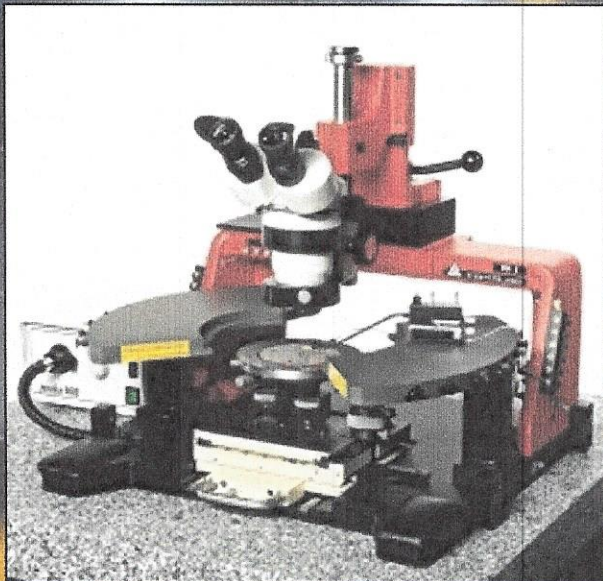


Probe Systems
Karl Suss

PM5



6" Analytical Probe System

Efficient and Compact

The SUSS PM5 Analytical Probe System is intended for cost-effective and precision analysis of wafers and substrates up to 150 mm (6").

High application flexibility is guaranteed with the PM5, which is suitable for the whole spectrum of DC and HF measurements. An exceptional failure analysis tool, it can be used as a flexible probecard, allowing up to 50 SUSS ProbeHeads at one time.

All probing accessories can be added onto the SUSS PM5 ensuring field upgrades at any time as well as an excellent cost of ownership.

FEATURES AND BENEFITS

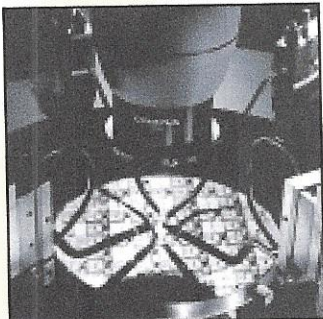
- ▶ For use with wafers and substrates up to 6"
- ▶ Cost effective, small footprint
- ▶ Easy to install and set up
- ▶ Versatile system concept meets laboratory user requirements
- ▶ Full range of SUSS accessories and upgrade path available
- ▶ DC and High Frequency configurations

Mask Aligners
Substrate Bonders
Flip Chip Bonders
Spin Coaters
Probe Systems

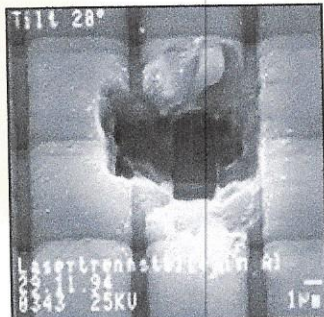
SUSS. Our Solutions Set Standards.



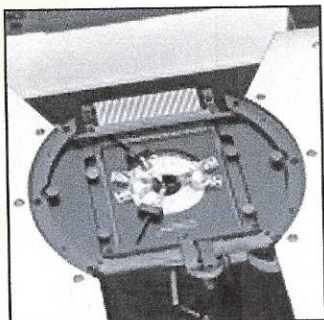
Challenges and Solutions



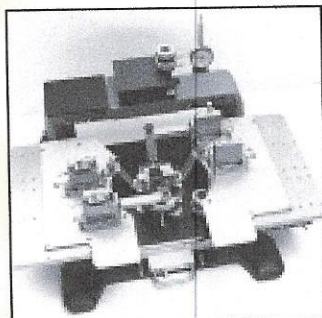
Analytical DC test



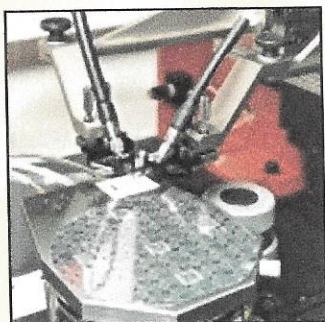
Laser cutting



HF Probecard



High frequency test



High frequency probe tips



PM5 as "flexible Probecard"

Analytical Probing

The PM5 provides the stability and resolution required for precise probe positioning. The SUSS modular design concept provides an upgrade path for future development.

