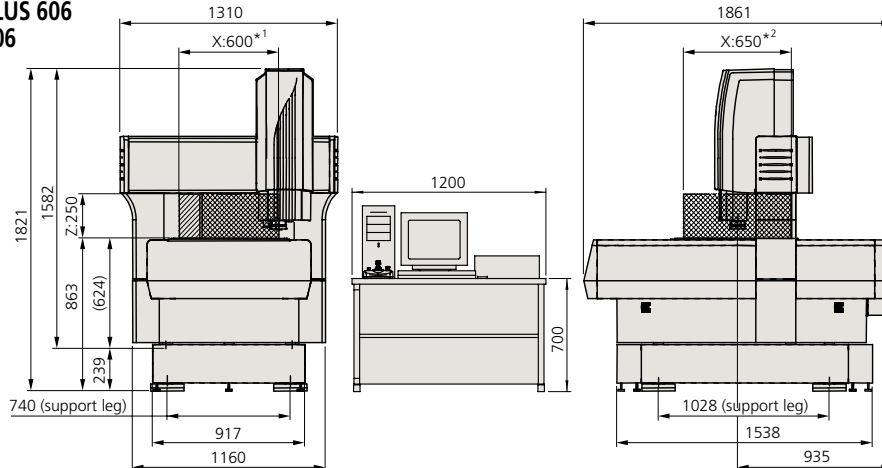
*1: HYBRID TYPE1 176mm
HYBRID TYPE2 162mm
*2: HYBRID TYPE2 195mm

