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En

CNC Video Measuring Systems

Destined to Improve Quality

The NEXIV VMR Series

Destined to Improve Quality

The perfect answer to all your measurement needs

The NEXIV VMR series.

With an expanded lineup that includes small to ultra-wide measurement platforms as well as models with LU-Nikon CFI60 Optics-Head, the NEXIV VMR series provides complete support for all your measurement needs.

NEXIV VMR EZ Solution Finder

Appropriate Object Size (for FOV measurement at highest magnification)	Optical Head	Model						Optional Parts
		VMR-1515/1515 Performa	VMR-3020	VMR-6555	VMR-10080	VMR-12072	VMR-H3030	Color Camera
1*–5 μm	VMR Maximum Magnification Module Model Z120X	High Density & Miniature Machined Parts; MEMS; Probe Cards; LCD-Array Process; Super Zoom & High Accuracy Non-Contact Height Measurement					Ultimate Precision; Advanced Packaging Technology: Water Level CSP, Flipchip	Yes (Limited Use)
4*–20 μm	Type 3	Semiconductor Packaging/Final Assembly Process; Medical Devices; Electronic Devices: SMD/Connector/Ferrule; Dies & Molds; Flat Panel Display Devices; Higher Magnification; OLED/LCD-Cell Process; Module Process; Printed Circuit Boards, Mask Pattern; Large Size, Multiple Parts Measurement					Metrology Laboratory Master Machine	Yes
8*–40 μm	Type 2	Larger Measurement Envelope; Versatile Measurement Tasks; Machined, Cast, Stamped, Etched, & Molded Parts					High Precision Dies & Molds	Yes
16*–80 μm	Type 1							Yes
	Model LU	Appropriate Wafer Size		Appropriate Display Panel Size				
		150mm (6 inch) wafers	200mm (8 inch) wafers	22 in.	37 in.	47 in.		

*For clear edges such as metallized line patterns on a transparent glass.

Optional Parts	Rotary Indexer RI-3600L (for Type 1 to 3)	Yes	Yes	Yes	No	No	Yes	

Standard Provided Software	Online CAD Interface	VMR AutoMeasure / VMR CAD Reader
	Offline CAD Interface	VMR Virtual AutoMeasure
	2D Profile Analysis	VMR Profiler
	Hard / Software Control	VMR Control Program
	Multiple Language Support	English/Japanese / Mandarin Chinese / Traditional Chinese / German / French, etc.
	Data File Management	VMR Data Manager

Optional Software	Quick Data Reporting	VMR Report Generator
	Statistical Process Control	SPC-PC IV / SPC-IV Excel
	3D Surface Analysis	NEXIV Bird's Eye View
	3D Surface & Roughness Analysis	D-Surf
	Gear Evaluation according to ISO	Gear Measurement Software

Ultrahigh-Precision
Measurement Platform

NEXIV VMR-H3030

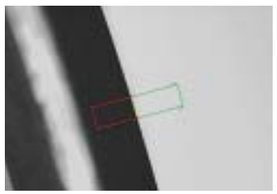
With ultra-high precision and versatility, this model can serve as the master instrument in your laboratory. NEXIV VMR-H3030 achieves sub-micrometer level uncertainty (U1xy 0.6 mm + 2L/1000 µm, U2xy 0.9 + 3L/1000 µm) thanks to optimum layout of the ultra-precise low-thermal expansion glass scales and robust hardware designs. Travel (X, Y, Z) 300 x 300 x 150 mm. Ideal for high precision molds.

Type 1, 2, 3 Models

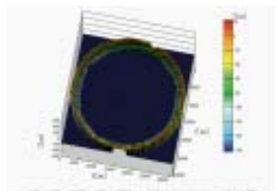
- Ultrahigh precision appropriate for the Master Instrument
- 3 models (type: 1, 2, 3) with 5-step zoom magnification to cover different fields of view and resolution requirements
- Wide illumination choices ensure accurate detection of edges in dies and molds
- Long working distance (50mm) permits measurement of parts with large height variance
- 15X zoom provides wide field of view for rapid search and high magnification for accurate measurement. Accurate calibration at all magnifications allows rapid field of view measurements of multiple parameters.
- User-friendly software

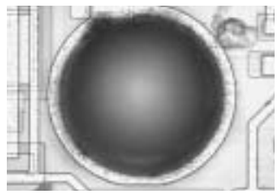
Applications

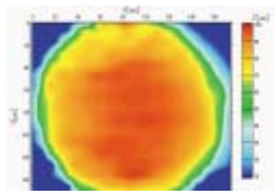
Master calibration instrument for laboratory, Dies and molds, Finely machined parts



Finely Machined Part and its 3D Graphic







Flip Chip Bump and its 3D Graphic

Z120X Model (with Maximum Magnification Module)

With an ultra-precision stage and maximum magnification module, it measures critical workpieces with superior accuracy (e.g., critical dimensions on patterned masks and bump heights).

- 120X optical magnification enables measurements of rerouted patterns on wafer level CSP
- High precision stage facilitates accurate measurements even for wider dimensions
- Enables measurements of top and bottom widths of etched lines
- Laser AF enables measurements of micron-sized bump heights
- Allows evaluation of cross-sectional shapes of bumps and solder balls

Applications

Wafer level CSP, Wafer level bump height, Wafer level SIP, Rerouted masks, Masks for MEMS

Small Part Measurement Platform

NEXIV VMR-1515 and VMR-1515 Performa

The VMR-1515 series has a smaller travel (X, Y, Z) 150 x 150 x 150. A low cost entry model called the Performa (without Laser AF and Outer LED Ring Illuminator) is available for video measurement applications.

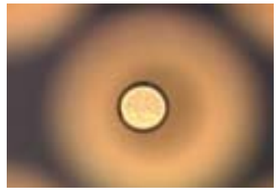
Type 1, 2, 3 Models

- 3 models (type: 1, 2, 3) with 5 step zoom magnification to cover different fields of view and resolution requirements
- A long 50mm working distance sufficiently supports measurements of 3D workpieces
- 15X zoom provides wide field of view for rapid search and high magnification for accurate measurement. Accurate calibration at all magnifications allows rapid field of view measurements of multiple parameters.
- High-speed TTL Laser AF ensures high-precision AF independent of surface shape. (Performa models have only Vision AF, no Laser AF)

Applications

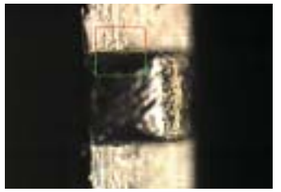
Semiconductor packages, Substrates, Stamped parts, Connectors and small parts, Clock parts

Connector



PGA

Plastic Gear



Black Injection Molding Parts - Connector

Z120X Model (with Maximum Magnification Module)

- 120X optical magnification enables measurements of fine line widths
- High-precision TTL Laser AF features high N.A. and enables measurements of small height gaps
- Perfect for measurements of high-density, finely-machined workpieces
- Optional Bird's-Eye View software plots MEMS parts in 3D format

Applications

Small high-density PCBs, Small precision dies and molds,
Packages (2D + height), MEMS parts

LU Model (universal epi-illuminator/motorized nosepiece)

- Full range of Nikon CFI60 LU microscope objectives from 5x to 150x
- Supports brightfield, darkfield, DIC, simple polarizing applications
- Motorized quintuple universal nosepiece
- Easy to use software controls all functions of the system

Applications

Small-size LCDs, Organic EL panels, wafers up to 150mm

Versatile Part Measurement Platform

NEXIV VMR-3020

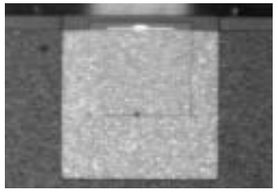
The standard model of the NEXIV series with 300 x 200 mm stage stroke. It handles a variety of measurement tasks including those for mechanical parts, molded parts, stamped parts and various other workpieces.