SUSS PM5 microscope options include stereo zoom, high magnification and emission microscopy. Microscope travel options vary from very simple manual movements to complete automation using the powerful SUSS ProberBench® operating system.

The microscope lifts manually or pneumatically with a minimum of three inches clearance. This creates clear and easy access to the probes and device under test (DUT).

The platen has enough area and heavy mass to provide extreme rigidity and accessibility to the probeheads. Platen Z travel has 40 mm (1.57") of linear motion with a 0.2 mm contact /separation stroke. This provides flexible clearance options from wafers to packaged parts mounted on large test boards.

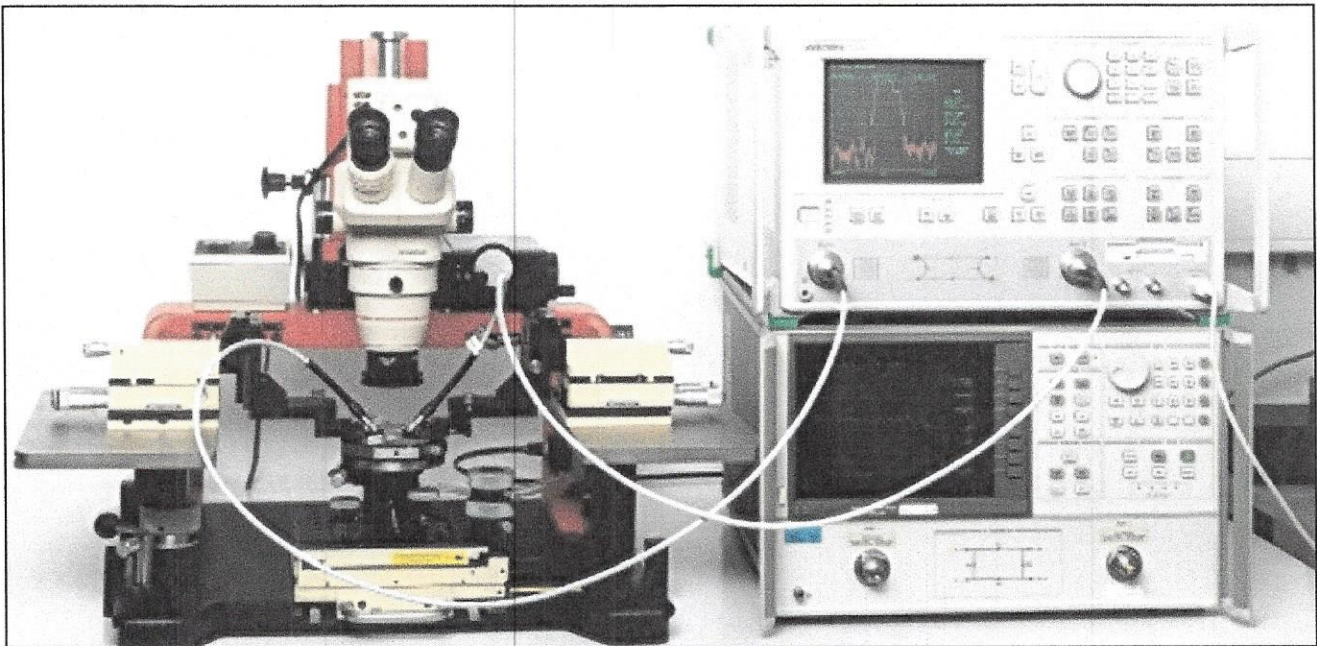
The chuck is mounted on a rigid X/Y table with ergonomic coaxial controls. The chuck position can be finely tuned in the Z direction. A pull-out stage moving along the Y axis permits quick and safe device loading as well as superior positional repeatability for packaged devices and substrates.

All system controls are ergonomically designed and located for optimum operator comfort.

The SUSS PM5 Probe System combines flexibility with sub-micron resolution. The linear platen movement, rigid cast base and a stiff microscope bridge are qualities featured in all SUSS probers.