QV STREAM PLUS 404
QV STREAM 404



*1: HYBRID TYPE1 276mm
HYBRID TYPE2 262mm
*2: HYBRID TYPE2 395mm

QV STREAM PLUS 606
QV STREAM 606

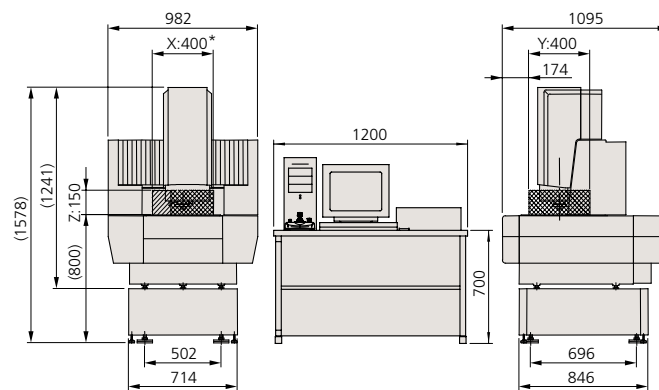


*1: HYBRID TYPE1 476mm
HYBRID TYPE2 462mm
*2: HYBRID TYPE2 645mm

QV ACCEL STREAM PLUS and QV ACCEL STREAM

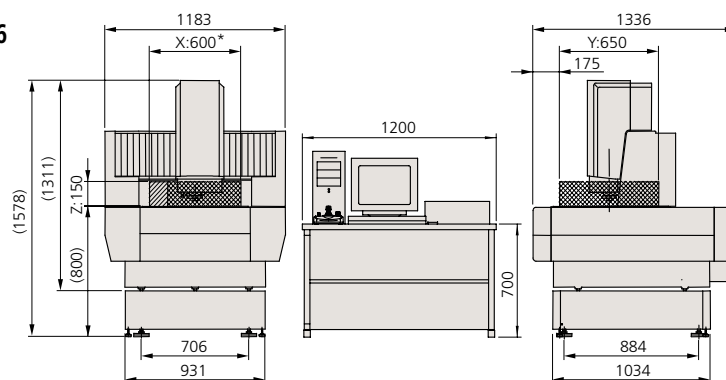
Unit: mm

QV ACCEL STREAM PLUS 404
QV ACCEL STREAM 404



*: HYBRID TYPE1 276mm

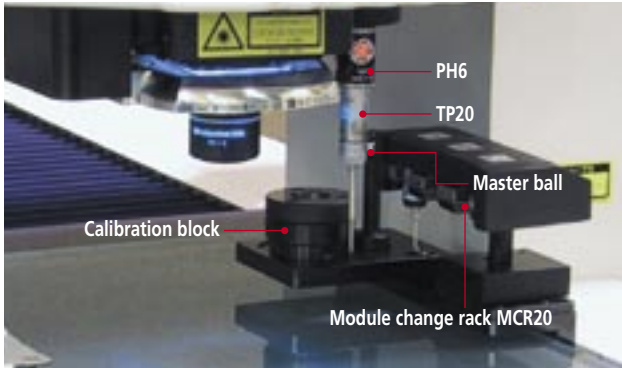
QV ACCEL STREAM PLUS 606
QV ACCEL STREAM 606



*: HYBRID TYPE1 476mm

Optional Accessories

Touch Signal Probe Unit



Module Change Rack

The module change rack makes it easy to switch between vision-based and touch signal probe measurements during an automatic measurement cycle.

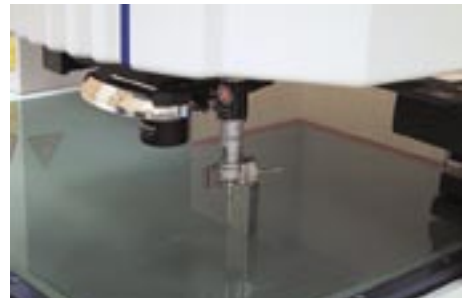


Non-contact and Contact Measurements with the One System

With the QV touch signal probe unit added in, the system can perform contact measurement with this probe in addition to non-contact vision measurements.

3D Workpiece Measurement

The touch signal probe enables 3D measurement of a workpiece which cannot be measured using image processing alone.



System Specifications after Installation of the Touch Signal Probe

Model		QV STREAM PLUS 302 QV STREAM 302	QV STREAM PLUS 404 QV STREAM 404 QV ACCEL STREAM PLUS 404 QV ACCEL STREAM 404	QV STREAM PLUS 606 QV STREAM 606 QV ACCEL STREAM PLUS 606 QV ACCEL STREAM 606
Measuring range	Vision measurement	200x200x200mm	400x400x250mm 400x400x150mm*	600x650x250mm 600x650x150mm*
	Touch signal probe measurement	134x200x200mm	334x400x250mm 334x400x150mm*	534x650x250mm 534x650x150mm*
Measuring accuracy (vision measurement)	E _{1XY}		(1.5+3L/1000) μm	
	E _{1Z}		(3.0+4L/1000) μm	
	E _{2XY}		(2.5+4L/1000) μm	
Measuring accuracy (touch signal probe measurement)	E _{1XY}		(1.8+3L/1000) μm	
	E _{1Z}		(1.8+3L/1000) μm	
Workpiece maximum height		200mm		250mm

*QV ACCEL STREAM/STREAM PLUS

Laser Auto Focus (not available for Hybrid Type1 and 2)

The system can be equipped with the Laser Auto Focus unit that allows a stable, high-speed height measurement during high-speed travel. This unit provides stable measurement results with minimum dependence on surface inclination since the double pinhole method is adopted in the detection system.



Objective	QV2.5x
Measurement principle	Double pinhole method
Laser spot diameter	3μm
Repeatability	σ=0.4μm



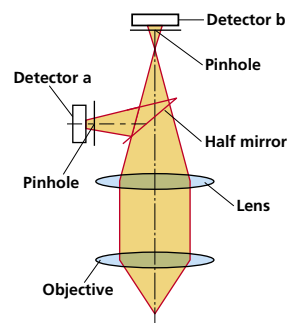
Example: Height of leads from a QFP package



Safety Precautions against Laser Beam

This system uses a low-power visible laser beam which corresponds to a CLASS 1 (visible light) of IEC 60825 for measurement. The CLASS 1 laser warning label as shown right is attached to the main unit.