Type 1, 2, 3 Models

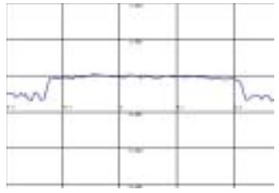
- Variety of illumination choices facilitates accurate detection of edges in molded parts
- 3 models (type: 1, 2, 3) with 5-step zoom magnification to cover different fields of view and resolution requirements
- Long working distance (50mm) permits measurement of parts with large height variances
- 15X zoom provides wide field of view for rapid search and high magnification for accurate measurement. Accurate calibration at all magnifications allows rapid field of view measurements of multiple parameters
- User-friendly software
- Laser AF enables cross-sectional shape and flatness evaluation as well as 3D profiling

Applications

Semiconductor packages, Substrates, Stamped parts, Connectors, Injection molded parts

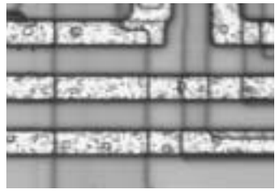


HDD Slider



HDD Slider Height Gap Profile

*****



Circuit Patterns on Flipchip

Z120X Model (with Maximum Magnification Module)

Its maximum magnification module achieves measurements of finely machined workpieces. Perfect for measurements of topical MEMS parts, high-density PCBs and semiconductor packages.

- The combination of the maximum magnification module and high-precision stage enables accurate measurements of large geometry workpieces as well as minute structures
- Laser AF uses small spot size to provide accurate measurements of finer cross-sectional shapes and heights
- Optional surface analysis software displays 3D shapes of MEMS parts

Applications

High-density PCBs, Exposure masks for substrates, Packages (2D + height), MEMS parts

LU Model (universal epi-illuminator/motorized nosepiece)

- Full range of Nikon CFI60 LU microscope objectives from 5x to 150x
- Supports brightfield, darkfield, DIC, simple polarizing applications
- Motorized quintuple universal nosepiece
- Easy to use software controls all functions of the system

Applications

Small-size LCDs, Organic EL panels, 8" (200mm) wafers

Wide Stage Envelopment Platform

NEXIV VMR-6555

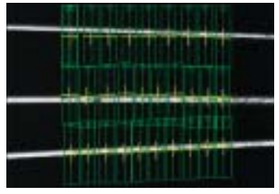
High-speed measurements with large 650 x 550 mm stroke stage. Optimal for measurements of PCB patterns and external dimensions of a display panel. You can save inspection costs by measuring a number of small parts at one time after placing them together on the stage.

Type 1, 2, 3 Models

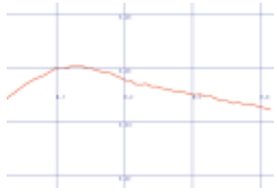
- 650 x 550 mm stage stroke perfect for PCBs
- Automatic measurement of batches of parts by placing multiple pieces together on the stage
- Laser AF achieves high-accuracy measurements of bump heights
- Laser AF also enables measurements of height variance and warping in workpieces
- Search function enables measurements of lands and holes of PCBs
- Search function provides accurate measurements even when workpieces are not properly located on the stage
- Variety of illumination choices facilitate accurate edge detection even for vague geometries
- High-speed stage and image processing provide higher throughput

Applications

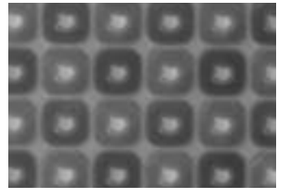
Semiconductor packages (multiple pieces), Substrates, Printing masks for substrates, Stamped parts (multiple pieces), Connectors (multiple pieces), Injection molded parts (multiple pieces)



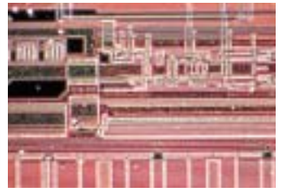
Multi-Vision AF on Bonding Wire



Loop Cross Section



CCD



IC Patterns

Z120X Model (with Maximum Magnification Module)

Amazing 120X zoom combined with a big stage enables ultrahigh magnification measurements on big workpieces. Ideal for measuring high-density PCBs and their masks.

- Amazing 120X zoom
- Measurements of 1µm line widths are possible at the maximum magnification
- Laser AF perfect for measuring small, complicated geometries
- High-speed stage and image processing provide higher throughput

Applications

High-density PCBs, Exposure masks for substrate, Semiconductor packages (multiple pieces; 2D + height), Photo plotter machines for masks, Probe cards

LU Model (universal epi-illuminator/motorized nosepiece)

- Full range of Nikon CFI60 LU microscope objectives from 5x to 150x
- Supports brightfield, darkfield, DIC, simple polarizing applications
- Motorized quintuple universal nosepiece
- Easy to use software controls all functions of the system

Applications

FPD panels (up to 22")

Ultrawide Measurement Platform

NEXIV VMR-10080

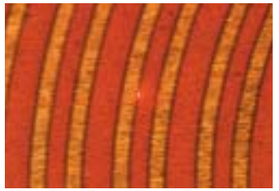
Long 1000 x 800 mm stage stroke performs brilliantly in the measurement of large-size workpieces.

Type 1, 2, 3 Models

- Long stage stroke enables measurements of LCD substrates/modules and large-size PCBs
- 3 models (type: 1, 2, 3) with 5 step zoom magnification to cover different fields of view and resolution requirements
- Laser AF also enables measurements of height variance and warping in workpieces
- Search function facilitates measurements of lands and holes of PCBs
- Variety of illumination choices facilitate accurate edge detection even for vague geometries
- High-speed stage and high-speed image processing provide high throughput

Applications

Printing masks for substrates, Mother substrates for PCBs, Shadow masks, FPD devices



Laser Scan on FPC and its Cross Section

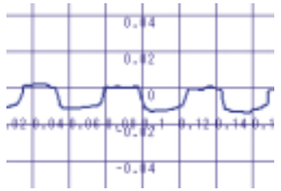


Photo Mask Pattern

Metallized Patterns of FPC

Z120X Model (with Maximum Magnification Module)

The model achieves ultrahigh magnification measurements with a long 1000 x 800 mm stage stroke. Ideal for measuring minute line widths of large-size display panels.

- Automatic measurements of batches of small parts
- Laser AF achieves high-accuracy measurements of bump heights
- Laser AF enables measurements of height variance and warping in workpieces
- Search function enables measurements of lands and holes of PCBs
- Search function also provides accurate measurements even when work-pieces are not located properly on the stage
- Variety of illumination choices facilitate accurate edge detection even for weak edges
- High-speed stage and image processing provide higher throughput

Applications

LCD glass substrates (pattern measurements),
Organic EL glass substrates (pattern measurements)

LU Model (universal epi-illuminator/motorized nosepiece)

- Full range of Nikon CFI60 LU microscope objectives from 5x to 150x
- Supports brightfield, darkfield, DIC, simple polarizing applications
- Motorized quintuple universal nosepiece
- Easy to use software controls all functions of the system

Applications

Large FPD panels (up to 37")

47-inch Display Device Measurement Platform

NEXIV VMR-12072

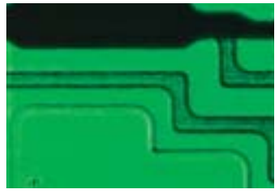
Ultralong 1200 x 720 mm stage stroke allows the measurement of large workpieces such as FPD devices.