Probecard and Packaged Part Test

All SUSS probecard holders quickly insert directly into the platen opening. This creates a low profile environment allowing standard probeheads to probe easily over the top of the probecard to the DUT. As the PM5 chuck stage has rapid independent X-Y movement, fast and accurate locations of random die are easily accomplished.



SAW Filter characterization with SUSS PM5

The PM5 accepts packaged part adapters that either fix on top of the chuck by vacuum or mount directly in place of the vacuum chuck giving extra clearance for high profile test boards.

SUSS' unique bayonet locking system allows adapters and vacuum chucks to be easily exchanged by hand while maintaining system planarity.

High Frequency Applications

The modular design of the SUSS PM5 allows the choice of either a dedicated HF set-up or in combination with DC probes.

SUSS HF probing components can be easily added to existing standard configurations.

The HF vacuum chuck has additional vacuum patterns for calibration substrates or burnishing pads.

The HF platen will accept all SUSS ProbeHeads regardless of the base type: vacuum, magnetic or bolt down.

The optional platen kinematic mount for the SUSS PH250 HF ProbeHead, gives valuable travel flexibility in north, south, east and west directions.

Low Current Measurements

Low current test requirements need a shielded environment with low leakage and low noise. SUSS provides the key components to create this environment. Low femto amp measurements are obtained by incorporating the SUSS ShieldEnclosure, guarded triaxial chuck and triaxial probearms.

Versatility

A wide range of additional accessories as well as other applications are available (see pages 6/7).

Return on Investment

The cost of failure analysis will increase, particularly for leading edge technology, necessitating higher equipment utilization and uptime.

The Design

Base

The SUSS PM5 combines stability and fine resolution with correct user ergonomics, a direct result of advanced mechanical engineering of the complete system.

Superior vibration attenuation and stability starts at the base of the system, which consists of a torsion stiff platen.

Platen Drive

The base houses the linear rotational mechanics of the platen drive, eliminating the need for awkward lever actuation.

The heavy duty linear platen drive distributes the force equally over two massive, stable columns. Each platen has its own separation column with guide bearings for precise and repeatable travel. The SUSS platen drive provides coarse and fine Z travel.

The large area platen surface is 20 mm thick and precision machine ground for flatness.

