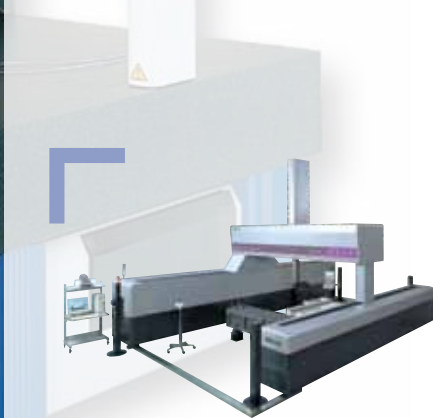


Coordinate Measuring Machines



Bright-STRATO

L

Coordinate Measuring Machines

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Coordinate Measuring Machines

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Vision Measuring Systems



Quick Vision ELF

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Vision Measuring Systems

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Crysta-Apex C

SERIES 191 — Standard CNC CMM

Engineered and constructed utilizing Mitutoyo's innovative CNC CMM technology, Crysta-Apex features lightweight materials and a stable structure. The result is a design that provides high travel stability, high accuracy, and affordability. The temperature correction function 60.8°F to 78.8°F (16°C to 26°C) can yield accurate measurements even on the shop floor. In addition to the point-to-point measurement, the MPP-100 and a Laser Probe provide contact/non-contact scanning function.



Temperature compensation system (photo: temperature sensors)



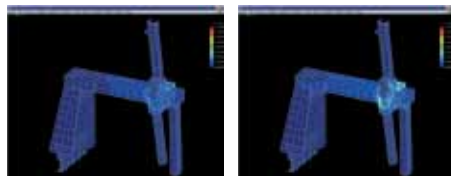
Joystick controller

Technical Data

Length standard:	High accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	520mm/sec
Max. acceleration:	0.23G (500, 700, 900 Series) 0.17G (1200, 1600, 2000 Series 9108, 9168, 9208)
Air pressure:	0.4MPa
Air consumption:	50L/min (500 series) 60L/min (700, 900 series) 100L/min (1200 series) 150L/min (1600, 2000 series)

Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.



Optimum machine structure has been determined through the FEM (Finite-Element Method) and modal analysis.

Guaranteed accuracy temperature environment*

	Temperature Range 1** 64.4°F - 71.6° (18°C - 22°C)	Temperature Range 2*** 60.8°F - 78.8° (16°C - 26°C)
Variation Per hour	2.0K	2.0K
Per day	2.0K	5.0K
Gradient Vertical	1.0K/m	1.0K/m
Horizontal	1.0K/m	1.0K/m

SPECIFICATIONS

Model No.	Crysta-Apex C544	Crysta-Apex C574	Crysta-Apex C776	Crysta-Apex C7106	Crysta-Apex C9106 [Crysta-Apex C9108]	Crysta-Apex C9166 [Crysta-Apex C9168]	Crysta-Apex C9206 [Crysta-Apex C9208]
Range	X-axis 19.88" (505mm) Y-axis 15.94" (405mm) Z-axis 15.94" (405mm)	19.88" (505mm) 27.75" (705mm) 15.94" (405mm)	27.75" (705mm) 27.75" (705mm) 23.82" (605mm)	27.75" (705mm) 39.56" (1005mm) 23.81" (605mm)	35.62" (905mm) 39.56" (1005mm) 23.81" 605mm [31.69" (805mm)]	35.62" (905mm) 63.18" (1605mm) 23.81" 605mm [31.69" (805mm)]	35.62" (905mm) 78.93" (2005mm) 23.81" 605mm [31.69" (805mm)]
Resolution	.000004" (0.0001mm)						
Accuracy*	MPE _E (1.7+3L/1000)µm**, (1.7+4L/1000)µm*** MPE _P 1.7µm MPE _{THP} 2.3µm MPT _{THP} 110 sec						
Work table	Material Granite						
Size	25.11" x 33.86" (638mm x 860mm)	25.11" x 45.67" (638mm x 1160mm)	34.64" x 55.90" (880mm x 1420mm)	34.64" x 67.71" (880mm x 1720mm)	42.51" x 67.71" (1080mm x 1720mm)	42.51" x 91.33" (1080mm x 2320mm)	42.51" x 107.0" (1080mm x 2720mm)
Tapped insert	M8 x 1.25mm						
Workpiece	Max. height 21.46" (545mm) Max. load 396 lbs (180kg)	21.46" (545mm) 396 lbs (180kg)	31.49" (800mm) 1763 lbs (800kg)	31.49" (800mm) 2204 lbs (1000kg)	31.49" (800mm) [39.36" (1000mm)] 2645 lbs (1200kg)	31.49" (800mm) [39.36" (1000mm)] 3306 lbs (1500kg)	31.49" (800mm) [39.36" (1000mm)] 3968 lbs (1800kg)
Mass (including stand and controller)	1135 lbs (515kg)	1377 lbs (625kg)	3692 lbs (1675kg)	4301 lbs (1951kg)	4918 lbs (2231kg) [4984 lbs (2261kg)]	6322 lbs (2868kg) [6388 lbs (2898kg)]	8624 lbs (3912kg) [8690 lbs (3942kg)]
Dimensions (W x D x H)	42.60x44.17x86.02" (1082x1122x2185mm)	42.60x57.40x86.02" (1082x1458x2185mm)	57.87x64.96x107.48" (1470x1650x2730mm)	57.87x76.77x107.48" (1470x1950x2730mm)	65.74x76.77x107.48" (1670x1950x2730mm) [65.74x76.77x123.22"] [[1670x1950x3130mm]]	65.74x105.90x107.48" (1670x2690x2730mm) [65.74x105.90x123.22"] [[1670x2690x3130mm]]	65.74x121.65x107.48" (1670x3090x2730mm) [65.74x121.65x123.22"] [[1670x3090x3130mm]]

* When using temperature compensation system.

ISO10360-2: 2001 & ISO 10360-4, Probe system used: SP25M with ø4 x 50mm stylus, L: Measuring length (mm)

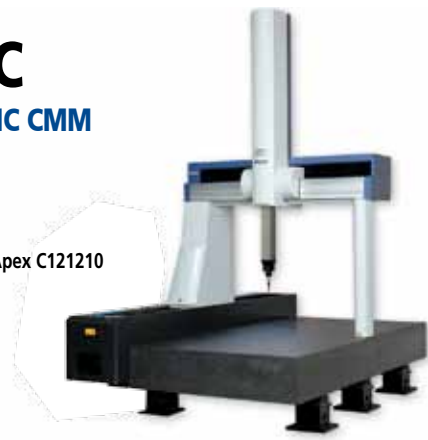
**Guaranteed accuracy temperature range: 64.4°F - 71.6°F (18°C - 22°C).

***Guaranteed accuracy temperature range: 60.8°F - 78.8°F (16°C - 26°C).

Crysta-Apex C

SERIES 191 — Standard CNC CMM

Crysta-Apex C121210



SPECIFICATIONS

Model No.		Crysta-Apex C121210	Crysta-Apex C122010	Crysta-Apex C123010	Crysta-Apex C163012 [Crysta-Apex C163016]	Crysta-Apex C164012 [Crysta-Apex C164016]	Crysta-Apex C165012 [Crysta-Apex C165016]
Range	X-axis	47.44" (1205mm)	47.44" (1205mm)	47.44" (1205mm)	63.18" (1605mm)	63.18" (1605mm)	63.18" (1605mm)
	Y-axis	47.44" (1205mm)	78.93" (2005mm)	118.30" (3005mm)	118.30" (3005mm)	157.67" (4005mm)	197.04" (5005mm)
	Z-axis	39.56" (1005mm)	39.56" (1005mm)	39.56" (1005mm)	47.44" (1205mm) [63.18" (1605mm)]	47.44" (1205mm) [63.18" (1605mm)]	47.44" (1205mm) [63.18" (1605mm)]
Resolution		.000004" (0.0001mm)					
Accuracy*	MPE _E	(2.3+3L/1000)μm**, (2.3+4L/1000)μm***			(3.3+4.5L/1000)μm**, (3.3+5.5L/1000)μm***, [(4.5+5.5L/1000)μm**, (4.5+6.5L/1000)μm***]		
	MPE _P	2.0μm			5.0μm [6.0μm]		
	MPE _{THP}	2.8μm			6.0μm [7.0μm]		
	MPT _{THP}	120 sec					
Work table	Material	Granite					
	Size	55.11" x 85.23" (1400mm x 2165mm)	55.11" x 116.73" (1400mm x 2965mm)	55.11" x 156.10" (1400mm x 3965mm)	70.86" x 165.55" (1800mm x 4205mm)	70.86" x 204.92" (1800mm x 5205mm)	70.86" x 244.29" (1800mm x 6205mm)
	Tapped insert	M8 x 1.25mm					
Workpiece	Max. height	47.24" (1200mm)	47.24" (1200mm)	47.24" (1200mm)	55.11" (1400mm) [70.86" (1800mm)]	55.11" (1400mm) [70.86" (1800mm)]	55.11" (1400mm) [70.86" (1800mm)]
	Max. load	4409 lbs (2000kg)	5511 lbs (2500kg)	6613 lbs (3000kg)	7716 lbs (3500kg)	9920 lbs (4500kg)	11023 lbs (5000kg)
Mass (including controller and stand)		8928 lbs (4050kg)	13558 lbs (6150kg)	20084 lbs (9110kg)	23368 lbs (10600kg) [23479 lbs (10650kg)]	32628 lbs (14800kg) [37738 lbs (14850kg)]	42990 lbs (19500kg) [43100 lbs (19550kg)]
Dimensions (W x D x H)		86.61x95.27x143.50" (2200x2420x3645mm)	86.61x126.77x143.50" (2200x3220x3645mm)	86.61x166.14x143.50" (2200x4220x3645mm)	106.29 x 181.10 x 162.99" (2700 x 4600 x 4140mm) [106.29 x 181.10 x 194.49"] [(2700 x 4600 x 4940mm)]	106.29 x 220.47 x 164.96" (2700 x 5600 x 4190mm) [106.29 x 220.47 x 196.46"] [(2700 x 5600 x 4990mm)]	106.29 x 259.84 x 166.93" (2700 x 6600 x 4240mm) [106.29 x 259.84 x 198.43"] [(2700 x 6600 x 5040mm)]