Type 1, 2, 3 Models

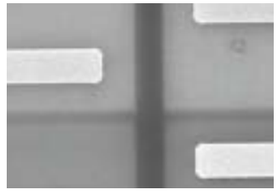
- Ultralong stage stroke enables measurements of large LCD substrates/modules and PCBs
- 3 models (type: 1, 2, 3) with 5 step zoom magnification to cover different fields of view and resolution requirements
- Laser AF enables the measurement of height gaps and warping in workpieces
- Search function enables measurements of lands and holes of PCBs
- Variety of illumination choices facilitate accurate edge detection, even for vague geometries
- High-speed stage and high-speed image processing provide high throughput

Applications

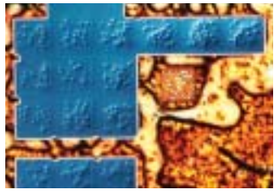
Large FPD panels and related devices



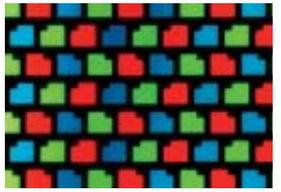
FPD-Cell Process



LCD-TFT



LCM-ACF under DIC Microscopy



Color Filter

Z120X Model (with Maximum Magnification Module)

The model achieves ultrahigh magnification measurements with an ultralong 1200 x 720 mm stage stroke, making it ideal for the measurement of large workpieces such as FPD devices.

- Automatic measurement of batches of small parts
- Laser AF achieves highly accurate measurements of bump heights
- Laser AF also enables the measurements of height gaps and warping in workpieces
- Search function enables measurements of lands and holes of PCBs
- Search function also provides accurate measurements even when work-pieces are not properly located on the stage
- High-speed stage and image processing provide higher throughput

Applications

LCD glass substrates (pattern measurements),
Organic EL glass substrates (pattern measurements)

LU Model (universal epi-illuminator/motorized nosepiece)

- Full range of Nikon CFI60 LU microscope objectives from 5x to 150x
- Supports brightfield, darkfield, DIC, simple polarizing applications
- Motorized quintuple universal nosepiece
- Easy to use software controls all functions of the system

Applications

Large FPD panels and related devices (up to 47"*) * Including module parts.

Ensure measurements with high accuracy and at high speeds.

Optical Head for Type 1, 2, 3

Standard head with 15X high-speed zoom

The standard head features 5-step, 15X high-speed zoom, providing greater flexibility in choosing magnifications according to the size of the measuring area.

Magnification vs field of view (mm)

Zoom position		1	2	3	4	5
Type 1	Optical magnification	0.5x	1x	2x	4x	7.5x
	Total magnification	18x	36x	72x	144x	270x
	Field of view (mm)	9.33 x 7	4.67 x 3.5	2.33 x 1.75	1.165 x 0.875	0.622 x 0.467
Type 2	Optical magnification	1x	2x	4x	8x	15x
	Total magnification	36x	72x	144x	288x	540x
	Field of view (mm)	4.67 x 3.5	2.33 x 1.75	1.165 x 0.875	0.582 x 0.437	0.311 x 0.233
Type 3	Optical magnification	2x	4x	8x	16x	30x
	Total magnification	72x	144x	288x	576x	1080x
	Field of view (mm)	2.33 x 1.75	1.165 x 0.875	0.582 x 0.437	0.291 x 0.218	0.155 x 0.117

Total magnifications listed above represent those on the monitor screen when a 17" TFT monitor is set to the SXGA (1280 x 1024 pixels) mode.

1X

2X

4X

8X

15X

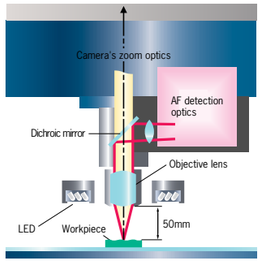
Color cameras can be used (optional).

Widefield, high N.A. objective lens

The highly corrected objective lens is equivalent to those found in Nikon's top-end microscopes. They have a high N.A. of 0.35 with a long 50mm working distance at all magnifications.

Upgraded TTL Laser AF

TTL Laser AF provides high resolution, long working distances, and fast operating speed for perfect focusing on narrow spaces at low magnifications. High-speed scanning measurement is possible at a rate of 1000 points per second max., enabling ultra-precise Z-axis measurements in a variety of applications.

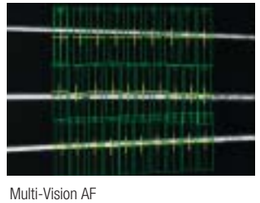


How TTL Laser AF works

High-speed, high-precision Vision AF

Thanks to the adoption of a new algorithm and a progressive scan CCD camera, Vision AF now provides greater speeds and accuracy closer to TTL Laser AF. Vision AF is convenient for applications where TTL Laser AF cannot be used, for example, when focusing on chamfered or round edges. The Multiple-Vision AF enables the simultaneous measurement of multiple points with different heights within the field of view.

Surface focus



Multi-Vision AF

Wide choice of illumination

The VMR series comes with four illumination choices to provide illumination perfect for the workpiece to be measured. These include:

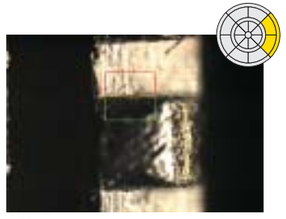
- Two LED ring illuminators—Inner (37 degrees oblique angle against Optical Axis), Outer (75 degrees oblique angle)
- Episcopic illumination (top light)
- Diascopic illumination (bottom light)

Edges previously difficult to capture can be detected with high resolution.
In addition, the VMR series features automatic light intensity control to provide the same brightness to multiple NEXIV systems without the need to edit the teaching program.

Illumination window

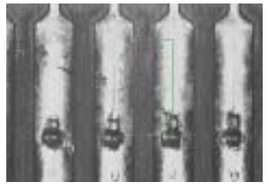
Connector

Episcopic illumination



LED ring illumination
(large angles of incidence)

Metallized Patterns of FPC

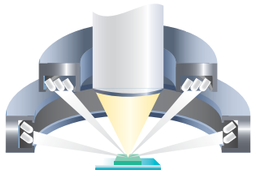


Episcopic illumination

LED ring illumination
(medium angles of incidence)

8-sector LED ring illumination

An illumination system consisting of inner and outer ring illuminators has been specially developed for the VMR series. The system makes possible observations of extremely low-contrast edges which are usually invisible under episcopic illumination by arbitrarily combining illuminations from eight directions. Best for edge enhancement of the contours of bosses, pins, ceramic packages, and similar workpieces.



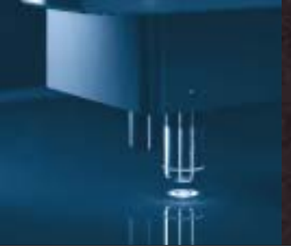
How the 8-sector LED ring illuminator works

Inner ring illuminator

(37° from the optical axis)
This type can be universally used whenever strong illumination from various directions is needed. This illumination also provides a full 50mm working distance.

Outer ring illuminator

(75° from the optical axis)
This type enables the observation of workpieces that are impossible with lighting at a shallow angle. When not in use, the illuminator retracts, creating more space over the workpiece. When in use, the working distance will be 10mm.



With variable magnifications up to 120x,
these models address applications that demand higher precision and density.

Maximum Magnification Module VMR-Z120X

Newly developed maximum magnification module VMR-Z120X

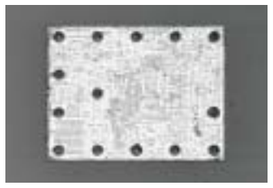
The new module achieves a 1x to 120X magnification range by using two objectives and changing the optical path. An 8-step zoom gives this system the capability to do rapid field of view measurements of hundreds of parameters and do critical measurements of line widths down to 1µm.