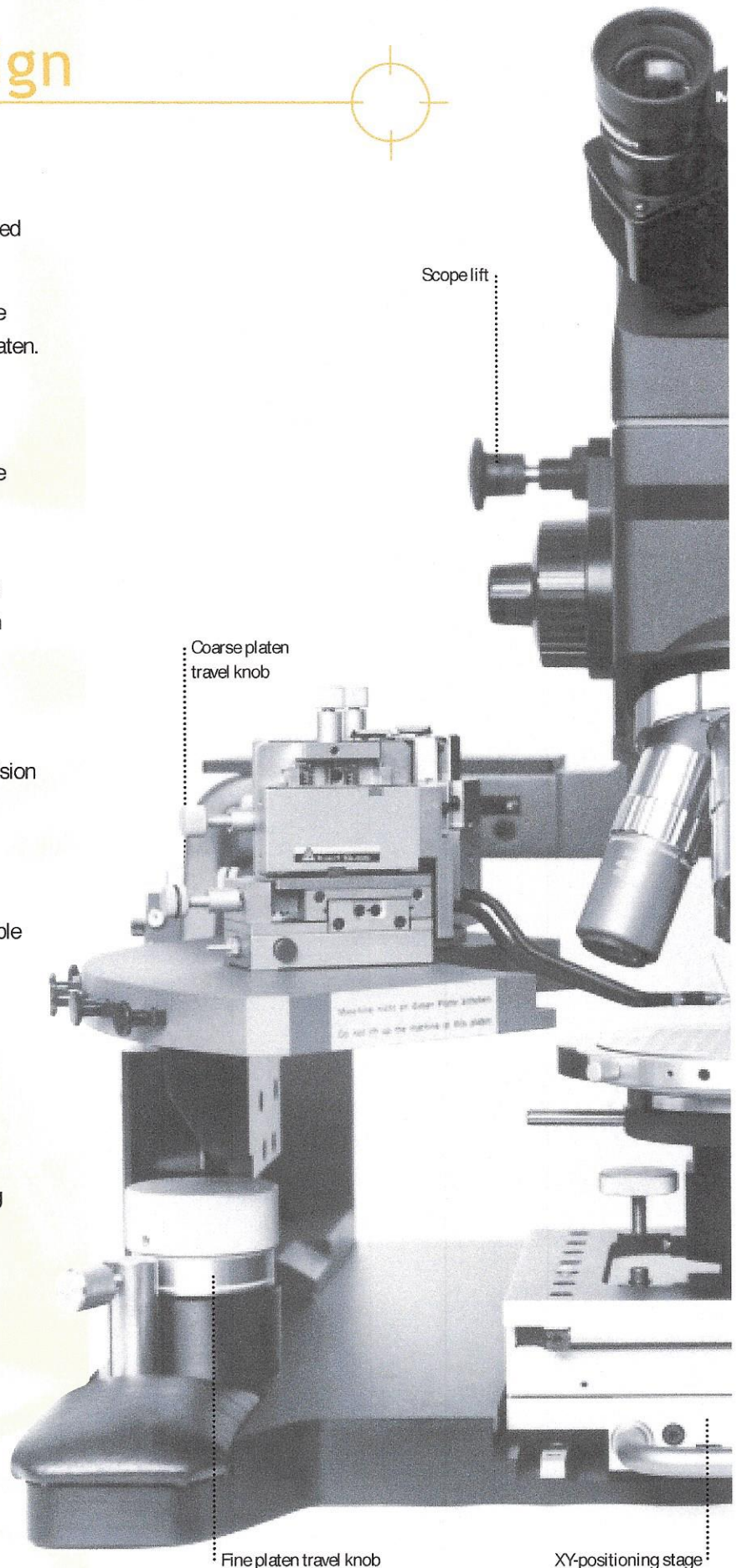
Wafer Stage

The versatile wafer stage design has fast and repeatable travel as well as ergonomic operation.

The wafer stage glides on the base platen. An ergonomic coax knob allows fast independent X and Y indexing. The pull-out (90 mm) along the Y axis permits quick and safe substrate loading.

An adjustable contact-separation stroke allows easy-to-use operation and provides the flexibility for probing substrates with different thicknesses.

The standard 360° theta rotation can be optionally replaced by a fine theta movement with $\pm 10^\circ$ travel range.