Model No.		Crysta-Apex C203016 [Crysta-Apex C203020]	Crysta-Apex C204016 [Crysta-Apex C204020]	Crysta-Apex C205016 [Crysta-Apex C205020]
Range	X-axis	78.93" (2005mm)	78.93" (2005mm)	78.93" (2005mm)
	Y-axis	118.30" (3005mm)	157.67" (4005mm)	197.04" (5005mm)
	Z-axis	63.18" (1605mm) [78.93" (2005mm)]	63.18" (1605mm) [78.93" (2005mm)]	63.18" (1605mm) [78.93" (2005mm)]
Resolution		.000004" (0.0001mm)		
Accuracy*	MPE _E	(4.5+8L/1000)μm**, (4.5+9L/1000)μm*** [(6+9L/1000)μm**, (6+10L/1000)μm***]		
	MPE _P	6.0μm [7.5μm]		
	MPE _{THP}	6.0μm [7.5μm]		
	MPT _{THP}	150 sec		
Work table	Material	Granite		
	Size	86.61" x 165.55" (2200mm x 4205mm)	86.61" x 204.92" (2200mm x 5205mm)	86.61" x 244.29" (2200mm x 6205mm)
	Tapped insert	M8 x 1.25mm		
Workpiece	Max. height	70.86" (1800mm) [86.61" (2200mm)]	70.86" (1800mm) [86.61" (2200mm)]	70.86" (1800mm) [86.61" (2200mm)]
	Max. load	8818 lbs (4000kg)	11023 lbs (5000kg)	13227 lbs (6000kg)
Mass (including controller and stand)		31085 lbs (14100kg) [31195 lbs (14150kg)]	42990 lbs (19500kg) [43100 lbs (19550kg)]	61729 lbs (28000kg) [61839 lbs (28050kg)]
Dimensions (W x D x H)		122.04 x 181.10 x 196.45" (3100 x 4600 x 4990mm) [122.04 x 181.10 x 227.95"] [(3100 x 4600 x 5790mm)]	122.04 x 220.47 x 198.42" (3100 x 5600 x 5040mm) [122.04 x 220.47 x 229.92"] [(3100 x 5600 x 5840mm)]	122.04 x 259.84 x 202.36" (3100 x 6600 x 5140mm) [122.04 x 259.84 x 233.85"] [(3100 x 6600 x 5940mm)]

*When using temperature compensation system.

ISO10360-2: 2001 & ISO10360-4, Probe system used: SP25M with φ4 x 50mm stylus, L: Measuring length (mm)

**Guaranteed accuracy temperature range: 64.4°F - 71.6°F (18°C - 22°C)

***Guaranteed accuracy temperature range: 60.8°F - 78.8°F (16°C - 26°C), 60.8°F - 75.2°F (16°C - 24°C) for 1600, 2000 Series.

LEGEX

SERIES 356 — Ultra-high Accuracy CNC CMM

Achieving premium performance, the fixed bridge structure and precision air bearings resting on the rigid guideways ensure superior stability of motion and ultra-high measuring accuracy. It is suitable for complex small to medium size workpieces such as a gear, bearing, lens, die, or scroll rotor which require high dimensional accuracy. The MPP-300Q probe adds a scanning function to the standard point-to-point measurement.



LEGEX 322

FEATURES

- The ultra high accuracy CNC CMM family is made possible by rigorous analysis of all possible error-producing factors and elimination or minimization of their effects.
- A newly developed, ultra-high accuracy crystallized glass scale with ultra-low expansion coefficient of $0.01 \times 10^{-6}/C$ is used on each axis.
- The fixed bridge structure and precision air bearings* running on highly rigid guideways ensure superior motion stability and ultra-high geometrical accuracy.
- A wide variety of optional probes such as touch-trigger probes, laser scanning probes, and a vision measuring probe are available.

*Linear bearing: LEGEX 322



LEGEX 12128



Mitutoyo original standard type glass scale (above) and ultra-high accuracy glass scale with virtually zero thermal expansion (below)



CMM calibration tool using the virtually zero thermal expansion glass gage

Technical Data

Length standard:	Ultra high accuracy linear encoder (glass scale with virtually zero thermal expansion coefficient)
Guide system:	Air bearing (linear guide: LEGEX 322)
Max. drive speed:	200mm/sec
Max. acceleration:	0.1G (0.085G: LEGEX 322)
Air pressure:	0.4MPa (0.5MPa: LEGEX 9106, No Air: LEGEX 322)
Air consumption:	120L/min

Guaranteed accuracy temperature environment*

Temperature range	68.0°F±3.6°F (20±2°C)
Temperature change	Per hour 0.5K
	Per 24 hours 1.0K
Temperature gradient	Vertical 1.0K/m
	Horizontal 1.0K/m

Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

SPECIFICATIONS

Model No.	LEGEX 322	LEGEX 574	LEGEX 774	LEGEX 776	LEGEX 9106	LEGEX 12128
Range	X-axis	11.81" (300mm)	20.07" (510mm)	27.95" (710mm)	27.95" (710mm)	47.63" (1210mm)
	Y-axis	7.87" (200mm)	27.95" (710mm)	27.95" (710mm)	27.95" (710mm)	47.63" (1210mm)
	Z-axis	7.87" (200mm)	17.91" (455mm)	17.91" (455mm)	24.01" (610mm)	24.01" (610mm)
Resolution	.0000004" (0.00001mm)					
Accuracy*	MPE _E	(0.8+2L/1000)μm	(0.35+L/1000)μm			(0.6+1.5L/1000)μm
	MPE _P	1μm	0.45μm			0.6μm
	MPE _{THP}	—	1.4μm			1.8μm
	MPT _{THP}	—	150 sec			
Work table	Material	Steel	Cast iron (Ceramic coating optional)	Cast iron (Ceramic coating optional)	Cast iron (Ceramic coating optional)	Cast iron (Ceramic coating optional)
	Size	15.71" x 10.67" (399mm x 271mm)	21.65" x 29.52" (550mm x 750mm)	29.52" x 29.52" (750mm x 750mm)		37.40" x 41.33" (950mm x 1050mm)
	Tapped insert	M8 x 1.25mm				
Workpiece	Max. height	8.27" (210mm)	27.8" (706mm)	27.4" (696mm)	34.13" (867mm)	33.89" (861mm)
	Max. load	33 lbs (15kg)	551 lbs (250kg)	1102 lbs (500kg)		1763 lbs (800kg)
Mass (main unit)	573 lbs (260kg)	7716 lbs (3500kg)	11023 lbs (5000kg)	11243 lbs (5100kg)	14330 lbs (6500kg)	23148 lbs (10500kg)
Dimensions (W x D x H)	30.87 x 34.49 x 38.17" (784 x 876 x 970mm) w/o stand	62.44 x 100.00 x 102.16" (1586 x 2540 x 2595mm)	78.07 x 102.20 x 101.77" (1856 x 2596 x 2585mm)	78.07 x 102.20 x 113.58" (1856 x 2596 x 2885mm)	80.94 x 125.98 x 119.29" (2056 x 3200 x 3030mm)	92.75 x 142.59 x 141.33" (2356 x 3622 x 3590mm)

* When using temperature compensation system.
ISO10360-2: 2001 & 10360-4, Probe system used: MPP-300Q (TP7M: LEGEX 322), L: Measuring length (mm)

STRATO-Apex

SERIES 355 — High Accuracy CNC CMM

Technical Data

Length standard:	High accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	519mm/sec (500mm/sec: 1600 series)
Max. acceleration:	0.23G (0.13G: 1600 series)
Air pressure:	0.4MPa
Air consumption:	50L/ min: 700 Series 70L/ min: 900 Series 150L/ min: 1600 Series

STRATO-Apex Guaranteed accuracy temperature environment*

Temperature range	66.2°F - 69.8°F (19°C - 21°C)	
Temperature change	Per hour	1.0K
	Per 24 hours	2.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

FALCIO-Apex 162012



FALCIO-Apex 1600 Guaranteed accuracy temperature environment*

Temperature range	64.4°F - 71.6°F (18°C - 22°C)	
Temperature change	Per hour	1.0K
	Per 24 hours	2.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

High performance models in the STRATO / FALCIO-Apex series have a high-end moving bridge type CNC CMM with upgraded kinematic accuracy.