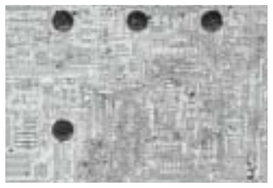
Magnification vs field of view (mm)

Optical magnification Total magnification Field of view (mm)	1X 36X 4.67×3.5	2X 72X 2.33×1.75	4X 144X 1.165×0.875	7.5X 270X 0.622×0.467
Optical magnification Total magnification Field of view (mm)	16X 576X 0.291X0.218	32X 1146X 0.146X0.109	64X 2292X 0.073X0.055	120X 4320X 0.039X0.029

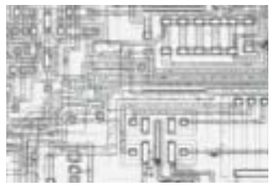
Total magnifications listed above represent those on the monitor screen when a 17" TFT monitor is set to the SXGA (1280 x 1024 pixels) mode.

Low magnifications

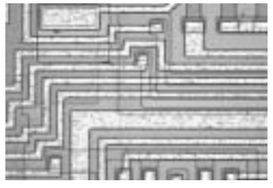

1X

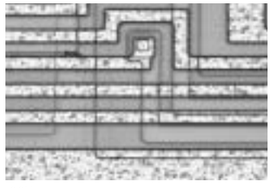

2X

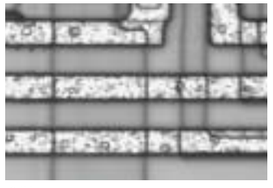

4X

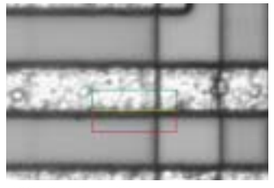

7.5X

High magnifications


16X


32X


64X

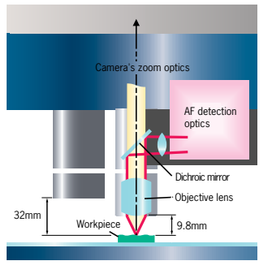

120X (6µm linewidth)

Two objective lenses—wide field and high power (N.A. 0.55)

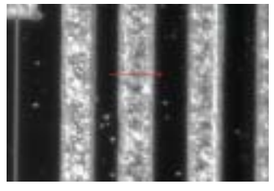
The combination of these two objective lenses enables a broad array of applications ranging from wide-field observations at low magnifications to accurate measurements at high magnifications.

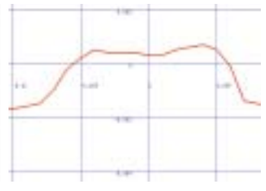
High-resolution TTL Laser AF with ultra tiny laser spot

The module comes with a high-resolution TTL Laser AF that incorporates high N.A. objectives and achieves ultra tiny laser spots. It significantly improves performance in focusing on and scanning over thin, transparent/semitransparent (e.g. resists) surfaces or irregular reflection surfaces. High-speed scanning measurement is possible at a rate of 1000 points per second max., enabling ultra-precise Z-axis measurements in a variety of applications.



How TTL Laser AF works

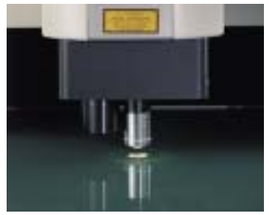


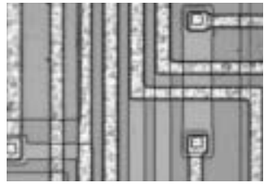

Minute steps measured

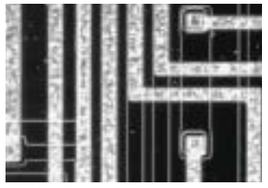
Three illumination types

The module delivers the best illumination to any workpieces by providing three types of CNC controllable illuminations—episcopic, diascopic (high magnification head), and darkfield illuminations. This enables edges to be detected with high accuracy.

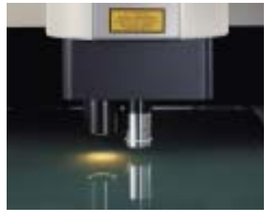
High magnifications darkfield illumination




Episcopic illumination


Darkfield illumination

Low magnifications darkfield illumination



Nikon's industry-acclaimed CFI60 optics supports high-precision, strain-free measurements.

LU Head (LU Model) Universal epi-illuminator/motorized nosepiece type

CFI60 optical system

CFI60 optics, the culmination of Nikon's optical technologies, achieves brilliant, high-contrast images, making the system most suitable for the observation of large LCD substrates and color filters. This system can perform both dimensional measurements of a workpiece via image processing and observation in a single unit. By using a high-contrast DIC slider, enhanced DIC imaging is also possible.

Motorized universal nosepiece

The CNC-based motorized nosepiece enables changes in magnification during the execution of a teaching program. This enables microscopy at the best magnification and with the optimum objective lens.

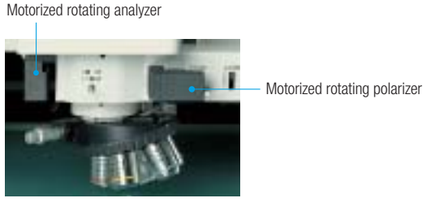
Automatic control from measurement to data processing

Easy to use software controls all functions of the system. From multi-source light control to image processing and stage movement, the process of measurement is automated for consistent, accurate results.

The following operations are manually controlled on the LU model:
Brightfield/darkfield illumination changeover
Field and aperture diaphragm settings
Polarizer*, analyzer*, Nomarski prism settings * Option to motorize.

High-speed, high-precision Vision AF (Auto Focus)

An optional motorized rotating polarizer/analyzer allows the operator to optimize contrast according to the workpiece. During DIC imaging, phase differences with greater sharpness can be visualized.



Wide variety of CFI60 objective lenses

The CFI60 optical system creates bright, high-contrast images by minimizing flare, while offering higher numerical apertures (N.A.) and longer working distances (W.D.). The VMR series can use a wide array of CFI60 universal objective lenses, including the CFI LU Plan BD.


CFI LU Plan Epi


CFI LU Plan Epi ELWD


CFI LU Plan BD


CFI LU Plan BD ELWD

CFI60 objective lenses	Magnification	N.A.	W.D. (mm)
CFI LU Plan BD	5X	0.15	18.00
	10X	0.30	15.00
	20X	0.45	4.50
	50X	0.80	1.00
	100X	0.90	1.00
CFI LU Plan BD ELWD	20X	0.40	13.00
	50X	0.55	9.80
	100X	0.80	3.50
CFI LU Plan Epi*	5X	0.15	23.50
	10X	0.30	17.30
	20X	0.45	4.50
	50X	0.80	1.00
	100X	0.90	1.00
CFI LU Plan Epi ELWD*	20X	0.40	13.00
	50X	0.55	10.10
	100X	0.80	3.50
CFI LU Plan Apo BD	150X	0.90	0.42
CFI LU Plan Apo Epi*	150X	0.95	0.30

*An LU objective adapter is necessary when using the EPI series of objective lenses.