SUSS PM5 Analytical Probe System

Various microscope options

Rigid microscope bridge

Stable platen

Microscope Stage

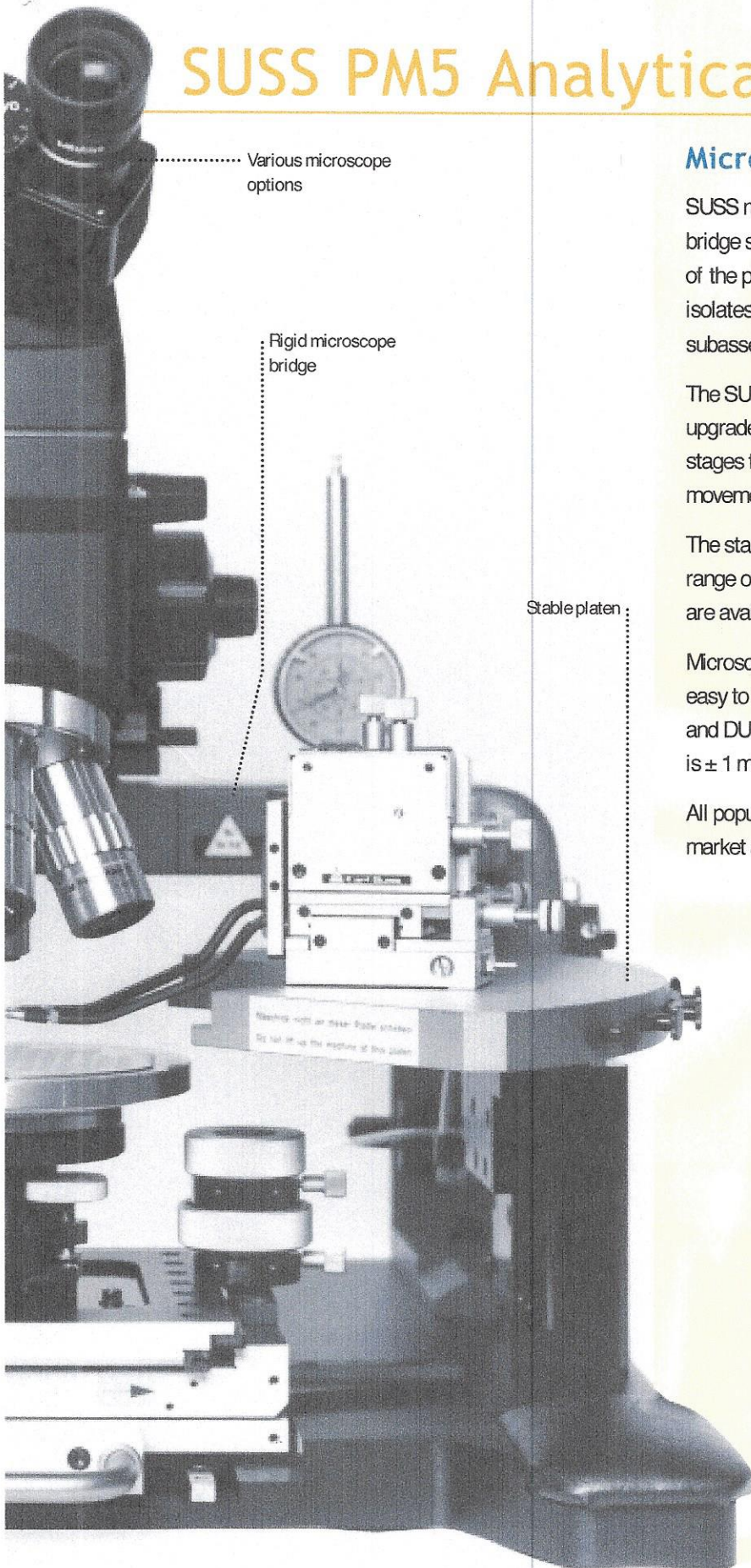
SUSS microscope stability starts with the massive bridge support system. The bridge spans the width of the probe system and secures to the base. This isolates the microscope stage from all other moving subassemblies.

The SUSS modular design concept gives the user an upgrade path from the simplest manual microscope stages to sophisticated programmable microscope movements.

The standard PM5 microscope stage has a travel range of 50 × 50 mm. However, other travel ranges are available.

Microscope lift options, manual or pneumatic, are easy to use and allow convenient access to the probes and DUT. Repeatability of returning to the focus position is ± 1 micron.

All popular microscopes currently available on the market are adaptable to SUSS Probe Stations.



Z-Theta chuck system

The PM5 Modular Probe System

Microscope Stages

Stage Type	Resolution	Travel	Access Lift Options	Microscope Type	Application
Manual	40 mm/rev.	50 x 50 mm	Fixed, manual or pneumatic tilt-back	High magnification or stereo view	Pad to internal die probing
Manual, high resolution	0.25 mm/rev.	50 x 50 mm	Fixed, manual or pneumatic tilt-back	High magnification	Laser cutting
Manual, large travel	40 mm/rev.	100 x 150 mm	Fixed, manual or pneumatic tilt-back	Stereo view	Large substrates i.e. MCM, stress test
Adjustable		env. 30 x 30 mm	Fixed	Stereo view	Minimal movement required

Microscopes

Microscope Type	Models Available	Application
Stereo view	Olympus SZ40 & 60 Series, Leica M5-12 Series, other	Pad probing and internal features down to 5 μ m
High magnification	Mitutoyo FS-60/FS-70 Series, A-Zoom, Zeiss PSM, other	Offers the most flexible options for features down to 0.4 μ m