FEATURES

- High measuring accuracy and high-speed motion.
 - Full-digital motion control.
 - Improved rigid air bearings on all axial guideways.
- Temperature compensation system.



STRATO-Apex 700/900

SPECIFICATIONS

Model No.	STRATO-Apex 776	STRATO-Apex 7106	STRATO-Apex 9106	STRATO-Apex 9166
Range	X-axis	27.75" (705mm)		35.62" (905mm)
	Y-axis	27.75" (705mm)	39.56" (1005mm)	63.18" (1605mm)
	Z-axis	23.81" (605mm)		
Resolution	0.0000008" (0.00002mm)			
Accuracy*	MPE _E	(0.9+2.5L/1000)μm		
	MPE _P	1.2μm		
	MPE _{THP}	2.0μm		
Work table	Material	Granite		
	Tapped insert	M8 x 1.25mm		

FALCIO-Apex

SERIES 355 — High Accuracy CNC CMM

SPECIFICATIONS

Model No.	FALCIO-Apex 162012 [FALCIO-Apex 162015]	FALCIO-Apex 163012 [FALCIO-Apex 163015]	FALCIO-Apex 164012 [FALCIO-Apex 164015]	
Range	X-axis	63.18" (1605mm)		
	Y-axis	78.93" (2005mm)	118.30" (3005mm)	157.67" (4005mm)
	Z-axis	47.44" (1205mm) [59.25" (1505mm)]		
Resolution	0.000004" (0.0001mm)			
Accuracy*	MPE _E	(3.8+4.0L/1000)μm [(4.8+5.0L/1000)μm: Z-axis = 1505mm]		
	MPE _P	2.8μm [3.3μm]		
	MPE _{THP}	2.8μm [3.8μm]		
Work table	Material	Granite		
	Size	72.83" x 129.13" (1850mm x 3280mm)	72.83" x 168.50" (1850mm x 4280mm)	72.83" x 207.87" (1850mm x 5280mm)
	Tapped insert	M8 x 1.25mm		
Workpiece	Max. Ht.	53.14" (1350mm) [64.96" (1650mm)]		
	Max. Wt.	396 lbs (180kg)		
Mass (includes controller & air stand)	21054 lbs (9550kg) [21164 lbs (9600kg)]	30864 lbs (14000kg) [30974 lbs (14050kg)]	55115 lbs (25000kg) [55225 lbs (25050kg)]	
Dimensions (WxDxH)	110.35 x 145.07 x 170.86" (2803 x 3685 x 4340mm) [110.35 x 145.07 x 194.48"] [(2803 x 3685 x 4940mm)]	110.35 x 145.07 x 172.83" (2803 x 3685 x 4390mm) [110.35 x 145.07 x 196.45"] [(2803 x 4685 x 4990mm)]	110.35 x 145.07 x 176.77" (2803 x 3685 x 4490mm) [110.35 x 145.07 x 200.39"] [(2803 x 5685 x 5090mm)]	

*When using temperature compensation system.
ISO10360-2: 2001 & ISO10360-4, L: Measuring length (mm), Probe system: SP25M with ø4 x 50mm stylus

Bright-STRATO

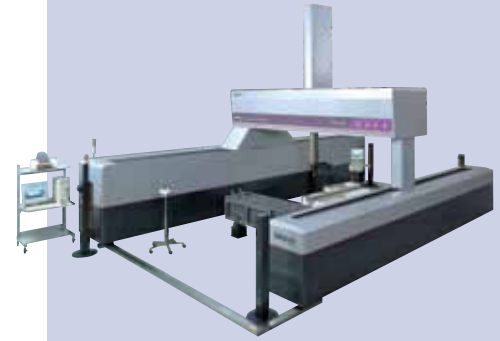
SERIES 355 — High Accuracy Large CNC CMM

FEATURES

This large-scale CNC CMM provides a huge measuring range of 80" x 120" x 60" (2000mm x 3000mm x 1500mm) to 120" x 200" x 80" (3000mm x 5000mm x 2000mm).



Bright-STRATO 305015



Technical Data

Length standard:	High accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	430mm/sec
Max. acceleration:	0.17G
Air pressure:	0.4MPa
Air consumption:	120L/min

SPECIFICATIONS

Model No.	Bright-STRATO 203015	Bright-STRATO 204015	Bright-STRATO 205015	Bright-STRATO 305015
Range	X-axis	78.94" (2005mm)	78.94" (2005mm)	118.31" (3005mm)
	Y-axis	118.31" (3005mm)	157.68" (4005mm)	197.05" (5005mm)
	Z-axis	59.25" (1505mm)	59.25" (1505mm)	59.25" (1505mm)
Resolution	.000004" (0.0001mm)			
Accuracy*	E	(4.8+5L/1000)µm		(5.5+5L/1000)µm
	R	5µm		5µm
Mass (main unit)	26400 lbs (12000kg)	30800 lbs (14000kg)	33000 lbs (15000kg)	35200 lbs (16000kg)

* The machine is equipped with the temperature compensation system.
Conformed standard: ISO10360-2 L: Measuring length (mm)

Guaranteed accuracy temperature environment*

Temperature range	64.4°F - 71.6°F 18°C - 22°C	
Temperature change	Per hour	1.0K
	Per 24 hours	2.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

*When using temperature compensation system.

Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

CP

SERIES 355 — Horizontal-arm Type Manual CMM

SPECIFICATIONS

Model No.	CP1057	
Range	X-axis	39.37" (1000mm)
	Y-axis	19.69" (500mm)
	Z-axis	29.53" (750mm)
Resolution	.00002" (0.0005mm)	
Accuracy*	E	(15+10L/1000)µm
	R	12µm
Probe positioning	Manual via control wheels	
Air supply	Pressure	0.4MPa
	Consumption	40L/min
Mass (main unit)	495 lbs (225kg)	
Dimensions (H x W x D)	61.22x72.05x36.65" (1555x1830x931mm)	

* The machine is equipped with the temperature compensation system.
Conformed standard: ISO10360-2: 2001 Probe system used: TP20
L: Measuring length (mm)



Guaranteed accuracy temperature environment*

Temperature range	59.0°F - 86.0°F 15°C - 30°C	
Temperature change	Per hour	2.0K
	Per 24 hours	5.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

*When using temperature compensation system.

• Operating Convenience

The user makes a measurement by simply operating the X, Y, and Z control wheels to bring the touch-trigger probe into contact with target points on the workpiece.

• Measuring Large Workpieces

Large workpieces that exceed the measuring range of the CP1057 can be measured, indirectly, by moving the CP1057's main unit along the surface plate and linking the measurement results obtained before and after movement.

• A Choice of Probes

Various probes are available for the CP1057, such as a point probe that can be used for scribed line pointing measurements, in addition to the standard touch-trigger probe.

• Temperature Compensation System (Option)

An optional temperature compensation system can be installed in the CP1057 to ensure measuring accuracy is maintained over a wide temperature range 59°F - 86°F (15°C to 30°C).

CARBstrato / CARBapex

SERIES 355 — Car Body Measuring System

FEATURES: CARBstrato

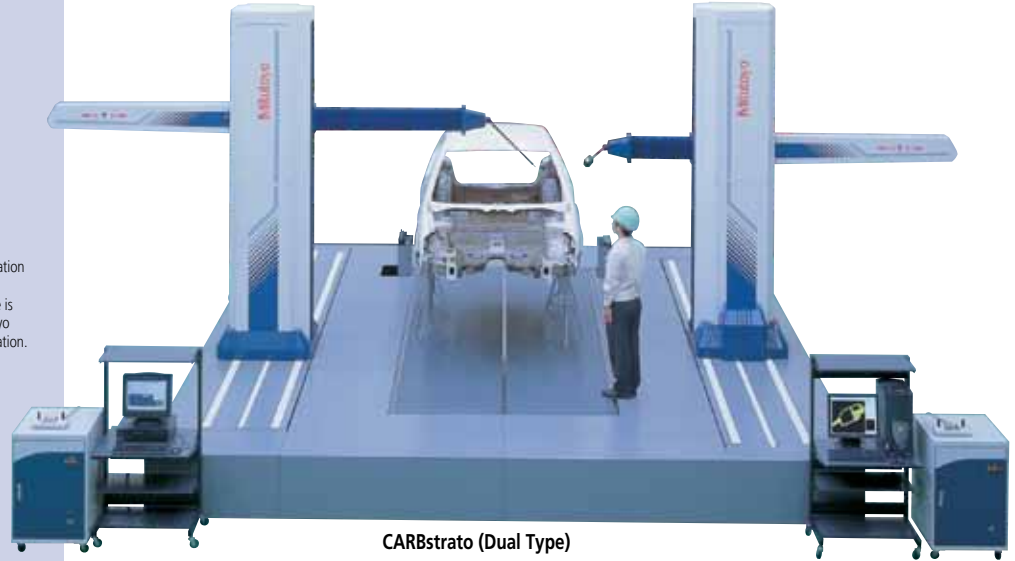
A very large, high precision, horizontal-type CNC CMM scaled for measuring car bodies. Single-arm or dual-arm types are available. The dual-arm configuration measures by controlling two arms simultaneously, one from each side.