CLASS 1 LASER PRODUCT
クラス1 レーザ製品



Options

Objective lenses

Objective	Turret lens magnification	Monitor magnification	Field of view (mm)	Working distance (mm)
QV-1x	1x	32x	6.27x4.70	34
	2x	64x	3.13x2.35	
	6x	192x	1.04x0.78	
QV-2.5x	1x	80x	2.50x1.88	34
	2x	160x	1.25x0.94	
	6x	480x	0.41x0.31	
QV-5x	1x	160x	1.25x0.94	33.5
	2x	320x	0.62x0.47	
	6x	960x	0.20x0.15	
QV-SL1x	1x	32x	6.27x4.70	52.5
	2x	64x	3.13x2.35	
	6x	192x	1.04x0.78	
QV-SL2.5x	1x	80x	2.50x1.88	60
	2x	160x	1.25x0.94	
	6x	480x	0.41x0.31	
QV-10x *2	1x	320x	0.627x0.470	30.5
	2x	640x	0.313x0.235	
	6x	1920x	0.104x0.078	
QV-25x *2, *3	1x	800x	0.250x0.188	13
	2x	1600x	0.125x0.094	
	6x	4800x	0.041x0.031	

*1 The monitor magnification and field of view values are for the PRO machine.

*2 Depending on the workpiece the illumination may be insufficient at a turret lens magnification of 2x and 6x.

*3 The PRL illumination is restricted in its usable position.

Calibration chart



Temperature Compensation Functions

The system can output a measurement result as a value converted at the standard temperature of 20°C even if the ambient temperature is 23°C. Compensation calculations are performed by inputting the thermal expansion coefficient of a workpiece and using temperature sensors placed on the X, Y, and Z axes and a workpiece.

- Temperature compensation of the machine main unit
- Workpiece temperature compensation
- Setup function for a temperature compensation reference position

Calibration Plate

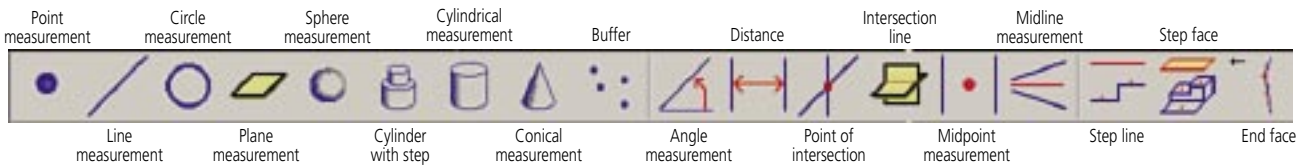
- Dedicated to HYBRID Type 1
02AND770
- Dedicated to HYBRID Type 2
02AND770 For QV-1X to QV-5X of objective options
02AKQ550 For QV-10X or QV-25X of objective options

More Powerful and Friendly Software

QVPAK version 7.2

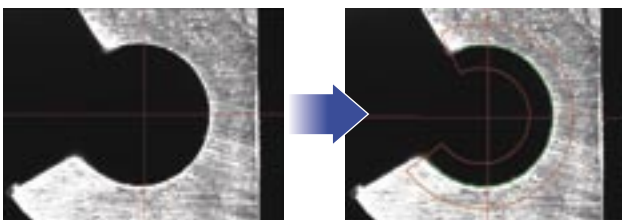


Example of Calculation Functions



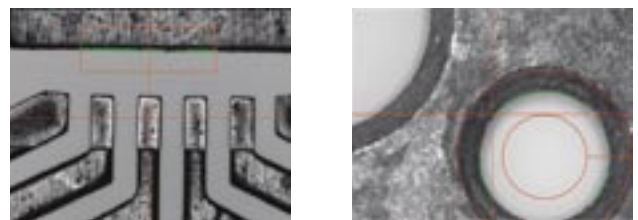
One-click Measuring Tool Set-up

The tool size, orientation, and threshold value of a measuring tool are automatically set with one click of the mouse.



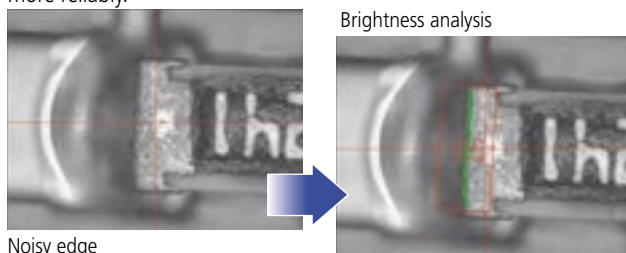
Removal of Abnormal Points

Abnormal points such as dust, burrs, and cracks are removed. The removal level can be set arbitrarily.



