

Cascade

# PMV200

200 mm Manual Vacuum Probe System

000111100010

## ➤ Overview

Cascade PMV200 probe system from FormFactor is the ideal solution for testing wafers and substrates up to 200 mm in a high vacuum environment  $< 1 \times 10^{-4}$  mbar. It supports a wide temperature range from  $-60^{\circ}\text{C}$  to  $300^{\circ}\text{C}$ . Specially designed for laboratory requirements, it supports a wide range of applications, including DC and RF measurements, MEMS and opto-engineering tests.

The PMV200 is equipped with a stable vibration isolating frame. The chuck and the manual chuck stage with 200 mm x 200 mm X-Y travel, theta and Z-axis are located inside the high-vacuum chamber. Via vacuum-tight mechanical feedthrough drives and cardan shafts, the X-Y travel, contact/separation and up to eight vacuum-type positioners can be easily operated from outside of the chamber. For the use under vacuum conditions, specially-designed thermal chucks with electrical and cooling line bulk-feedthroughs are available.

The PMV200 can be customized with a number of instruments, including various video microscopes, optical topology measurement tools and black bodies for exposure of the DUT with controlled IR radiation.



## ➤ Features / Benefits

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flexibility</b>                 | <ul style="list-style-type: none"><li>• System is customized to user's requirements</li><li>• Different substrate carriers for wafers up to 200 mm or single dies</li><li>• Upstream pressure, downstream pressure or medium vac regulation</li><li>• Wide range of measurements (I-V, C-V, RF)</li><li>• Accessories available, such as Black Bodies and optical motion analysis tools</li></ul> |
| <b>Stability</b>                   | <ul style="list-style-type: none"><li>• High accuracy, ideal for small structures</li><li>• Highly stable mechanics with a stable vibration isolation table</li></ul>                                                                                                                                                                                                                             |
| <b>Ease of use</b>                 | <ul style="list-style-type: none"><li>• Simple, straightforward design for easy and ergonomic operation</li><li>• Quick and ergonomic change of the DUT through front door</li></ul>                                                                                                                                                                                                              |
| <b>High measurement throughput</b> | <ul style="list-style-type: none"><li>• Manual control of chuck for fast step-and-repeat testing of the entire wafer</li></ul>                                                                                                                                                                                                                                                                    |

## > Specifications\*

### Chuck Stage

|              |                                                              |
|--------------|--------------------------------------------------------------|
| Travel range | 200 mm (round or square)                                     |
| Resolution   | 5 $\mu\text{m}$                                              |
| Manipulation | Linear, from outside the chamber via rotary feed thru drives |

### Probe Platen

|                        |                                                   |
|------------------------|---------------------------------------------------|
| Platen space           | Universal platen for up to six VCP110 positioners |
| Z contact / separation | About 250 $\mu\text{m}$                           |
| Manipulation           | From outside the chamber                          |

### Microscope

|               |                                                                                        |
|---------------|----------------------------------------------------------------------------------------|
| Travel        | Swivel mechanism for moving the microscope in a safe rest position for chamber opening |
| Focus         | Manual drive                                                                           |
| Type          | Video zoom microscope                                                                  |
| Zoom          | 7x                                                                                     |
| Magnification | 0.38x to 2.6x                                                                          |
| Resolution    | 721 lp/mm to 240 lp/mm                                                                 |
| Field of view | 12.8 mm x 17.1 mm to 1.8 mm x 2.4 mm                                                   |

### Chuck

|                |                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------|
| Standard Chuck | No temperature control, holds carrier for fixing single chips, wafer fragments and full wafer up to 200 mm |
|----------------|------------------------------------------------------------------------------------------------------------|

### Thermal Chuck

|                     |                    |
|---------------------|--------------------|
| Minimum temperature | -60°C, -40°C, 25°C |
| Maximum temperature | 200°C, 300°C       |

### Vacuum Chamber

|           |                                                                                                                                                          |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Size      | Approximately $\varnothing$ 600 mm x 300 mm (H)                                                                                                          |
| Material  | Stainless steel                                                                                                                                          |
| Loading   | Hinged top side lid, made of aluminum, fast lock mechanism                                                                                               |
| View port | Central, top side, made of $\varnothing$ 90 mm quartz glass, 6 mm thickness, $\varnothing$ 75 mm clear opening, minimum objective working distance 75 mm |

### Feedthrough

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chamber wall: | <ul style="list-style-type: none"> <li>• 6x DN50 ISO-KF flange for rotary feedthrough drives to operate VCP110 probe positioners from outside</li> <li>• 2x DN50 ISO-KF flange for rotary feedthrough drives for operating chuck XY stage from outside</li> <li>• 1x DN50 ISO-KF flange for rotary feedthrough drive for operating platen contact/separation drive from outside</li> <li>• 2x DN50 ISO-KF flange for measurement feedthroughs</li> <li>• 1x DN25 ISO-KF flange with safety valve</li> <li>• 1x DN10 ISO-KF flange for venting valve, manually operated</li> </ul> |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## > Specifications\* (continued)