FEATURES: CARBapex

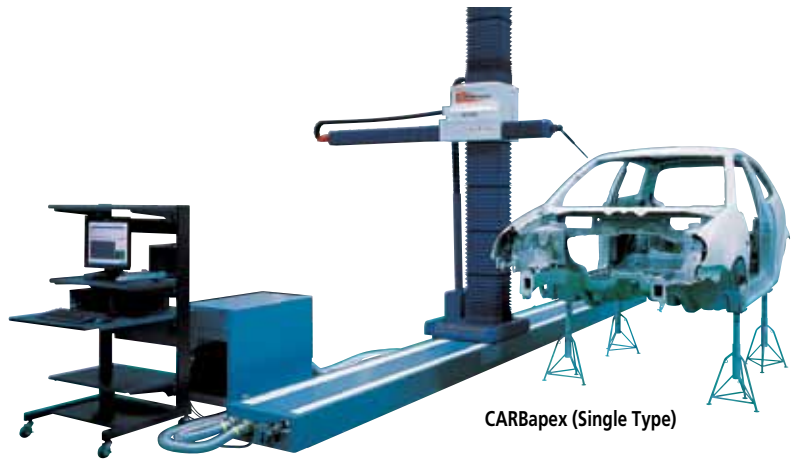
A large, affordable, horizontal-type CNC CMM scaled for measuring car bodies. Single-arm or dual-arm types are available. The dual-arm configuration measures by controlling two arms simultaneously, one from each side.

Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.



CARBstrato (Dual Type)



CARBapex (Single Type)

Technical Data

Length standard: High accuracy linear encoder
 Guide system: Air bearing (Y and Z) Linear Guide (X)
 Max. drive speed: 866mm/sec (CARBstrato) / 519mm/sec (CARBapex)
 Max. acceleration: 0.2G (CARBstrato) / 0.1G (CARBapex)

Guaranteed accuracy temperature environment*

Temperature range		60.8°F - 78.8°F 16°C - 26°C
Temperature change	Per hour	1.0K
	Per 24 hours	5.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

*When using temperature compensation system.

SPECIFICATIONS

Model No.		CARBstrato	CARBapex
Range	X-axis	236.22" (6000mm)	236.22" (6000mm)
	Y-axis	62.99" (1600mm)	62.99" (1600mm)
	Z-axis	94.49" (2400mm)	94.49" (2400mm)
Accuracy* MPE _E	Single	18+20L/1000≤70μm	25+28L/1000≤95μm
	Dual	38+30L/1000≤90μm	50+35L/1000≤120μm
Max Measuring Range	X-axis	708.66" (18000mm)	708.66" (18000mm)
	Z-axis	137.80" (3500mm)	137.80" (3500mm)
	Single Y	78.74" (2000mm)	78.74" (2000mm)
	Dual Y	153.54" (3900mm)	153.54" (3900mm)
Dimensions (H x W x D)		155.63x176.10x288.35" (3953x4473x7324mm)	144.33x163.19x275.59" (3666x4145x7000mm)

Conformed standard: ISO10360-2: 2001
 Probe system used: TP2/TP20 with ø3 x 20mm stylus
 L: Measuring length (mm)

Mitutoyo

MACH-V565 /9106

SERIES 360 — In-line Type CNC CMM

FEATURES

The MACH-3A and MACH-V maximize machining operations by performing in-line or near-line, high speed coordinate measuring in conjunction with your CNC machine tools. These high throughput machines can be incorporated right into the manufacturing line and can provide pre/post machining feedback to your machine tool for machining adjustments.

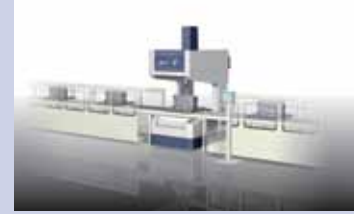


MACH-V9106

SPECIFICATIONS

Model No.	MACH-V565	MACH-V9106
Range	X-axis	19.88" (505mm)
	Y-axis	23.82" (605mm)
	Z-axis	19.88" (505mm)
Resolution	0.000004" (0.0001mm)	
Accuracy*	MPE _E	(2.5+3.5L/1000)μm / (2.9+4.3L/1000)μm / (3.6+5.8L/1000)μm**
	MPE _P	2.5μm (2.2μm: using SP25M)
Dimensions (W x D x H)	86.81x41.57x103.86" (2205x1056x2638mm)	118.31x57.36x112.68" (3005x1457x2862mm)

* The machine is equipped with the temperature compensation system.
 ** Guaranteed accuracy temperature range: 66.2°F - 69.8°F (19°C - 21°C), 59°F - 77°F (15°C - 25°C), 41°F - 95°F (5°C - 35°C)



Technical Data

Length standard: High accuracy linear encoder
 Guide system: Linear guide: MACH-V
 Max. drive speed: 866mm/sec: MACH-V
 Max. acceleration: 0.86G: MACH-V

Guaranteed accuracy temperature environment

Temperature range	5°C - 35°C	
Temperature change	Per hour	2.0K
	Per 24 hours	10.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

MACH-3A 653

SERIES 360 — In-line Type CNC CMM



SPECIFICATIONS

Model No.	MACH-3A 653	
Range	X-axis	23.81" (605mm)
	Y-axis	19.88" (505mm)
	Z-axis	11.22" (285mm)
Resolution	0.000004" (0.0001mm)	
Accuracy*	MPE _E	(2.5 + 3.5L/1000)μm, (2.8 + 4.2L/1000)μm, (3.2 + 5.0L/1000)μm, (3.5 + 5.7L/1000)μm, (3.9 + 6.5L/1000)μm**
	MPE _P	2.5μm
Dimensions W x D x H	(1870 x 1280 x 1920mm) 73.62" x 50.39" x 75.59"	

* The machine is equipped with the temperature compensation system.
 According to ISO 10360-2 methods when using the TP7M probe system with a ø4 x 20mm stylus. L: Measuring length (mm)
 ** Guaranteed accuracy temperature range: 19°C - 21°C / 15°C - 25°C / 10°C - 30°C / 5°C - 35°C / 35°C - 40°C

Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

Technical Data

Length standard: High accuracy linear encoder
 Guide system: Linear guide
 Max. drive speed: 1212mm/sec
 Max. acceleration: 1.2G

Guaranteed accuracy temperature environment

Temperature range	5°C - 40°C	
Temperature change	Per hour	2.0K
	Per 24 hours	10.0K
Temperature gradient	Vertical	1.0K/m
	Horizontal	1.0K/m

Main Unit Startup System

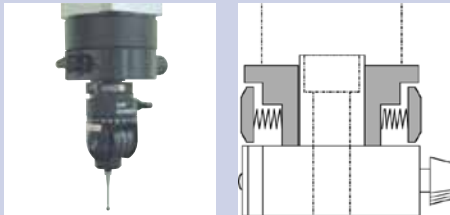
This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation.

Crysta-Plus M443 / 574 / 7106

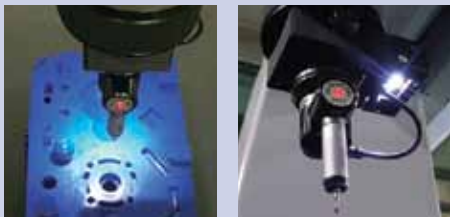
SERIES 196 — Manual-Floating Type CMM



One-touch air clamp and fine feed for rapid and easy positioning



Ergonomically designed guide grip on Z-axis for reliable measurement
(only for Crysta-Plus M776 and M7106)



Probe illumination (optional) to illuminate the probe and styli directly and brighten the working field

Manual floating type CMMs developed in quest for high-accuracy, low-cost and easy operation. The Crysta-Plus M is suitable to measure a wide range of applications from a simple dimension to complex form.

FEATURES

- Smooth operation utilizing high-precision air bearings and lightweight moving members.
- Continuous fine feed over the entire measuring range.
- One-touch air clamp for each axis.