CFI Objective Lenses for LCD

	N.A.	Glass Thickness Correction Range	Working Distance (t=glass thickness (mm))		
MTI L Plan Epi 20x CR	0.45	0 to 1.2mm	10.9mm at t=0	10.5mm at t=0.6	10.0mm at t=1.2
MTI L Plan Epi 50x CR	0.7	0 to 1.2mm	3.9mm at t=0	3.4mm at t=0.6	3.0mm at t=1.2
MTI L Plan Epi 100x CRA	0.85	0 to 0.7mm	1.20mm at t=0	1.05mm at t=0.3	0.85mm at t=0.7
MTI L Plan Epi 100x CRB	0.85	0.6 to 1.3mm	1.3mm at t=0.6	1.15mm at t=0.9	0.95mm at t=1.3

* Working Distance varies depending on correction for glass thickness.

Magnification and FOV Size

Objective Lens		5x	10x	20x	50x	100x	150x
With 1.0x Tube Lens	Total Magnification	180	360	720	1800	3600	5400
	Field of View	0.933	0.467	0.233	0.093	0.047	0.031
		0.701	0.350	0.175	0.070	0.035	0.023
With 0.5x Tube Lens	Total Magnification	90	180	360	900	1800	2700
	Field of View	1.866	0.933	0.467	0.187	0.093	0.062
		1.401	0.701	0.350	0.140	0.070	0.047

* Either 0.5x Tube Lens or 1.0x Tube Lens is selectable as a factory option.

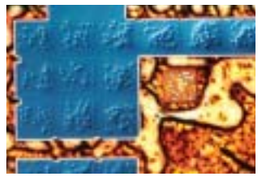
Effect of LCD objective lens

Comparison of images observed over glass substrates.
Patterns can be clearly visualized, even when viewed through glass.

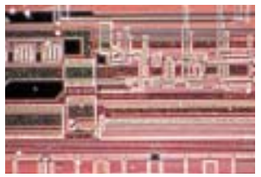

With Plan EPI objective lens


With LCD objective lens

Nomarski DIC image


With CFI LU Plan BD 20x objective lens

Darkfield image


CFI LU Plan BD 50x objective lens

Edge detection with excellent precision

Enhanced capabilities yet easier operation

Gray scale processing via video edge probes

The black and gray portions of a workpiece are digitally classified into 256 levels, then edges are detected and processed based on this classification. This prevents measurement data from being affected by changes in illumination.

Video edge probes with auto “best-fit” function

When the operator clicks the point to be measured, the system automatically rotates the probes, sets them at the optimum position, and sets the probe size, all automatically.

Drag to resize and fit the projection probe to the edge

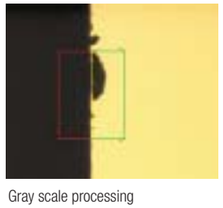
After this process

Drag to resize and fit the circle probe to the circle

After this process

Easy selection of desired edges by eliminating dust and burrs

Some workpieces contain multiple edges within a given caliper, or their contrast is too low, making edge detection extremely difficult. This function graphically profiles the contrasts of the image within the caliper using a multi-gray-level scale, enabling the operator to select any one of a number of edges. Selection of the desired edge is simple: click the appropriate buttons in the edge selection menu and adjust a threshold level using the mouse.



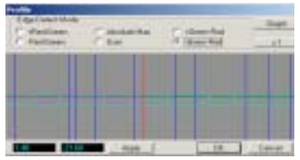
Gray scale processing

Dust clearly removed by the projection probe
Edge selection graphic window

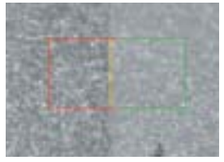
Enhanced edge detection with Nikon’s unique algorithm

Thanks to Nikon’s proprietary edge detection algorithm (patent pending), detection of edges at low magnifications is now possible with excellent precision. This enables the detection of minute, low-contrast edges, a task that is difficult to perform using gray scale processing. Image recognition capability almost equal to the human eye and a detection speed among the world’s fastest allow the system to measure any workpiece with unrivaled precision.

Only a main edge is extracted and enhanced

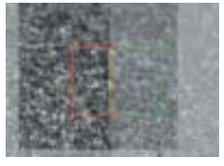


Processing window

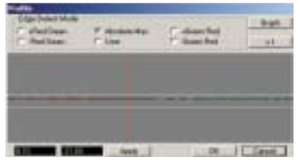


Before edge enhancement

Processing window



Enhancement after eliminating noise factors



Processing window

Advanced intelligent search

Enhances accuracy for increased productivity

Skew alignment and deviations between the edge probing points within a workpiece are automatically corrected by a pattern-matching feature, eliminating possible measurement errors.

APS (Auto Position Search)

Thanks to this function, the operator no longer needs to manually place multiple workpieces in proper alignment; the NEXIV automatically searches workpiece position for skew alignment.

Search on left-side mark

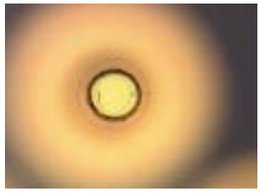
Search on right-side mark

Before APS

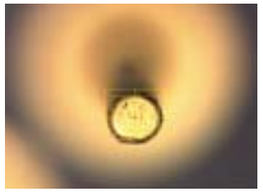
After APS

MPS (Multi-Pattern Search)

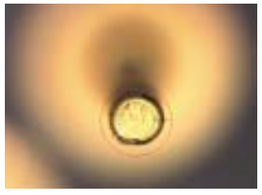
Automatically corrects deviations between the edge probing points programmed in a teaching file as well as irregular feature positions without edge probing error.



Normal pin location



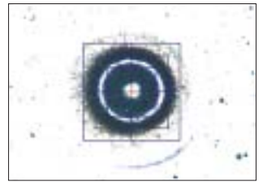
Pattern matched on abnormal pin location



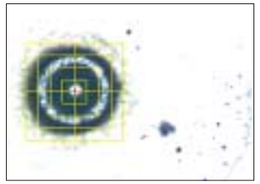
Circle probe appears on the abnormal pin location without measurement failure

PMM (Pattern Matching Measurement)

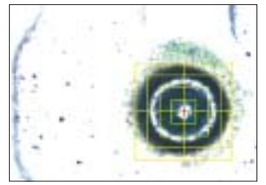
Determines coordinate values for features too difficult to measure in the normal geometric measuring mode.



Trained pattern 1



Actual searched pattern 1



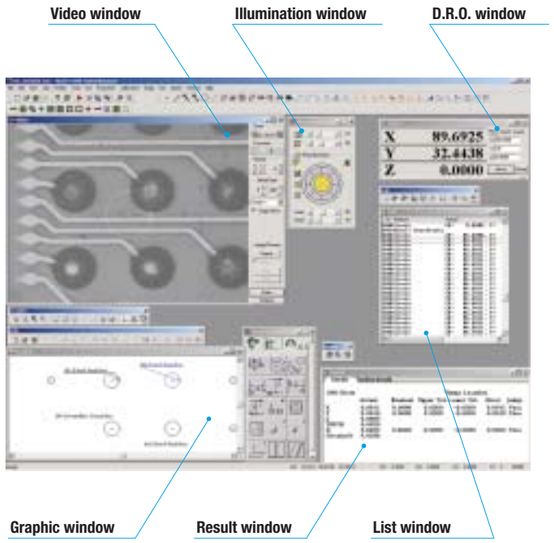
Actual searched pattern 2

User-friendly standard software:

VMR AutoMeasure

Interactive wizards simplify a whole range of tasks.

Main program



Interactive teaching wizards

A set of default teaching wizards provides step-by-step guides to facilitate teaching, regardless of the knowledge or experience of the operator. Besides these, operators can customize teaching wizards by registering frequently used teaching procedures.