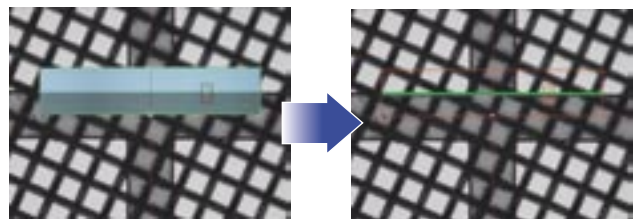
Increase in Edge Detection Capability

The edge-detection capability has been enhanced so that indistinct edges where the brightness change is small, or is marked only by a texture change between different surfaces can be detected much more reliably.



Enhanced Filter Function

This function eliminates image noise to allow stable edge detection. Median, Averaging, Gaussian, and Morphology filters are available.



A preview function is provided to check the effect of these filters.

QV Smart Editor Function

This function displays a part program created by QVPAK in a tree structure using icons and titles. It has improved the ease of editing programs for factors such as condition and edge detection conditions.

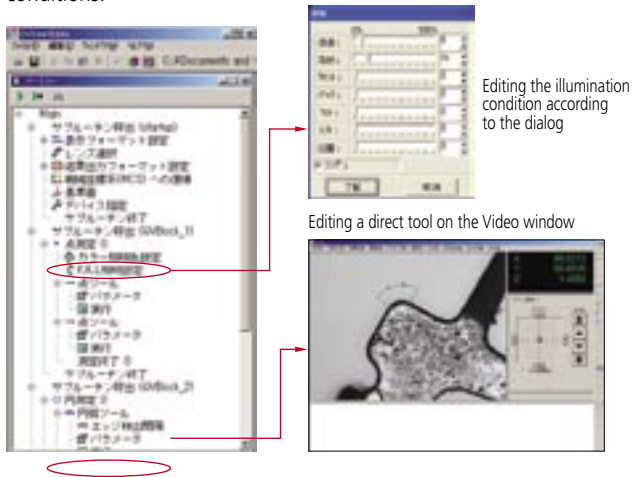
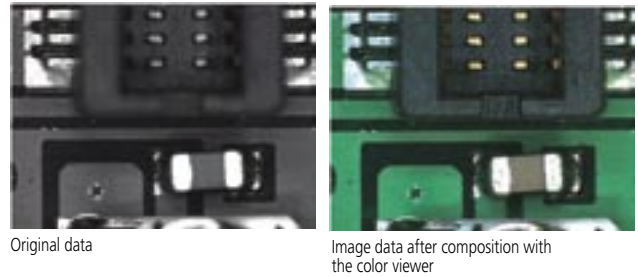


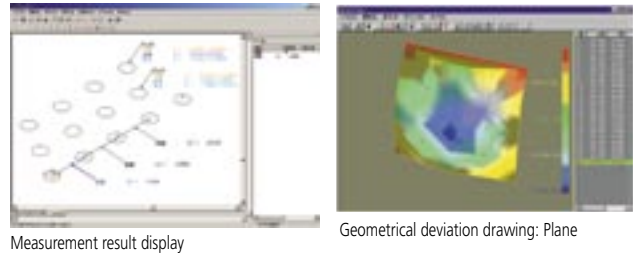
Image Composition and Color Viewer

This function composes multiple images representing different heights and creates a composite image in focus in a wide range. It is also possible to create a pseudo color image with a B&W camera using the RGB color illumination.



QV Graphics

QVPAK is capable of 3D graphic display of measurement results, calculation between features (e.g. circle-to-circle distance calculation) from measured forms, and also drawing the geometrical deviation of a circle, line, and cylinder.