Crysta-Plus M443



Crysta-Plus M574



Crysta-Plus M7106



Technical Data

Length standard: High accuracy linear encoder
Guide system: Air bearing
Axis clamp: One-touch air clamp
(Screw clamp: M776, M7106)
Fine feed range: Entire range
Air pressure: 0.4MPa (0.35MPa: M443, M574)
Air consumption: 50L/min

Guaranteed accuracy temperature environment

Temperature range		19°C - 21°C	15°C - 30°C*
Temperature change	Per hour	—	2.0K
	Per 24 hours	—	5.0K
Temperature gradient	Vertical	0.5K/m	1.0K/m
	Horizontal	0.5K/m	1.0K/m

*The values shown in Bold in the table above apply to the case when using the temperature compensation system. (Option)

SPECIFICATIONS

Model No.		Crysta-Plus M443	Crysta-Plus M574	Crysta-Plus M7106
Range	X-axis	15.74" (400mm)	19.69" (500mm)	27.56" (700mm)
	Y-axis	15.74" (400mm)	27.56" (700mm)	39.37" (1000mm)
	Z-axis	11.81" (300mm)	15.74" (400mm)	23.62" (600mm)
Resolution		.00002" (0.0005mm)		
Accuracy*	E	(3.0+4.0L/1000)µm	(3.5+4.5L/1000)µm	(4.5+4.5L/1000)µm
	R	4.0µm		5.0µm
Work table	Material	Granite		
	Size	24.56" x 31.69" (624mm x 805mm)	30.07" x 46.25" (764mm x 1175mm)	35.43" x 68.50" (900mm x 1740mm)
	Tapped insert	M8 x 1.25mm		
Workpiece	Max. Ht.	18.90" (480mm)	23.22" (590mm)	31.49" (800mm)
	Max.Wt.	396 lbs (180kg)		1763 lbs (800kg)
Mass (main unit & stand)		903 lbs (410kg)	1424 lbs (646kg)	3968 lbs (1800kg)
Dimensions (W x D x H)		38.62x41.22x77.44" (981x1047x1967mm)	56.45x47.44x89.25" (1434x1205x2267mm)	57.48x79.40x111.81" (1460x2017x2840mm)

* ISO10360-2: 2001, L: Measuring length (mm), Temp: 20°C ± 1°C, Probe system: TP20

CMM Probes

Scanning probe system



MPP-300Q
MPP-300
Ultra-high accuracy and low measuring force type



SP80
High accuracy type and available with 500mm long extension stylus



SP25M
Compact and high accuracy type



MPP-10
For effective screw depth measurement

Optical (non-contact) probe system



QVP (Quick Vision Probe)
For video measurement



CF20
Centering microscope system



CMM Probes

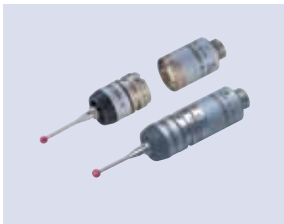
Touch-trigger probe system



TP7M
High accuracy type



TP200
Compact and high accuracy (stylus change) type



TP20 Compact (stylus change) type



Micro Touch probe
UMAP-CMM



MH20i / MH20 Manual head type



Probe heads



PH10M / PH10MQ
Motor drive index type



MIH
Manual index type

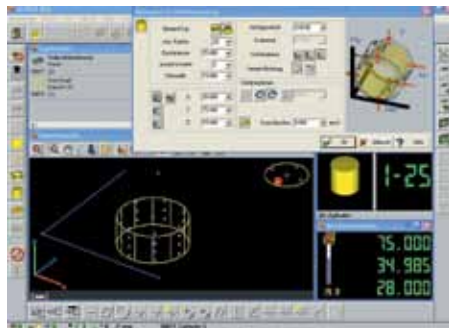
MCOSMOS

Software for Manual / CNC Coordinate Measuring Machine

Three levels of module configuration

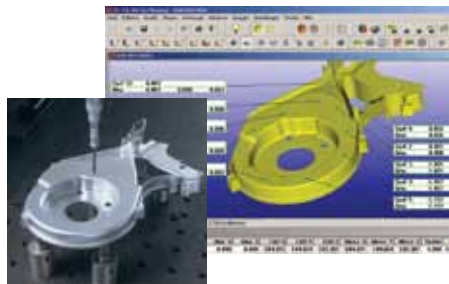
MCOSMOS has three choices of module configuration. From the basic MCOSMOS C1 to the advanced MCOSMOS C3, you can choose a best configuration for your measurement applications.

Module included	GEOPAK	CAT1000P	CAT1000S	SCANPAK
MCOSMOS C1	✓	—	—	—
MCOSMOS C2	✓	✓	—	—
MCOSMOS C3	✓	✓	✓	✓



GEOPAK (Geometry module)

Geopak is our universal geometric measurement program, which allows you to control the measurement of your workpiece from drawing to completion, or simply to run existing measurement programs on a repeat basis.



CAT1000S (free form surface evaluation module)

In addition to the online/offline part program creation, CAD model based generation of surface measurement points, and comparison of actual/nominal data, with graphical output.



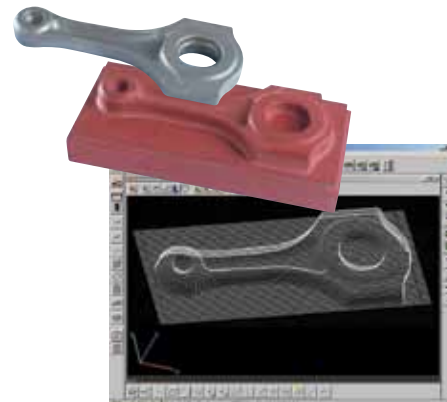
GEARPAK (gear measurement and analysis module)

Advances in CMM controller techniques make the measurement of gears feasible, and the Gearpak module takes advantage of this to bring sophisticated measurement capabilities within easy reach.



CAT1000P (offline part program module)

For online/offline part program creation, using the measurement of geometric elements directly from the CAD model, with automatic collision avoidance.



SCANPAK (2D profile evaluation module)

For the scanning and evaluation of workpiece contours (2D), and data transfer to CAD system.



MAFIS (Mitutoyo Airfoil Inspection System)

Evaluation and analysis of airfoil shape such as Turbine Blades require special calculations according to the particular design specifications. The MAFIS system uses cross sectional data of the shape obtained by Scanpak to perform these calculations, and output the result via the standard geometry program.



Quick Vision ELF

Bench-Top CNC Vision Measuring Systems

FEATURES

- **Controller-integrated compact size design**

This series is appropriate for installation at a small site because of its light weight and space saving design.

- **Small body packed full of functions**

This series offers various types of machines equipped with the PRL illuminator and power turret. Also, the laser auto-focus unit can be installed.

- The highest performance/cost ratio of the Quick Vision series



SPECIFICATIONS

Model No. and Type		QVELF202 PRO machine
Range	X-axis	10" / 250mm
	Y-axis	8" / 200mm
	Z-axis	8" / 200mm
Resolution		0.1μm
High-sensitivity CCD camera		B&W
Accuracy* (20°C±0.2°C)	E _{1XY}	(2.0+3L/1000)μm
	E _{1Z}	(3.0+5L/1000)μm
Max. drive speed (XYZ-axis)		200mm/s
Illumination (PRL: Programmable Ring Light)	Surface	LED, White
	Contour	LED, White
	Ring light	LED, White
Magnification change system**		Turret
Stage glass size		10.59 x 12.24" / 269 x 311mm
Max workpiece load		33lbs / 15kg
Optional accessory		laser auto-focus (factory installed option)

* The measuring accuracy is defined at the following conditions
 Programmable power turret: 1X Objective set: 5X L = Dimension between two arbitrary points (mm)
 **Fixed: Optical system with fixed magnification, Turret: Programmable Power Turret

QV Apex / Hyper QV

SERIES 363 — CNC Vision Measuring System



QV Apex302PRO



Hyper QV404PRO



QV Apex606PRO

Optional Accessories

- 02AKT250:** 1X objective (HR type)
- 02ALA150:** 1X objective (SL type)
- 02AKT300:** 2.5X objective (HR type)
- 02ALA170:** 2.5X objective (SL type)
- 02ALA420:** 5X objective
- 02AKN020:** Calibration glass chart



SPECIFICATIONS

Model No.		QV Apex302PRO QV Apex302PRO2 QV Apex302PRO3 Hyper QV302PRO	QV Apex404PRO QV Apex404PRO2 QV Apex404PRO3 Hyper QV404PRO	QV Apex606PRO QV Apex606PRO2 QV Apex606PRO3 Hyper QV606PRO
Range	X-axis	12" / 300mm	16" / 400mm	24" / 600mm
	Y-axis	8" / 200mm	16" / 400mm	26" / 650mm
	Z-axis	8" / 200mm	10" / 250mm	10" / 250mm
Resolution		0.1µm [0.02µm]		
High-sensitivity CCD camera		B&W (PRO3 model: color)		
Accuracy*	E1XY	(1.5+3L/1000)µm [(0.8+2L/1000)µm]		
	E1z	(1.5+4L/1000)µm [(1.5+2L/1000)µm] [PRO2 model: (4.0+5L/1000)µm]		
	E2XY	(2+4L/1000)µm [(1.4+3L/1000)µm] [PRO2 model: (2.5+4L/1000)µm]		
Illumination (PRL: Programmable Ring Light)	Surface	LED, RGB (PRO2 and PRO3 models: Halogen)		
	Contour	LED, white (PRO2 and PRO3 models: Halogen)		
	PRL	LED, RGB (PRO2 and PRO3 models: Halogen)		
Magnification change system		Programmable power turret (PRO2 model: Programmable power zoom lens)		
Max. drive speed	XY-axis	300mm/s [200mm/s]	400mm/s [200mm/s]	400mm/s [200mm/s]
	Z-axis	300mm/s [200mm/s]	300mm/s [200mm/s]	300mm/s [200mm/s]
Stage glass size		15.7x10.7" / 399 x 271mm	19.4x21.7" / 493 x 551mm	27.4x29.8" / 697 x 758mm
Max workpiece height		7.8" / 200mm	9.8" / 250mm	9.8" / 250mm
Max. stage loading		44lbs [33lbs] / 20kg [15kg]	88lbs [66lbs] / 40kg [30kg]	110lbs [88lbs] / 50kg [40kg]
Dimensions (W x D x H)**		33.8 x 37.4 x 63.3" 859 x 951 x 1609mm	40.4 x 55.3 x 70" 1027 x 1407 x 1778mm	51.5 x 78.1 x 70.6" 1309 x 1985 x 1794mm
Mass**		794lbs / 360kg	1276lbs / 579kg	3196lbs / 1450kg

* The measuring accuracy is defined at the following conditions, Programmable power turret: 1X, Objective set: 2.5X, L = Dimension between two arbitrary points (mm)
In PRO2, the zoom magnification is 3X.
**Including machine stand

The optional laser auto-focus unit is optimal for high-speed height and depth measurements. (factory option)

FEATURES



Non-stop Vision Measurement Extreme 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. Eliminating the time needed to accelerate, decelerate and then hold the stage motionless while a measurement is made achieves a extreme improvement in productivity.