Teaching wizards

Interactive measurement wizards

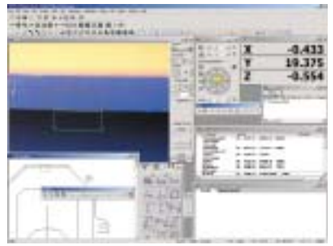
The measurement wizards guide operators, step by step, through what is required to achieve their tasks. In addition to the default wizards, operators can create customized wizards by registering frequently used procedures to streamline future operation.

Measurement wizards

Online CAD interface program

By importing CAD data (IGES, DXF, Gerber, and Excellon) of a workpiece, the operator can display its graphics in the CAD graphic window on NEXIV VMR AutoMeasure. This facilitates efficiency in teaching and shortens working time.

- The operator can move the stage to the desired position by double-clicking the appropriate position within the input workpiece.
- This function makes it possible to create a teaching file automatically from CAD feature data on NEXIV VMR AutoMeasure.



CAD graphic window

CAD interface off-line teaching support program: NEXIV Virtual AutoMeasure

This program enables CAD data to be read into the Virtual Video Window on a separate computer, allowing the operator to use NEXIV's teaching program with the same operational procedures as on the online computer. This eliminates the necessity of using the actual workpiece during teaching sessions and lets the NEXIV system concentrate on automatic measurement for increased productivity.

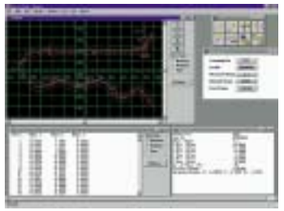
- Supports IGES, DXF, DMIS, NC files, Gerber, and Excellon.
- The Virtual Video Window enables the operator to confirm the current field of view based on CAD data.
- Same operational procedures as the NEXIV AutoMeasure.
- Manual or one-click automated programming.
- Possible to combine programs with Macro steps, such as Line Width Measure and Multi Pattern Search.

Two-dimensional profile shape analysis program: NEXIV Profiler

This program makes it possible to measure and judge 2-dimensional profile shapes in a workpiece that cannot be measured in the normal geometric mode. Now more accurate quantitative measurements can be taken than with the chart comparison method using profile projectors and/or conventional measuring microscopes.

Shape profile function

The NEXIV can now accomplish the following measurements. When the operator enters the start point, end point, and the measurement pitch, NEXIV automatically performs measurement and saves the results.



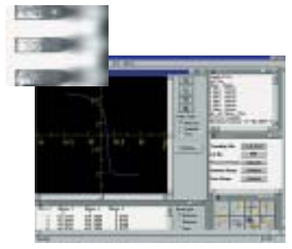
Constant pitch profiling on XY plane

On XY plane:

- Constant pitch profiling—along axis
- Constant pitch profiling—along vector
- Constant pitch profiling—along angle

On XZ/YZ plane:

- Height constant pitch profiling—along axis
- Height constant pitch profiling—along angle



Height constant pitch profiling on XZ plane (IC lead)

Shape evaluation function

Deviations between the measurement results and the nominal shape data are graphically displayed on the monitor or printed out for easy evaluation.

- Calculation of shape deviations: axis direction; normal direction
- Table listing of shape data
- Graph drawing of shape data
- Creation of nominal shape data: data can be created not only by keyed-in entry but also from CAD data. Data creation by exchanging the measured shape data is also possible.

Shape"best fit"function

This function is used to minimize the deviation between the measurement results and the nominal shape data. Deviation evaluation is easy even when the two use different coordinates.

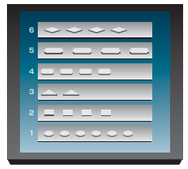
Creation of nominal shape data from CAD data

Nominal shape data can be created from CAD data in the DXF/IGES file format.

NEXIV VMR Control Program

This program enables multiple teaching files to be run sequentially according to set replay instructions.

- Simplifies the process of giving instructions to measure many different workpieces continuously, e.g., measurements of various dedicated jigs
- Allows the inspector's operating environment to be separated from that of the system administrator
- Enables the administration of inspection date, inspector, date of manufacture, lot number and other inspection data
- Automatic printing linked to inspection sheets



NEXIV VMR Visual Basic Control

With the newly developed Communication Package Program, users can program their own application software to remotely control the various functions of the NEXIV AutoMeasure on a Visual Basic 6.0/Net environment. By sending variables to the AutoMeasure teaching file, workpieces of different sizes can be measured on a single program. The results data then can be sent back to the VB program.

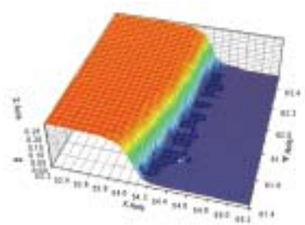
Handy options

Contribute to time and labor savings throughout the work process

3D surface analysis program: NEXIV Bird's-Eye View

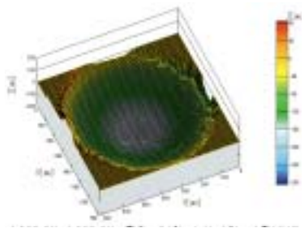
Running on Origin™, this program allows data obtained using the Scan Measure feature provided with TTL Laser AF to be plotted in a 3-dimensional format. After that, 3-dimensional shape analysis and 2-dimensional cross-section shape analysis can be performed.

Note: Origin™ is software developed by OriginLab® Corporation.



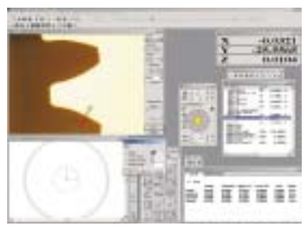
Surface analysis software: D-SURF

This software not only draws 3D graphics of a minuscule workpiece surface measured by the NEXIV system, but it also provides various analyses such as the calculation of various evaluation values.



Gear evaluation software

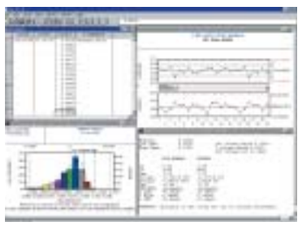
This software provides evaluations on various parameters of the measured workpiece, including pitch deviations, tooth space runout, base tangent length, and dimension overpin , based on industrial standards.



Real-time SPC via DDE (Dynamic Data Exchange)

Using a DDE Link function, measured data can be immediately transferred to spreadsheets such as Microsoft Excel®, SPC-PC IV, SPC-PC IV Excel, and others, making real-time SPC analysis possible.

Note: SPC-PC IV and SPC-PC IV Excel are products of Quality America Inc.



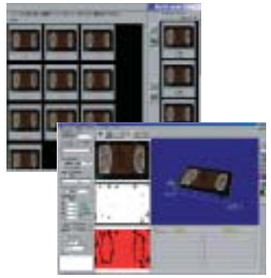
Focus images synthesis program: MultiLayer View

The MultiLayer View program can be used to synthesize focus portions of multiple images of the same field of view taken at different layers, creating one perfect image that is in focus throughout. Before synthesis is carried out, the images can be displayed as thumbnails on a PC monitor so that users can select the desired focus portions.

- The NIXIV's CCD camera captures multiple images on the Z-axis.
- In a configuration with the NEXIV system, users can easily attach the whole image of measured portions to an inspection result sheet.

Main functions

- 2-D, 3-D display
- Contour output
- Z-slice display
- Sliced area/perimeter display
- Cross section profile data display/save



Applications

- Attachment of synthesized images to inspection result sheet
- Filing of measured images

Report generating program: VMR Report Generator

This software is fully compatible with the NEXIV VMR AutoMeasure software and enables the quick generation of inspection results sheets in various report forms including user-designed forms. Users can even customize the program for their own easier use by making macro scripts.