Accessories

Probes	Active, passive, HF, triaxial, coaxial, low impedance, Kelvin
Probe Tips	Tungsten, tungsten-carbide, palladium, copper shaft, other
Probecards	SUSS supports all major probecard manufacturers
Manual ProbeHeads	Contacting bond pads and internal nodes down to 1 μ m
Remote Controlled ProbeHeads	For submicron probing, programmable
Dark Box	Light-tight, electrically shielded
Laser Cutter	Depassivating, cutting traces, trimming and blowing fuses
Utility Pumps	Vacuum, pressure or combinations
Standard Chucks	From 4" to 6", usually made of stainless steel
Triaxial Chucks	For low-current measurements
High Insulation Chucks	Power device test, low capacitance demands
Microwave Chucks	Designed for brittle III-IV compounds and high measurement stability
	Auxiliary chucks for calibration and burnishing substrates
Thermal Chucks	Adaptor kits for all hot chucks on the market available
Packaged Device Holders	Held down by vacuum on the chuck's surface
Fixtures and Chuck Accessories	Quickly manufactured to hold down substrates, provide alignment pins, or allow bottom side probing
Chuck Surfaces	Standard: stainless steel. Options: gold plated, Teflon coated, aluminum hard coated, nickel plated, other
Camera and Monitors	Facilitates ease of viewing devices
Tables	Vibration isolating tables

Flexible and Versatile



ProbeHead Platens

PHMounts

Vacuum

Magnetic

Mechanical

HF Universal

Customized

Application

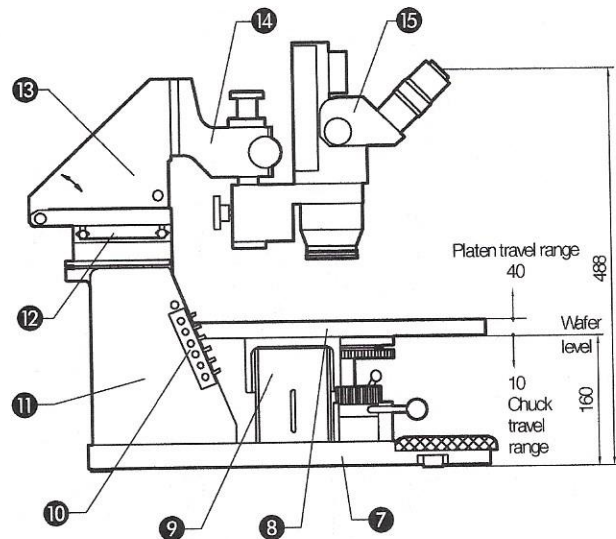
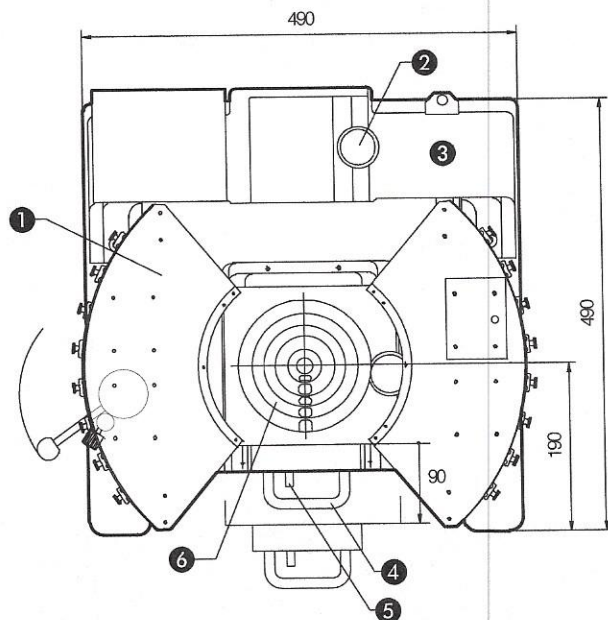
Most common, offers ease of use and flexibility

Offers more rigidity than vacuum. Commonly used when magnetic base probeheads are already used

Mechanical T-nut mount providing high rigidity

Offers vacuum, magnetic, bolt down and kinematic mounting. Kinematic requires additional kit

Custom designs are available for specialized applications, such as test head docking, substrates and MCM test