Measurement Throughput Comparison between QV STREAM and the Conventional System

STREAM PLUS series: more than 5 times

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

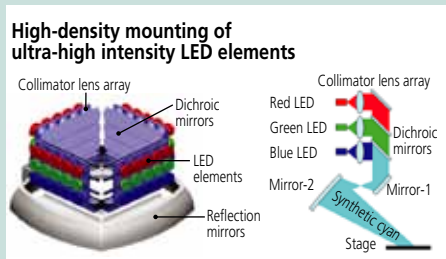
STREAM Mode

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

Newly Developed Stroboscopic Illumination System

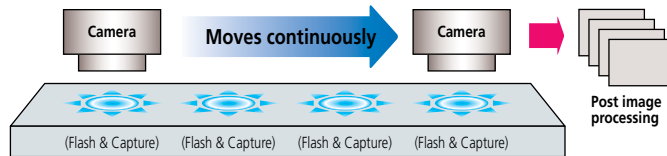
The development of a high-intensity LED flash illuminator made non-stop vision measurement possible. At the precise moment the stage reaches a measurement point the illuminator creates an extremely short, high-intensity flash that effectively freezes all motion. The illuminator turns on and off so fast 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.



QV STREAM PLUS 606

STREAM MODE



Choice of based machine

In addition to the standard QV Apex is available as a based machine.



QV Apex 302

QV STREAM PLUS 404

SPECIFICATIONS

Model No.		QV STREAM PLUS 302	QV STREAM PLUS 404	QV STREAM PLUS 606
Range	X-axis	12" / 300mm	16" / 400mm	24" / 600mm
	Y-axis	8" / 200mm	16" / 400mm	26" / 650mm
	Z-axis	8" / 200mm	10" / 250mm	10" / 250mm
Resolution		0.1µm		
High-sensitivity CCD camera		B&W, progressive scan CCD		
Accuracy*	E1XY	(1.5+3L/1000)µm		
	E1Z	(1.5+4L/1000)µm		
	E2XY	(2.0+4L/1000)µm		
Max. drive speed (XY/Z-axis)		300mm/s	XY: 400mm/s, Z:300mm/s	XY: 400mm/s, Z:300mm/s
Max. measuring speed		40mm/s	40mm/s	40mm/s
Illumination (PRL: Programmable Ring Light)	Surface	Hi-intensity LED [stroboscopic (B) and continuous (RGB & W) illumination, switchable]		
	Contour	Hi-intensity LED [stroboscopic (B) and continuous (B) illumination, switchable]		
	PRL	Hi-intensity LED [stroboscopic (B) and continuous (RGB & W) illumination, switchable]		
Magnification change system		Programmable power turret		
Stage glass size		15.7 x 10.7" / 399 x 271mm	19.4 x 21.7" / 493 x 551mm	27.4 x 29.8" / 697 x 758mm
Max. stage loading		44lbs / 20kg	88lbs / 40kg	110lbs / 50kg
Dimensions (W x D x H)**		33.8 x 37.4 x 63.3"	40.4 x 55.3 x 70"	51.5 x 78.15 x 70.62"
		859 x 951 x 1609mm	1027 x 1407 x 1778mm	1309 x 1985 x 1794mm
Mass**		793lbs / 360kg	1276lbs / 579kg	3196lbs / 1450kg

* The measuring accuracy is defined at the following conditions
Programmable power turret: 1X Objective set: 2.5X
L = Dimension between two arbitrary points (mm)

** Including machine stand

Mitutoyo

QV HYBRID TYPE1, TYPE3

SERIES 365 — CNC Vision Measuring System

FEATURES

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



SPECIFICATION: QV Apex-based

Model No.		QVH Apex302	QVH Apex404	QVH Apex606
Range	Vision	12"x8"x8" 300 x 200 x 200mm	16"x16"x10" 400 x 400 x 250mm	24"x26"x10" 600 x 650 x 250mm
	Non-contact displacement sensor	Type1 7"x8"x8" 180 x 200 x 200mm	Type1 11"x16"x10" 280 x 400x 250mm	Type1 19"x26"x10" 480 x 650 x 250mm
		Type3 7"x8"x8" 176 x 200 x 200mm	Type3 11"x16"x10" 276 x 400 x 250mm	Type3 19"x26"x10" 476 x 650 x 250mm
Accuracy**	E1XY	(1.5+3L/1000)µm		
	E1Z	(1.5+4L/1000)µm / (1.5+4L/1000)µm*		
	E2XY	(2.0+4L/1000)µm		

SPECIFICATION: QV STREAM PLUS-based

Model No.		QVH STREAM PLUS302	QVH STREAM PLUS404	QVH STREAM PLUS606
Range	Vision	12"x8"x8" 300 x 200 x 200mm	16"x16"x10" 400 x 400 x 250mm	24"x26"x10" 600 x 650 x 250mm
	Non-contact displacement sensor	Type1 7"x8"x8" 180 x 200 x 200mm	Type1 11"x16"x10" 280 x 400x 250mm	Type1 19"x26"x10" 480 x 650 x 250mm
		Type3 7"x8"x8" 176 x 200 x 200mm	Type3 11"x16"x10" 276 x 400 x 250mm	Type3 19"x26"x10" 476 x 650 x 250mm
Accuracy**	E1XY	(1.5+3L/1000)µm		
	E1Z	(1.5+4L/1000)µm / (1.5+4L/1000)µm*		
	E2XY	(2.0+4L/1000)µm		

SPECIFICATION: Hyper QV-based

Model No.		Hyper QVH302	Hyper QVH404	Hyper QVH606
Range	Vision	12"x8"x8" 300 x 200 x 200mm	16"x16"x10" 400 x 400 x 250mm	24"x26"x10" 600 x 650 x 250mm
	Non contact displacement sensor	Type1 7"x8"x8" 180 x 200 x 200mm	Type1 11"x16"x10" 280 x 400x 250mm	Type1 19"x26"x10" 480 x 650 x 250mm
		Type3 7"x8"x8" 176 x 200 x 200mm	Type3 11"x16"x10" 276 x 400 x 250mm	Type3 19"x26"x10" 476 x 650 x 250mm
Accuracy**	E1XY	(0.8+2L/1000)µm		
	E1Z	(1.5+2L/1000)µm / (1.5+2L/1000)µm*		
	E2XY	(1.4+3L/1000)µm		

SPECIFICATION: QV ACCEL-based

Model No.		QVH ACCEL808	QVH ACCEL1010	QVH ACCEL1212	QVH ACCEL1517
Range	Vision	32"x32"x6" 800 x 800 x 150mm	40"x40"x6" 1000 x 1000 x 150mm	50"x50"x4" 1250 x 1250 x 100mm	60"x70"x4" 1500 x 1750 x 100mm
	Non contact displacement sensor	Type1 27"x32"x6" 680 x 800 x 150mm	Type1 35"x40"x6" 880 x 1000 x 150mm	Type1 45"x50"x4" 1130 x 1250 x 100mm	Type1 55"x70"x4" 1380 x 1750 x 100mm
Accuracy**	E1XY	(1.5+3L/1000)µm		(2.2+3L/1000)µm	
	E1Z	(1.5+4L/1000)µm / (1.5+4L/1000)µm*		(2.5+5L/1000)µm / (2.5+5L/1000)µm*	
	E2XY	(2.5+4L/1000)µm		(3.5+4L/1000)µm	

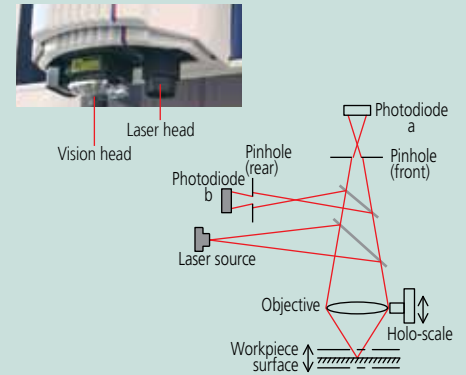
* Using Non-contact displacement sensor

**The measuring accuracy is defined at the following conditions

Programmable power turret: 1X, Objective set: 2.5X, L = Dimension between two arbitrary points (mm)

FEATURES: Hybrid Type1

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



Laser Beam Safety Precautions

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

CLASS 1 LASER PRODUCT

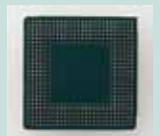
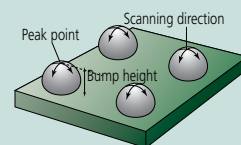
FEATURES: Hybrid Type3

- Enables surface roughness or thickness measurement of thin and transparent objects such as film. Measurable thickness: 25 to 300µm
- Enables detection of high inclination angles both for mirrored surfaces and diffusing surfaces. Maximum tracking inclination angle ±87° (diffusing surface)
- Realizes high-resolution and high-accuracy height measurement by the wavelength confocal method using axial chromatic aberration.