Operating environment: Windows® Excel2000/XP
Memory space: 64MB or more

An example of macro scripts written by users: In order to input manually the data measured by other instruments and compile them into one complete report, the macro automatically makes cell blanks and display them in sky blue and a message prompts manual inputs.

Rotary indexer RI-3600L

The RI-3600L can rotate the image of a workpiece and display it with a 0.01° resolution. Because it can be controlled externally, it enables automatic measurements while controlling the posture of the workpiece.

Minimum readout: 1"
Control resolution: 0.01°
Max. workpiece diameter: 75mm
Operation mode: Auto or Manual
Pre-set points: Point of origin and 3 others

Dedicated isolation table

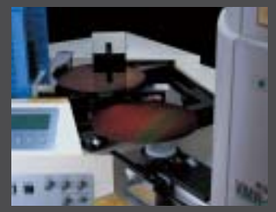
This pneumatic-type isolation table effectively absorbs external vibrations preventing them from affecting measurements.

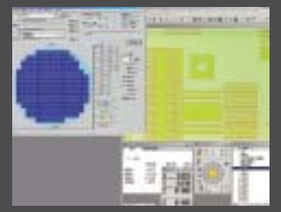
Automated Wafer Measuring System

NEXIV VMR-3020 with Wafer Loader NWL860T

With a wafer loading/unloading system, this system measures the whole contents of a wafer carrier automatically.

- Dedicated software provides fully automatic carrier-by-carrier measurements
- User-friendly GUI facilitates the selection of wafers to be measured
- Wafer map facilitates the selection of chips to be measured
- Industry-proven NWL860T wafer loader ensures reliable wafer transport
- In combination with the VMR-3020 Z120X, it can measure minuscule dimensions on wafers



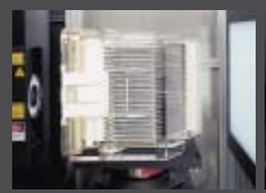


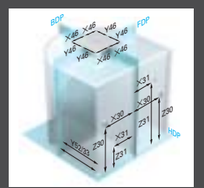
Wafer Carrier Measuring System

NEXIV VMR-C4540

Non-contact, fully automatic measurement provides outstanding throughput. Perfect for measuring FOUP and FOSB.

- Four side planes of the carrier are continuously measured by rotating the kinematic plate in 90° increments
- SEMI-compliant kinematic plate provides perfect XYZ coordinates
- Variety of illumination choices facilitate accurate measurements of registration pin holes and latch-key holes
- Laser AF provides fast, non-contact measurements of wafer positions
- Wide area, high-intensity LED illumination enables accurate measurements of wafer heights
- 300mm, 200mm wafer carrier and SMIF Pod base





Specifications

Main Unit						
Model	**VMR-H3030/Z120X**	**VMR-1515/Z120X/LU**	**VMR-3020/Z120X/LU**	**VMR-6555/Z120X/LU**	**VMR-10080/Z120X/LU**	**VMR-12072/Z120X/LU**
Stroke (XxYxZ)						
Optical Head for Type 1, 2, 3 LU model	300 x 300x 150 mm (11.8 x 11.8 x 5.9 in.)	150 x 150 x 150 mm (5.9 x 5.9 x 5.9 in.)	300 x 200 x 150mm (11.8 x 7.9 x 5.9 in.)	650 x 550 x 150mm (25.6 x 21.7 x 5.9 in.)	1000 x 800 x 150mm (39.4 x 31.5 x 5.9 in.)	1200 x 720 x 150 mm (47.2 x 28.3 x 5.9 in.)
With max. magnification module (high mag. lens)	300 x 300 x 150mm (11.8 x 11.8 x 5.9 in.)	150 x 150 x 150 mm (5.9 x 5.9 x 5.9 in.)	300 x 200 x 150mm (11.8 x 7.9 x 5.9 in.)	650 x 550 x 150mm (25.6 x 21.7 x 5.9 in.)	1000 x 800 x 150mm (39.4 x 31.5 x 5.9 in.)	1200 x 720 x 150 mm (47.2 x 28.3 x 5.9 in.)
With max. magnification module (low mag. lens)	250 x 300 x 150mm (9.8 x 11.8 x 5.9 in.)	100 x 150 x 150 mm (3.9 x 5.9 x 5.9 in.)	250 x 200 x 150mm (9.8 x 7.9 x 5.9 in.)	600 x 550 x 150mm (23.6 x 21.7 x 5.9 in.)	950 x 800 x 150mm (37.4 x 31.5 x 5.9 in.)	1150 x 720 x 150 mm (45.3 x 28.3 x 5.9 in.)
Minimum readout	0.01µm	0.1 µm				
Maximum workpiece weight	30kg (66.1 lb)	20kg (44.0 lb)		30kg (66.1 lb)	40kg (88.2 lb)	
Measuring accuracy U_{1X}, U_{1Y}	0.6 + 2L/1000 µm (workpiece max. 10kg)	1.5 + 4L/1000 µm (workpiece max. 5kg)	1.5 + 4L/1000 µm (workpiece max. 5kg)	1.5 + 2.5L/1000 µm (workpiece max. 30kg)	2 + 4L/1000 µm (workpiece max. 40kg)	2.2 + 4L/1000 µm (workpiece max. 40kg)
U_{2XY}	0.9 + 3L/1000 µm (workpiece max. 10kg)	2.5 + 4L/1000 µm (workpiece max. 5kg)	2.5 + 4L/1000 µm (workpiece max. 5kg)	2.5 + 2.5L/1000 µm (workpiece max. 30kg)	3 + 4L/1000 µm (workpiece max. 40kg)	3.2 + 4L/1000 µm (workpiece max. 40kg)
Z-axis (L: Length in mm < W.D.)	0.9 + L/150 µm	1.5 + L/150 µm Note: Z-axis accuracy is guaranteed by Laser AF.				
Camera	B&W 1/3-in. CCD (progressive scan), color 1/3-in. CCD					
Working distance Optical Head for Type 1, 2, 3 With max. magnification module LU model	50mm High mag. objective lens: 9.8mm Low mag. objective lens: 32mm Refer to CFI Objective Lenses for LCD on page 15.					
Magnification vs field of view Optical Head for Type 1 Optical Head for Type 2 Optical Head for Type 3 With max. magnification module LU model	0.5 – 7.5X / 9.33 x 7 – 0.622 x 0.467 mm 1 – 15X / 4.67 x 3.5 – 0.311 x 0.233 mm 2 – 30X / 2.33 x 1.75 – 0.155 x 0.117 mm 1 – 120X / 4.67 x 3.5 – 0.039 x 0.029 mm Refer to Magnification and FOV Size on page 15.					
Auto focus	TTI Laser AF and Vision AF. LU model: Vision AF only					
Illumination Optical Head for Type 1, 2, 3 With max. magnification module LU model	Diascopic, episcopic, 8-segment LED ring illumination (inner ring / outer ring) Episcopic, diascopic (with high mag. head only), darkfield illumination Diascopic, Episcopacy & Darkfield illumination					
Power source	AC100-240V ±10%, 50/60Hz					
Power consumption	Max. 11A (Standard type), 13A (Z120X type)			Max. 13A (Standard type), 15A (Z120X type)		
Dimensions & weight Main unit only	915 x 1060 x 1300 mm, approx. 450kg (36.0 x 41.7 x 51.2 in., 992.1 lb.)	512 x 703 x 1200 mm, approx. 180kg (20.2 x 27.7 x 47.2in., 396.8lb.)	625 x 728 x 1195 mm, approx. 200kg (24.6 x 28.7 x 47.0 in., 441.0 lb.)	–	–	–
Main unit & table	1000 x 1100 x 1900 mm, approx. 570kg (39.4 x 43.3 x 74.8 in., 1256.6 lb.)	512 x 703 x 1200 mm, approx. 180kg (20.2 x 27.7 x 47.2 in., 396.8 lb.)	690 x 730 x 1725 mm, approx. 240kg (27.2 x 28.7 x 67.9 in., 529.1 lb.)	1220 x 1680 x 1750 mm, approx. 600kg (48.0 x 66.1 x 68.9 in., 1322.8 lb.)	1530 x 2200 x 1750 mm, approx. 1500kg (60.2 x 86.6 x 68.9 in., 3306.9 lb.)	1734 x 2200 x 1750 mm, approx. 1600kg (68.3 x 86.6 x 68.9 in., 3527.4 lb.)
Controller	250 x 550 x 500 mm, approx. 31kg (9.8 x 21.7 x 19.7 in., 68.3 lb.)					
Footprint	2400 (W) x 1400 (D) mm (94.5 x 55.1 in.)	2100 (W) x 1100 (D) mm (82.7 x 43.3 in.)	2100 (W) x 1100 (D) mm (82.7 x 43.3 in.)	2400 (W) x 2000 (D) mm (94.5 x 78.7 in.)	2800 (W) x 2500 (D) mm (110.2 x 98.4 in.)	3000 (W) x 2500 (D) mm (118.1 x 98.4 in.)