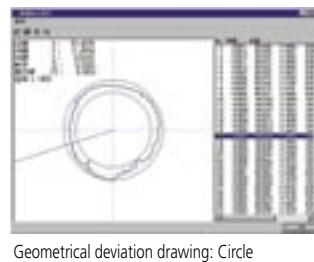
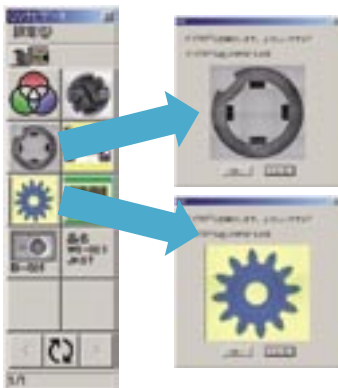
QV Navigator 2

This function provides a navigated display of calculation procedures between features and a coordinate system setup pattern. It allows you to customize even a complicated pattern at will. Also, a part program can be registered along with workpiece images, thus making Repeat measurements easier.

User-macro creation function

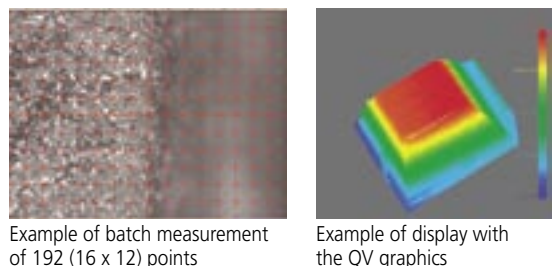


Part-program registration example



Multipoint autofocus

The Auto Focus tool (surface and pattern) can calculate heights at multiple points by dividing the tool into sub areas. The tool can also measure the maximum point, minimum point, and average height.

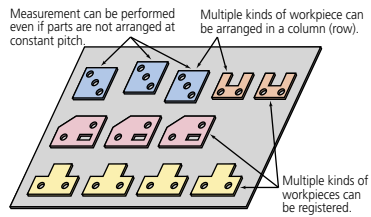


Optional Application Software

Automatic Measurement Management

QV Part Manager

QV Part Manager is the execution program management software for multiple workpieces arranged on the measurement stage.

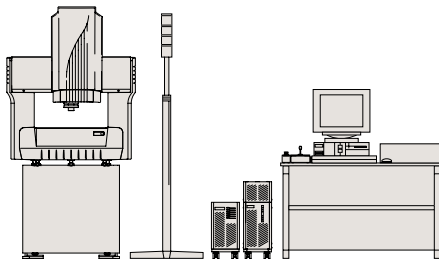


QV part manager screen

External Control

QV Eio-PC

QVPAK can be controlled from an external PC via RS-232C. QV status can be output using an external I/O board.

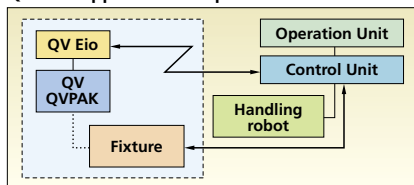


QV Eio-PC usage example (System using PATLITE)

QV Eio

External control can be implemented as the interface between a PC and QVPAK.

QV Eio supported example



QV-JMP Export

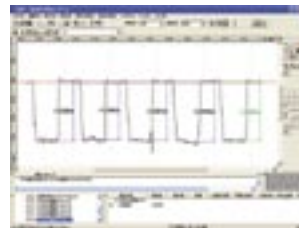
This software outputs QVPAK measurement results to JMP in the SPC software.



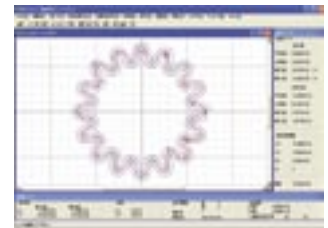
Form Evaluation and Analysis

FORMPAK-QV

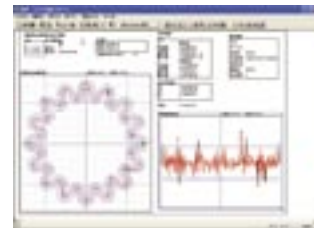
This program performs tolerancing to nominal values and form analysis from the form data obtained with the QV Auto Trace tool and the laser probe.