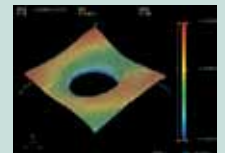
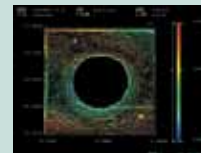
*For Type3, due to the white halogen light, it is not applicable to JIS C 6802 "Radiation safety standard of laser products".

Applications

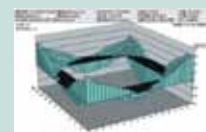
- Measurement of BGA/CSP bump height and coplanarity of IC packages



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



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



Main Unit Startup System

This machine incorporates a startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo prior to relocating this machine after initial installation. Refer to page IX for details.

ULTRA QV

SERIES 363 — Ultra-high Accuracy CNC Vision Measuring System

Standard glass scale

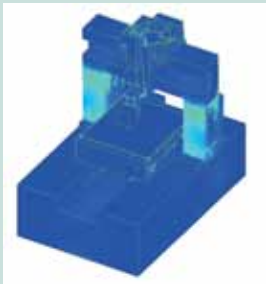


Ultra-high accuracy crystallized glass scale with virtually zero thermal expansion

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



Ultra-precision manufacture eleven meters underground



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.

FEATURES

- Minimizes straightness errors through the use of a precision air-bearing linear guide system.
- Utilizes a $0.01\mu\text{m}$ resolution glass scale manufactured at an ultra-precision facility located eleven meters underground.
- Minimizes accuracy fluctuation against thermal change through the use of virtually zero thermal expansion glass scales.
- Optimizes the mechanical structure of the main unit in Finite Element Method analysis.
- Stabilizes the geometrical accuracy (i.e. straightness of each axis and perpendicularity) to lessen thermal effects.



SPECIFICATIONS

Model No.	ULTRA QV404 PRO	
Range	X-axis	16" / 400mm
	Y-axis	16" / 400mm
	Z-axis	8" / 200mm
Resolution	0.01 μm	
High-sensitivity CCD camera	B&W	
Accuracy* (20°C \pm 0.2°C)	E1XY	(0.25+L/1000) μm
	E1Z	(1.5+2L/1000) μm [(1+2L/1000) μm : 10 - 60mm]
	E2XY	(0.5+2L/1000) μm
Max. drive speed (X/Y/Z-axis)	150mm/sec	
Illumination (PRL: Programmable Ring Light)	Surface	Halogen
	Contour	Halogen
	PRL	Halogen
Magnification change system	Programmable power turret	
Stage glass size	19.4 x 21.7" / 493 x 551mm	
Max. stage loading	88lbs / 40kg	
Dimensions (W x D x H)**	47.2 x 68.3 x 75.2" / 1200 x 1735 x 1910mm	
Mass**	4746lbs / 2150kg	

* The measuring accuracy is defined at the following conditions
Programmable power turret: 1X, Objective set: 5X
L = Dimension between two arbitrary points (mm)

**Including machine stand

QV ACCEL

SERIES 363 — CNC Vision Measuring System

FEATURES

Moving-bridge type structure

Designed with primary focus on measurement efficiency, the machine adopts a more rigid construction and drives the X and Y axes at 400mm/s (QV ACCEL808, ACCEL1010), which is approximately 30% faster than that of standard QV Apex

models. The moving-bridge type structure also eliminates the need for a moving stage. This facilitates a more simplified design of the workpiece fixture, resulting in a significant reduction in the man-hours required for fixture fabrication and inspection.



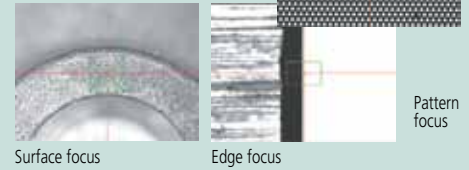
SPECIFICATIONS

Model No.	QV ACCEL808PRO QV ACCEL808PRO3	QV ACCEL1010PRO QV ACCEL1010PRO3	QV ACCEL1212PRO QV ACCEL1212PRO3	QV ACCEL1517PRO QV ACCEL1517PRO3
Range	X-axis	32" / 800mm	40" / 1000mm	50" / 1250mm
	Y-axis	32" / 800mm	40" / 1000mm	50" / 1250mm
	Z-axis	6" / 150mm	6" / 150mm	4" / 100mm
Resolution	0.1µm			
High-sensitivity CCD camera	B&W (PRO3 model: color)			
Accuracy*	E1xy	(1.5+3L/1000)µm		(2.2+3L/1000)µm
	E1z	(1.5+4L/1000)µm		(2.5+5L/1000)µm
	E2xy	(2.5+4L/1000)µm		(3.5+4L/1000)µm
Max. drive speed	X/Y-axis	400mm/s		300mm/s
	Z-axis	150mm/s		150mm/s
Illumination (PRL: Programmable Ring Light)	Surface	LED, RGB (PRO3 models: Halogen)		
	Contour	LED, white (PRO3 models: Halogen)		
	PRL	LED, RGB (PRO3 models: Halogen)		
Magnification change system	Programmable power turret			
Stage glass size	34.8" x 37.7"	46.7" x 46.7"	56.7" x 56.7"	67.5" x 77.5"
	883 x 958mm	1186 x 1186mm	1440 x 1440mm	1714 x 1968mm
Dimensions (W x D x H)	58 x 67.5 x 62"	75.3 x 82 x 63"	85.3 x 92 x 61"	96 x 113 x 61"
	1475x1716x1578mm	1912x2086x1603mm	2166x2340 x1554mm	2440 x 2868 x 1554mm
Max stage loading	22lbs / 10kg		66.1lbs / 30kg	66.1lbs / 30kg
Mass	5666lbs / 2570kg		7937lbs / 3600kg	9921lbs / 4500kg

* The measuring accuracy is defined at the following conditions, Programmable power turret: 1X, Objective set: 2.5X, L = Dimension between two arbitrary points (mm)

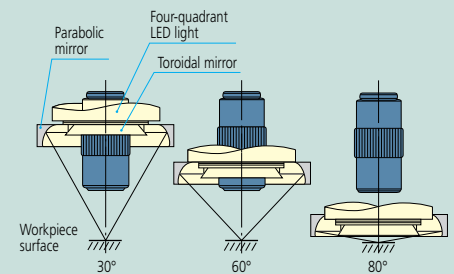
Image Multi-AutoFocus

The optimal focus can be selected for each surface texture and measured feature, realizing high reproducibility and reliable edge detection.



Programmable Ring Light (PRL)

Fine control of obliquity and direction provides illumination optimal for measurement. Obliquity can be arbitrarily set in the range from 30° to 80°. This type of illumination is effective for enhancing the edge of inclined surfaces or very small steps. Illumination can be controlled independently in every direction, back and forth, right and left. Measurement with edge enhancement is possible by forming a shadow by lighting from only one direction.



RGB Color LED Illumination

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



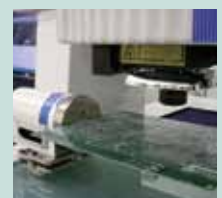
Laser Auto Focus (LAF) Function*

Mitutoyo offers models featuring the LAF system which enables high-speed focusing.
*Available to PRO 3 model.



Optional Index table*

Automatic multi-plane measurement is possible with the optional index table.
*Not available with QV ACCEL models

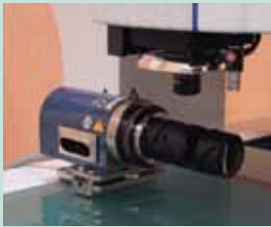


Accessories for Quick Vision



QV-Index Head*

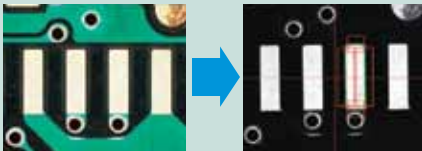
Automatic multi-plane measurement is possible with the optional index table.



Max. workpiece diameter	5.51" / 140mm
Max. workpiece mass	4.41 lbs / 2kg
Min. rotation angle	0.1°
Positioning accuracy	±0.5°
Max. rotation speed	10rpm

RGB color filtering unit*

The color filtering function can be added to the vertical reflected illumination or programmable ring light in Quick Vision models that use a halogen light source. This function enhances the visibility of low-reflection surfaces on colored 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.



