Nikon

NiTECH (주)엔아이텍 NEW INSTRUMENTS TECHNOLOGY

Wafer Carrier Measurement System

NEXIV

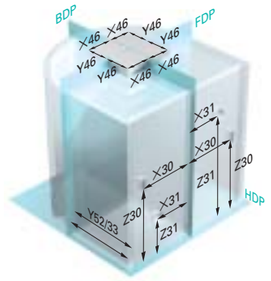
VMR-C4540

— Detects hard-to-see edges such as latch key edges using a variety of illumination as well as Nikon's unique image processing technologies.

— Incorporates Laser AF that provides quick non-contact focusing, even on transparent surfaces and on the edge of the peripheries of the wafer, to measure SEMI-standard dimensions with excellent accuracy and at high speed.

— Designed for 300mm, 200mm, 150mm, 125mm wafer carriers.

VMR-C4540



Features

Designed for 300mm wafer carriers

A joint development by Nikon and SELETE*, the VMR-C4540 is a dedicated wafer carrier measurement system designed to manage dimensional accuracy. It provides all dimensional measurements required for wafer carrier fabrication, including control of deformation due to aging of wafers and of wafer carriers.

*Semiconductor Leading Edge Technologies, Inc.

■ **Compatible wafer carriers:**

- 300mm FOUP
- 300mm FOSB
- 300mm
- SMIF Pod door (with a dedicated adapter)
- Reticle SMIF Pod (with a dedicated adapter)
- 200mm (with a dedicated adapter)
- 150mm (with a dedicated adapter)
- 125mm (with a dedicated adapter)

SEMI-standard dimensions

The VMR-C4540 can measure SEMI-specified dimensions that will affect the reliability of wafer carriers, including the door shield, opening and closing, the transfer of wafers, as well as the wafer's "sit" position to FDP.

■ **Points that can be measured:**

- Carrier: latch key, registration pin, robotic handle, door flange, bottom plane (adapter is necessary), etc.
- Wafer position: "sit" position, height at both front and rear ends
- Compliant SEMI standards:
  SEMI E1.9 Cassette, SEMI E57 Kinematic Coupling, SEMI E47.1 FOUP, SEMI E62 FIMS, SEMI M31 FOSB

Kinematic plate

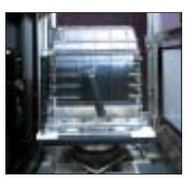
The VMR-C4540 uses a SEMI-compliant Kinematic plate to perform precision measurements based on HDP (Horizontal Datum Plane), BDP (Bilateral Datum Plane), and FDP (Facial Datum Plane).

Rotary Kinematic plate

Master gauge for calibration

Measurements of the door

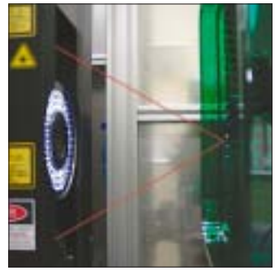
Measurement of the robotic handle



Measurement of the bottom plane with an adapter

Non-contact, fully automated measurement

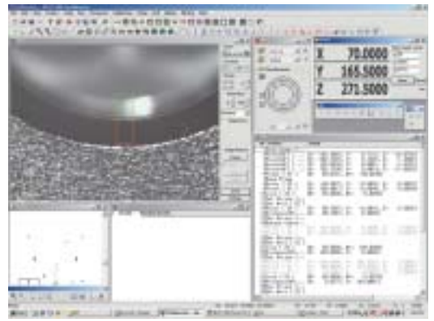
The VMR-C4540 can measure the four planes of the workpiece carrier by rotating the Kinematic plate on which the workpiece is placed in steps of 90°. Measurement of the bottom of the carrier is also possible with an adapter. The measurement head with an objective lens having a 160mm ultra-long working distance moves in 3D directions, allowing non-contact measurement of all measurement points, including the robotic handle. Dedicated software makes possible fully automatic continuous measurement of the four planes of the workpiece carrier.



Laser AF focused on the edge of the peripheries of a wafer

LED 8-segment oblique illuminators surrounding the objective lens

LED diascopic illuminator for wafer height measurement



Main screen using the dedicated software

Features

Laser AF

The VMR-C4540 features Laser AF allowing perfect focusing even on transparent surfaces. This enables measurements of the wafer's "sit" positions and the door surface over seal from FDP without making contact with the workpiece.

Leading-edge video measurement technologies

The VMR-C4540 utilizes advanced video measurement technologies of the industry-acclaimed Nikon Video Measuring System, NEXIV series , including long working-distance objective lenses, 5-step 10X high-speed zoom, and wide choices of illumination. The available illumination includes LED 8-segment oblique and LED diascopic, as well as coaxial episcopic illumination. The oblique illumination projected from 8 directions emphasizes edges hard to see allowing these edges to be detected accurately by gray scale processing. A dedicated LED diascopic illuminator is designed for measuring wafer heights.

■ **Five-step 10X high-speed zoom**

Optical magnification	0.27×	0.54×	0.81×	1.66×	2.74×
Field of view (with 1/2-in. CCD)	20×16	10×8	6.0×4.8	3.3×2.6	2.0×1.6

Unit: mm

High speed, high throughput

The rotary Kinematic plate provides continuous measurements of all four planes of the workpiece carrier. Nikon's top-notch technologies nurtured through the development of the NEXIV series, non-contact measurement, the head's rapid 200mm/sec. travel speed, and high-speed video processing all combine to achieve high throughput for measurements of large quantities of carriers with excellent efficiency.