Detailed form analysis screen



Contour tolerancing screen



Layout edit screen

Inspection Certificate Creation

MiCAT

Mitutoyo Intelligent Computer Aided Technology
the standard in world
metrology software
MeasurLink

Measure Report-QV

Features

- This program, which is based on the commercial spreadsheet Microsoft Excel, can easily customize an inspection certificate.
- Data from multiple instruments such as calipers and micrometers can be fetched in addition to Quick Vision data.



MeasurLink SPC-Super



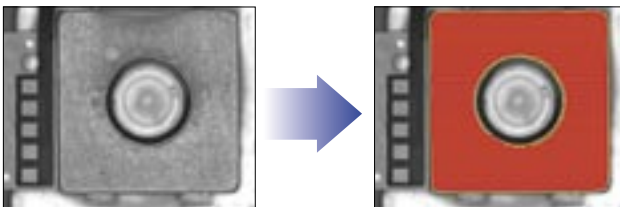
Various statistical calculation processing can be performed from measurement results. It is also possible to display control charts in real time.

for Hybrid Type1/2 only

Auto-scanning Route Generation

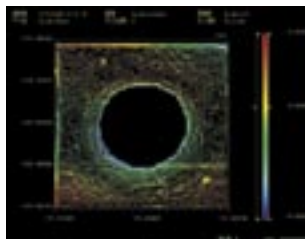
QV Trace Maker

QV Trace Maker is a program that can automatically create a scanning route for the laser probe based on vision information acquired by Quick Vision. Various routes can be created even if the measuring area is outside the viewing field. In combination with MSHAPE-QV the 3D form evaluation of complicated contours can be performed with ease.



Target area image composition

Trace condition setup



MSHAPE-QV evaluation example

for Hybrid Type1/2 only

Surface Texture Analysis Software

FORMTRACEPAK-PRO

This is the form evaluation support system software to make curved form analysis from data acquired with the laser probe.

Display Function

Painting, wire framing, shading, and shading contour

Analysis Function

Cutting surface, BAC, ADC, spectrum, probability distribution, peak height distribution, and slope enhancement

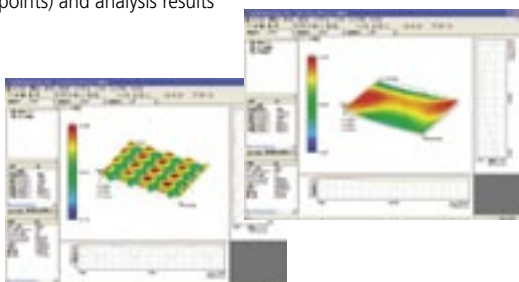
Others

2D form analysis by extracting a 2D section in an arbitrary direction

Original report printout after layout edition

CSV format output of a curved surface

(a group of points) and analysis results



for Hybrid Type1/2 only

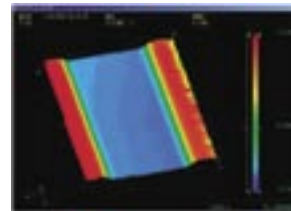
Contour Analysis

MSHAPE-QV

This is the form evaluation support system to perform curved form analysis from data acquired with the laser probe.

Main Functions

Display forms	2D/3D contour lines 2D/3D unfiltered profile Shadow graph
Form analysis	Curved plane analysis Unfiltered profile analysis, etc.



2D contour line display



3D display of the 2D contour line display

for Hybrid Type1/2 only

IC Package Evaluation Software

IC Package Measuring Program

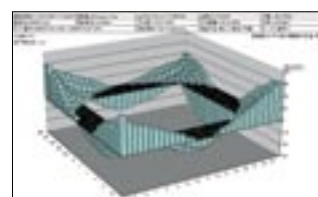
- BGA coplanarity measurement and ball height measurement
- 3D form measurement of package surface
- 2D cross-section measurement of package surface, etc.



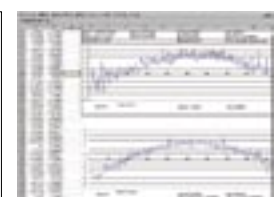
QV-Graph

Main Functions

Display forms	3D bar graph 2D continuous cross-section graph
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3D bar graph



2D continuous cross-section graph



Specifications are subject to change without notice.

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