Red filter used



* Accessories for Quick Vision Series only

† Accessories for Quick Vision and Quick Scope Series

Objective †

Objective	Order No.	Working distance
QV-SL0.5X	02AKT199	30.5mm
QV-HR1X	02AKT250	40.6mm
QV-SL1X	02ALA150	52.5mm
QV-HR2.5X	02AKT300	40.6mm
QV-SL2.5X	02ALA170	60mm
QV-5X	02ALA420	33.5mm
QV-10X	02ALG010	30.5mm
QV-25X	02ALG020	13mm

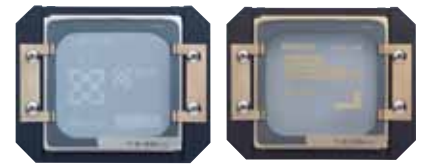
The monitor magnification and field of view values are for the PRO machine.
QV-10X, QV-25X: Depending on a workpiece of illumination may be insufficient at a turret lens magnification of 2X and 6X.
QV-25X: The PRL illumination is restricted in its usable position.

Objective mag.	Turret lens mag.	Monitor mag.	View Field
0.5X	1X	16X	12.54 x 9.40
	2X	32X	6.27 x 4.70
	6X (4X)	96X (64X)	2.09 x 1.56 (3.13 x 2.35)
1X	1X	32X	6.27 x 4.70
	2X	64X	3.13 x 2.35
	6X (4X)	192X (128X)	1.04 x 0.78 (1.56 x 1.17)
2.5X	1X	80X	2.50 x 1.88
	2X	160X	1.25 x 0.94
	6X (4X)	480X (320X)	0.41 x 0.31 (0.62 x 0.47)
5X	1X	160X	1.25 x 0.94
	2X	320X	0.62 x 0.47
	6X (4X)	960X (640X)	0.20 x 0.15 (0.31 x 0.23)
10X	1X	320X	0.62 x 0.47
	2X	640X	0.31 x 0.23
	6X (4X)	1920X (1280X)	0.10 x 0.07 (0.15 x 0.11)
25X	1X	800X	0.25 x 0.18
	2X	1600X	0.12 x 0.09
	6X (4X)	4800X (3200X)	0.04 x 0.03 (0.06 x 0.04)

Calibration glass chart

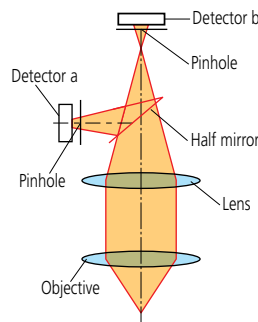
No. 02AKN020 †

A calibration chart is used to compensate for the pixel size of the CCD chip, autofocus accuracy and the optical axis offset at each magnification of the variable magnification unit (PPT).



Laser Auto Focus* (Factory-installed option)

The system can be equipped with a 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	$\sigma = 0.4\mu\text{m}$



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

Quick Scope

SERIES 359 — CNC / Manual Vision Measuring System



QS200Z

SPECIFICATIONS

Model No.		QS200	QS250	QS200Z	QS250Z
Range	X-axis	8" / 200mm	8" / 200mm	8" / 200mm	8" / 200mm
	Y-axis	8" / 200mm	10" / 250mm	8" / 200mm	10" / 250mm
	Z-axis	4" / 100mm	4" / 100mm	4" / 100mm	4" / 100mm
Resolution		0.5µm			
Scale type		Linear encoder			
Measuring accuracy (at 20°C)*		XY: (2.5+6L/1000)µm, Z: (5+6L/1000)µm			
Magnification	Objective	2.5X, 1X, 5X	2.5X, 1X, 5X	0.5X - 3.5X zoom	0.5X - 3.5X zoom
	On monitor	105X (at 2.5X)	105X (at 2.5X)	21X - 147X	21X - 147X
Image detecting unit		Color CCD camera			
Illumination		Surface: co-axial light, fiber-optic ring light		Contour: stage light	
Stage glass size		10.6 x 10.3"	10.6 x 12.2"	10.6 x 10.3"	10.6 x 12.2"
		269 x 261mm	269 x 311mm	269 x 261mm	269 x 311mm
Max. workpiece height		4.3" / 110mm	4.3" / 110mm	4.3" / 110mm	4.3" / 110mm
Max. stage loading		22lbs / 10kg	22lbs / 10kg	22lbs / 10kg	22lbs / 10kg
Dimensions (W x D x H), Mass		18.3 x 32 x 26" / 465 x 815 x 663mm, 167lbs / 76kg			

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



QS-L2010/AFB

SPECIFICATIONS

Model No.	QS-L2010/AFB	QS-L2010Z/AFB	QS-L2010ZB	QS-E2010B
Range (X-axis / Y-axis / Z-axis)	8" x 4" x 6" / 200 x 100 x 150mm			
Resolution	0.1µm			
Scale type	Linear encoder			
Measuring accuracy (at 20°C)*	XY: (2.5+20L/1000)µm Z: (5+6L/1000)µm		XY: (2.5+20L/1000)µm Z: (5+40L/1000)µm	XY: (3+20L/1000)µm Z: (5+40L/1000)µm
Magnification	Objective	2.5X, 1X, 5X	0.5X - 3.5X zoom	0.5X - 3.5X zoom
	On monitor	105X (at 2.5X)	21X - 147X	21X - 147X
Image detecting unit	Color CCD camera		Color CMOS camera	
Illumination	Surface: co-axial light, fiber-optic ring light		Contour: stage light	
Stage glass size	10 x 6" / 250 x 150mm			
Max. workpiece height	6" / 150mm			
Max. stage loading	22lbs / 10kg			
Dimensions (W x D x H), Mass	25 x 28 x 28" / 624 x 705 x 722mm		25 x 30 x 28" / 624 x 769 x 722mm	
Mass	146lbs / 66kg		159lbs / 72kg	

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

FEATURES: CNC model

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

FEATURES: Manual model

- Excellent surface observation model for a wide variety of workpieces.
- 0.1µm resolution and 150mm Z-axis range.
- Power zoom enables easy and fast magnification change. (QS-L2010/AFB is a fixed-magnification type)
- Fine illumination capability enables lighting changes to match workpiece requirements.
- The quick release system on the stage enables instant switching between coarse movement and fine movement.
- Quick Navigation function enables the user to repeat measurements quickly.
- An auto-focus function is available for QS-L2010/AFB and QS-L2010Z/AFB.

Quick Image

SERIES 361 — Non-contact 2-D Vision Measuring System

Quick Image is a new concept in 2-D vision measuring instruments. It provides unique features for improving measurement efficiency.

FEATURES

- Long focal depth and wide field of view
- Telecentric optical system
- Mega-pixel color CCD camera
- Large quadrant LED ring light



SPECIFICATIONS

Model		QI-A505B	QI-B505B	QI-A1010B	QI-B1010B	QI-A2010B	QI-B2010B	QI-A2017B	QI-B2017B	QI-A3017B	QI-B3017B	QI-A4020B	QI-B4020B
Range	X, Y-axis	2 x 2" / 50 x 50mm		4 x 4" / 100x100mm		8 x 4" / 200x100mm		8 x 7" / 200 x 170mm		12 x 7" / 300 x 170mm		16 x 8" / 400 x 200mm	
	Z-axis	1" / 25mm		4" / 100mm		4" / 100mm		4" / 100mm		4" / 100mm		4" / 100mm	
Measuring mode		High-resolution mode and Normal mode											
Accuracy	Within the screen	QI-A models: $\pm 5\mu\text{m}$ (high-resolution mode), $\pm 8\mu\text{m}$ (normal mode) [QI-B models: $\pm 2.7\mu\text{m}$ (high-resolution mode), $\pm 4\mu\text{m}$ (normal mode)]											
	$U_{1\%}$	$\pm(5+0.08L)\mu\text{m}$ L = measuring length (mm)											
Repeatability within the screen ($\pm 2\sigma$)		QI-A models: $\pm 1\mu\text{m}$ (high-resolution mode), $\pm 2\mu\text{m}$ (normal mode) [QI-B models: $\pm 0.7\mu\text{m}$ (high-resolution mode), $\pm 1\mu\text{m}$ (normal mode)]											
CCD camera		Megapixels color CCD camera											
Optical system	Magnification*	0.2X	0.5X	0.2X	0.5X	0.2X	0.5X	0.2X	0.5X	0.2X	0.5X	0.2X	0.5X
	Working distance	90mm											
	Depth of focus	High-resolution mode: $\pm 0.6\text{mm}$, Normal mode: $\pm 1.1\text{mm}$ ($\pm 1.8\text{mm}$) (): QI-B models											
Illumination	Contour	✓		✓		✓		✓		✓		✓	
	Surface	✓		✓		✓		✓		✓		✓	
	4-quadrant LED	✓		✓		✓		✓		✓		✓	
Stage glass size	3.4x3.2" / 86x82mm		6.7x6.7" / 170x170mm		9.5x5.5" / 242x140mm		10.2x9" / 260x230mm		14x9" / 360x230mm		17.3x9" / 440x232mm		
Max. stage loading	11lbs / 5kg		22lbs / 10kg		22lbs / 10kg		44lbs / 20kg		44lbs / 20kg		33lbs / 15kg		
Mass	44lbs / 20kg		154lbs / 70kg		163lbs / 74kg		309lbs / 140kg		326lbs / 148kg		340lbs / 154kg		

*Double telecentric system

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