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chamber bottom plate: | <ul style="list-style-type: none"><li>• 1x DN100 ISO-K flange for measurement feedthroughs</li><li>• 1x DN63 ISO-K flange for turbo-molecular drag pump</li><li>• 2x DN40 ISO-KF flange (1x for optional thermal chuck, 1x spare)</li><li>• 1x DN25 ISO-KF flange for vacuum gauge</li><li>• 1x DN16 ISO-KF flange (spare)</li><li>• 6x WDE105 feedthrough (1x for optional thermal chuck, 5x spare)</li><li>• 1x D28 opening (spare)</li></ul> |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                |                                                                            |
|----------------|----------------------------------------------------------------------------|
| <b>Purging</b> | Manual operated inlet valve to fill the vacuum chamber with inert gas (N2) |
|----------------|----------------------------------------------------------------------------|

### Carrier

|                   |                                      |
|-------------------|--------------------------------------|
| Wafer carrier     | 50 mm, 75 mm, 100 mm, 150 mm, 200 mm |
| Universal carrier | Small dies, wafer fragments          |

### Positioner

|              |                                                      |
|--------------|------------------------------------------------------|
| Type         | VCP110 high vacuum type probe positioner             |
| Travel range | X, Y and Z = 12 mm linear                            |
| Fixation     | Magnetic                                             |
| Manipulation | From outside the chamber via rotary feed thru drives |

### Measurement Setup

|             |                                                                     |
|-------------|---------------------------------------------------------------------|
| Probe arms  | Triax, advanced coax and high frequency                             |
| Cabling     | Triax, advanced coax and high frequency (40 GHz, 50 GHz and 67 GHz) |
| Feedthrough | Triax, advanced coax and high frequency (40 GHz, 50 GHz and 67 GHz) |
| Triax chuck | For low-noise I-V and C-V measurements                              |

### High Vacuum System

|                         |                                |
|-------------------------|--------------------------------|
| Minimum pressure        | $< 1 \times 10^{-4}$ mbar      |
| Maximum pressure        | Atmosphere                     |
| Pump type               | Turbo and diaphragm            |
| Vacuum gauge            | Full range                     |
| Pressure control system | Optional, up-stream controlled |

### TV System

|      |                                       |
|------|---------------------------------------|
| USB  | Digital camera connection to computer |
| HDMI | Digital camera connection to monitor  |

### Microscope Upgrade

|            |                                                                                      |
|------------|--------------------------------------------------------------------------------------|
| Movement   | Upgrade from default boom stand to high resolution XY microscope movement            |
| Microscope | Upgrade from default video zoom microscope to high-magnification compound microscope |

### View-port

|                   |                                                                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Customized window | For applications where the standard window does not meet the requirements, other windows available with different window material, AR coating, working distance and diameter. |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

\* Data, design and specification depend on individual process conditions and can vary according to equipment configurations. Not all specifications may be valid simultaneously.

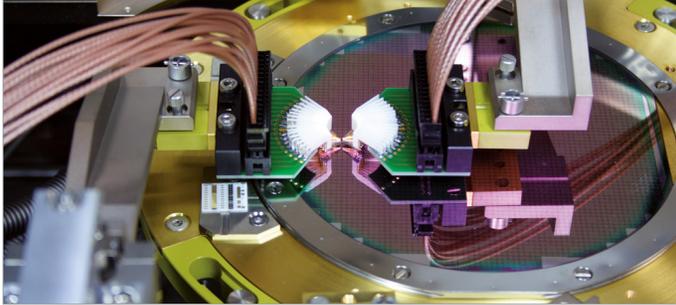
## > Applications

### MEMS / MOEMS

Acceleration sensors  
RF-MEMS switches, resonators  
Microbolometers  
Yaw rate sensors / gyro sensors  
Gas sensors  
Micromirrors / optical switches

### Next Generation Technologies

OLEDs  
Nanotechnology



Test of a MEMS wafer with two Multi DC ProbeWedges™.

## > Handling

All knobs located outside of the chamber ensure easy and precise control of the chuck stage and positioners. The hinged front door enables quick and ergonomic loading and unloading of the DUT. The chamber lid allows easy probe configuration and probe tip exchange.



The large front door enables quick and ergonomic loading and unloading of the DUT. The chuck and up to eight vacuum-type positioners can be easily operated from outside of the chamber via universal joint drivers.



View through the view port of the chamber lid. The shown configuration consists of four RF IZI Probes® and four DC probes.

## > Ordering Information

| Part Number | Description                                                                                                                            |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------|
| PMV200DC-QT | Manual vacuum probing solution for DC test includes the PMV200 package, four DC triax positioners, probe tips, feedthrough and cabling |
| PMV200RF-QT | Manual vacuum probing solution for RF test includes the PMV200 package, two RF positioners, IZI Probes, feedthrough and cabling        |

The offered PMV200 packages include all required components for successful probing:

- PMV200 base system with a chuck movement of 200 mm
- High-vacuum pump station
- Substrate carrier for the required sample size
- Microscope with camera and monitor

## > Warranty

|                   |                                                                                 |
|-------------------|---------------------------------------------------------------------------------|
| Warranty*         | Fifteen months from date of delivery or twelve months from date of installation |
| Service contracts | Single- and multi-year programs available to suit your needs                    |

\* See FormFactor's Terms and Conditions of Sale for more details.

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PMV200-DS-0722