

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

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

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### Positioner

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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

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### Measurement Setup

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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

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### High Vacuum System

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Minimum pressure	< 1 x 10 <sup>-4</sup> mbar
Maximum pressure	Atmosphere
Pump type	Turbo and diaphragm
Vacuum gauge	Full range
Pressure control system	Optional, up-stream controlled

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### TV System

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

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### Microscope Upgrade

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

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### View-port

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

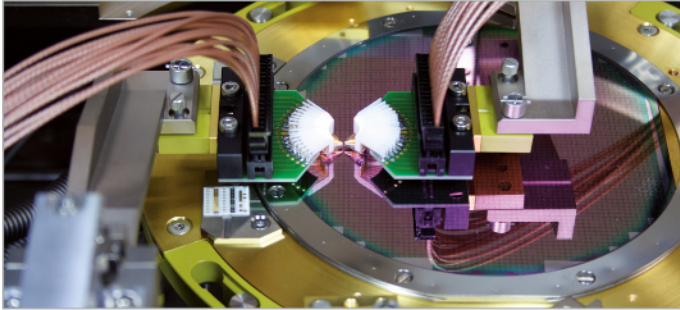
## > Applications

### MEMS / MOEMS

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

### Next Generation Technologies

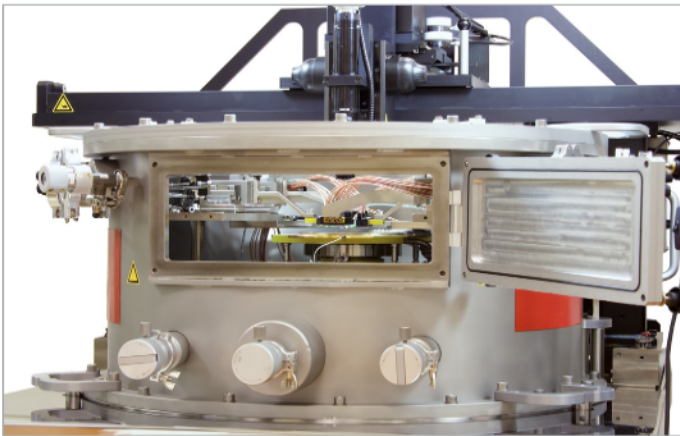
OLEDs  
Nanotechnology



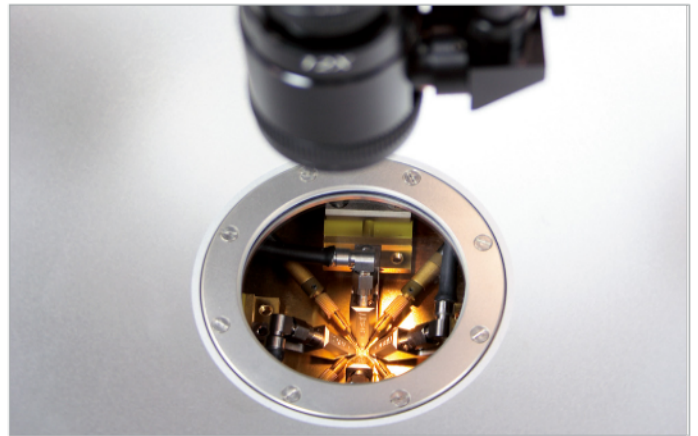
Test of a MEMS wafer with two Multi DC ProbeWedges™.

## > 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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