Dedicated measurement software

Based on the NEXIV VMR software programs known for their easy operation, Nikon has developed a dedicated software program expressly for the new carrier measurement system. It allows a series of measurement procedures to be automated by CNC Replay. If you create an evaluation program by freely selecting teaching programs for each plane, the system can measure all four planes in a single process.

Data is easily adaptable

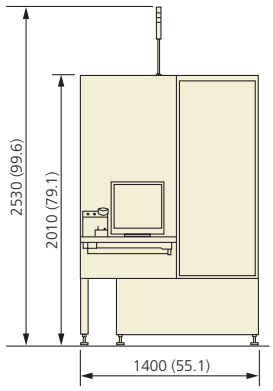
Measurement results can be saved as CSV files, facilitating later processing and modification. The wafer carrier ID number, which may be the name of CSV files, can also be read by a barcode reader (option). Measuring results can be transmitted through an RS-232C port or a LAN network.

■ Specifications

Compatible wafer carriers	SEMI-compliant 300mm wafer carriers (FOUP, FOSB, etc.) and 200mm, 150mm, 125mm wafer carriers (with dedicated adapter)
Stroke (Measurement head; X x Y x Z)	480 x 180 x 400mm (18.9 x 7.1 x 15.7 in.)
Rotary Kinematic plate	360˚ (in steps of 90˚)
Minimum readout	0.1µm
Head travel speed	XZ axis: 200mm/sec. max.; Y axis: 50mm/sec.
Kinematic plate rotation speed	90˚/2 sec.
Camera	Black & white 1/2-in. CCD
Optical magnification	0.27X—2.75X (5-step 10X zoom)
Field of view	20 x 16mm—2.0 x 1.6mm
Maximum workpiece weight	15kg (33.1 lb.)
Measurement accuracy	10 + 10L/1000 µm (L: measurement length in mm)
Repeatability	2µm (2 sigma)
Illumination	Coaxial episcopic, diascopic, 8-segment oblique illumination
Autofocus	Laser AF
Power source	AC 100-120V or 200-240V±10%, 50/60Hz
Power consumption	13A (at AC 100-120V), 7A (at AC 200-240V) excluding PC
Dimensions & weight	1400 (W) x 1500 (D) x 2010 (H)mm, approx. 1400kg (55.1 x 59.1 x 79.1 in., 3086.4 lb.)
Host computer	IBM PC/AT (Windows®2000)
Monitor	17-in. SXGA TFT LCD

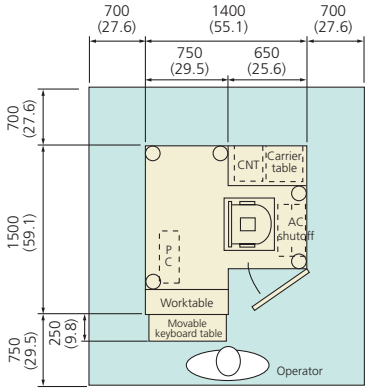
■ Dimensional Diagram

Unit: mm (inches)



■ Footprint

Unit: mm (inches)



Laser AF is a Class 1 Laser Product

CLASS 1 LASER PRODUCT

Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. April 2007

⚠ WARNING	TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING YOUR EQUIPMENT.

ISO 9001 Certified
NIKON CORPORATION
Instruments Company

ISO 14001 Certified
NIKON CORPORATION
Yokohama Plant

NIKON CORPORATION
Parale Mitsui Bldg., 8, Higashida-cho, Kawasaki-ku,
Kawasaki, Kanagawa 210-0005, Japan
phone: +81-44-223-2175 fax: +81-44-223-2182
http://www.nikon-instruments.jp/eng/

NIKON INSTRUMENTS INC.
1300 Walt Whitman Road, Melville, N.Y. 11747-3064, U.S.A.
phone: +1-631-547-8500; +1-800-52-NIKON (within the U.S.A.only)
fax: +1-631-547-0306
http://www.nikonusa.com/

NIKON INSTRUMENTS EUROPE B.V.
P.O. Box 222, 1170 AE Badhoevedorp, The Netherlands
phone: +31-20-44-96-222 fax: +31-20-44-96-298
http://www.nikon-instruments.com/

NIKON INSTRUMENTS (SHANGHAI) CO., LTD.
CHINA phone: +86-21-5836-0050 fax: +86-21-5836-0030
(Beijing office) phone: +86-10-5869-2255 fax: +86-10-5869-2277
(Guangzhou office) phone: +86-20-3882-0552 fax: +86-20-3882-0580

NIKON SINGAPORE PTE LTD
SINGAPORE phone: +65-6559-3618 fax: +65-6559-3668

NIKON MALAYSIA SDN. BHD.
MALAYSIA phone: +60-3-78763887 fax: +60-3-78763387

NIKON INSTRUMENTS KOREA CO., LTD.
KOREA phone: +82-2-2186-8410 fax: +82-2-555-4415

NIKON UK LTD.
UNITED KINGDOM phone: +44-20-8541-4440 fax: +44-20-8541-4584

NIKON GMBH AUSTRIA
AUSTRIA phone: +43-1-972-6111-00 fax: +43-1-972-6111-40

NIKON BELUX
BELGIUM phone: +32-2-705-56-65 fax: +32-2-726-66-45

Printed in Japan (0704-05)T