- | | |
|-----------------------|------------------|
| 1 Platen | 4 Loading sledge |
| 2 Microscope movement | 5 Carrier |
| 3 Microscope bridge | 6 Chuck |

- | | |
|----------------------|------------------------|
| 7 Base plate | 12 Microscope movement |
| 8 Probe platen | 13 Microscope holder |
| 9 Platen base | 14 Microscope adapter |
| 10 Vacuum outlets | 15 Microscope |
| 11 Microscope bridge | |

Dimensions in mm

SUSS PM5 Analytical Probe System



TECHNICAL DATA

Wafer/Substrate size

Size up to 6"/150 mm diameter: Wafer, single chips and fragments

XYTheta Wafer Stage

Planarity over 6"	<10 μ m
Resolution	5 μ m
Range of movement	155 x 155 mm
Independent X-Y braking	
Load stroke Y axis	90 mm
Z height adjustment range	10 mm
Z contact/separation stroke	0-3 mm
Theta range of travel, standard	360°
Theta range of travel, fine (optional)	\pm 10°

Chuck

Adjustable vacuum diameters	
Vertical rigidity 6"	<15 μ m/10 N
Planarity	3 μ m

Probe-head Platen

Fixed or manual drive with contact stroke	
Vacuum, magnetic, mechanical fixation or high frequency	
Range of travel	40 mm
Contact/separation stroke	0.2 mm
Repeatability	1 μ m

Utilities

Vacuum	-0.8 bar
Compressed air (Pneumatic lift only)	4 bar

Dimensions and Weight

Width x Depth x Height	490 x 490 x 480 mm, 20 x 20 x 19"
Weight	60 kg/133 lb

Karl Suss Worldwide

North America

KARL SUSS America, Inc.
228 Suss Drive · Waterbury Center, VT 05677 · USA
Phone (802) 244-5181 · Fax (802) 244-5103

KARL SUSS America, Inc.
Regional Sales & Service Center
4710 East Elwood St. · Suite 21 · Phoenix, AZ 85040 · USA
Phone (480) 557-9370 · Fax (480) 557-9371

KARL SUSS America, Inc.
Region Sales & Service Center
2694 Orchard Parkway · San Jose, CA 95134-2020 · USA
Phone (408) 432-3071 · Fax (408) 432-3072

Germany

KARL SUSS KG GmbH & Co.
Schleissheimer Strasse 90 · D-85748 Garding b. München · Germany
Phone (+49)-[0] 89/3 20 07-0 · Fax (+49)-[0] 89/3 20 07-162

KARL SUSS Dresden GmbH
Süss - Strasse 1 · D-01561 Sacka b. Dresden · Germany
Phone (+49)-[0] 35240-73-0 · Fax (+49)-[0] 35240-73-700

KARL SUSS Vaihingen GmbH
Planckstr. 9 · D-71665 Vaihingen/Enz · Germany
Phone (+49)-[0] 7042 / 955-0 · Fax (+49)-[0] 7042 / 955-100

France

KARL SUSS France S.A.
Avenue des Colombières · F-74490 Saint Jeoire · France
Phone (+33) [0] 4 50 35 83 92 · Fax (+33) [0] 4 50 35 88 01

Great Britain

KARL SUSS Great Britain Ltd.
23 Ivanhoe Road · Hogwood Lane Industrial Estate
Finchampstead · Wokingham · Berkshire
GB - RG40 4QQ · England
Phone (+44) [0] 11 89-732144 · Fax (+44) [0] 11 89-734395

Japan

KARL SUSS Japan K.K.
カール・スース・ジャパン株式会社
〒226-0006 神奈川県横浜市緑区白山1-18-2
ジャーマン・インダストリー&トレード・センター
GITC 1-18-2, Hakusan, Midori-ku · Yokohama, Kanagawa 226-0006
Phone (+81)-45-931-5600 · Fax (+81)-45-931-5601

Asia

KARL SUSS Asia Co., Ltd.
212/2 Soi Ladprao 10
Ladprao Road, Ladyao · Jatujak · Bangkok 10900 · Thailand
Phone (+66)-2 938 44-26, -27 · Fax (+66)-2 512 5569

Come visit our website!

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