Host Computer	
Main unit	IBM PC/AT (Windows® XP)
Monitor	17-in. TFT color

*The "Z120X" type is equivalent to the "TZ" type in Japan.

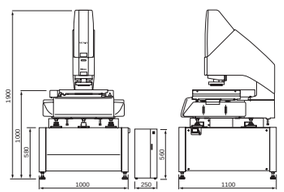
Automatic Wafer Measuring System VMR-3020 + NWL860T	
Compatible wafer sizes	ø150mm/200mm (SEMI/JEIDA compliant, silicon)
Standard wafer carriers	Entegris® 150mm: PA182-60MB, 200mm: 192-80M
Processing speed per carrier (Continuous transfer of 25 wafers)	8 minutes + NEXIV's measurement time
Orientation flat/notch detection	Non-contact, transmitted-type sensor
Wafer transfer/chuck	Vacuum chuck, mechanical transfer
Main unit dimensions (excluding PC rack)	1700 (W) x 960 (D) x 1735 (H) mm (66.9 x 37.8 x 68.3 in.)
Footprint (excluding areas for operation and maintenance)	2750 (W) x 1100 (D) mm (108.3 x 43.3 in.)
Main unit weight	Approx. 370kg (815.7 lb.)
Requirements Electricity	AC100-240V ±10%, 50/60Hz, 11.5A max.
Vacuum	–800hPa (–600mmHg), 10Nl/min.

Wafer Carrier Measuring System VMR-C4540	
Compatible carriers (FOUP, FOSB, OC)	SEMI-compliant 300mm wafer carriers 200mm wafer carriers (with dedicated adapter)
Stroke Measuring head (X x Y x Z) Rotary table	480 x 180 x 400 mm (18.9 x 7.1 x 15.7 in.) 360˚ (in 90˚ increments)
Minimum readout	0.1 µm
Head travel speed	XZ axis: max. 200mm/s (7.9 in.) Y axis: max. 50mm/s (2.0 in.)
Kinematic plate rotation speed	90˚/2 sec.
Camera	B&W 1/2-in. CCD
Optical magnification	0.27X to 2.74X (5-step 10X zoom)
Field of view	20 x 16 mm to 2.0 x 1.6 mm
Max. workpiece weight	15kg (33.1 lb.)
Measuring accuracy	(10 + 10L/1000)µm, L = measuring length in mm
Repeatability (2σ)	2µm
Illumination	Episcopic, diascopic, darkfield
Auto focus	Laser AF, Vision AF
Power source	AC100-240V±10%, 50/60Hz
Power consumption (approx.)	AC100-120V: 13A (main unit), 9A (PC) AC200-240V: 7A (main unit), 5A (PC)
Dimensions	1400 (W) x 1739 (D) x 2530 (H) mm (55.1 x 68.5 x 99.6 in.)
Weight	Approx. 1400kg (3086.41 lb.)
Host computer	IBM PC/AT (Windows® 2000)
Monitor	17-in. TFT

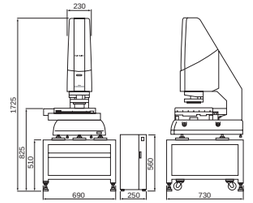
Dimensional diagrams

Unit: mm

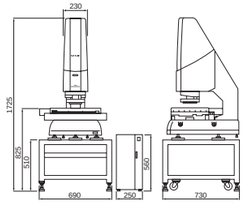
VMR-H3030/Z120X/LU



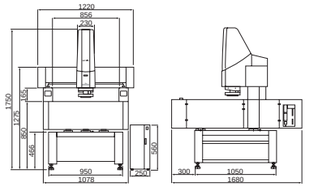
VMR-1515/Z120X/LU



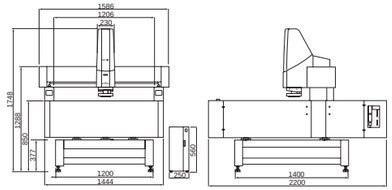
VMR-3020/Z120X/LU



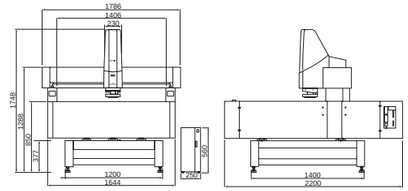
VMR-6555/Z120X/LU



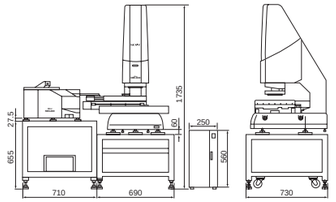
VMR-10080/Z120X/LU



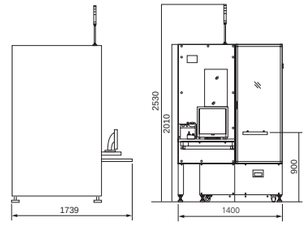
VMR-12072/Z120X/LU



NEXIV VMR-3020 with Wafer Loader NWL860T

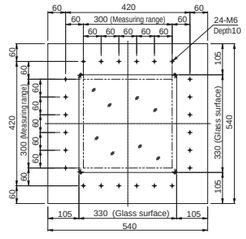


VMR-C4540

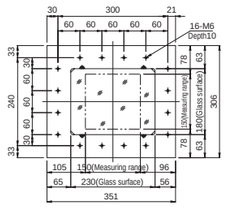


Position of tapped holes for custom fixtures

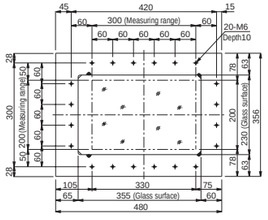
VMR-H3030/Z120X/LU



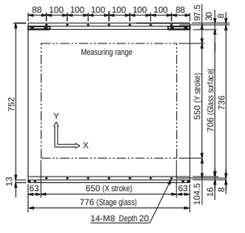
VMR-1515/Z120X/LU



VMR-3020/Z120X/LU



VMR-6555/Z120X/LU



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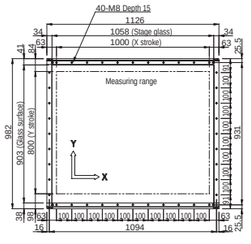

VMR-12072/Z120X/LU