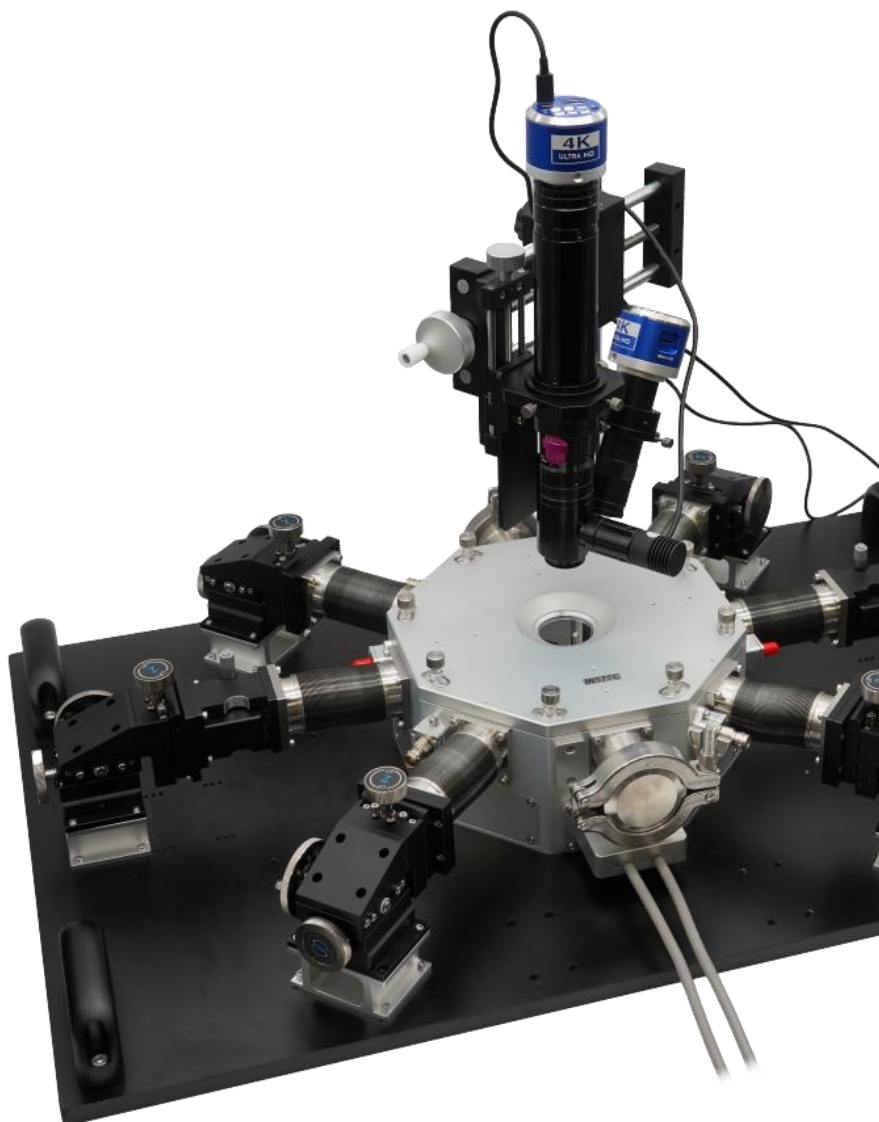


INTEC Inc.

Electrical Probing Solutions

- **Precision temperature control from -190°C up to 1500°C**
- **Atmospheric control for evacuation or gas purge**
- **DC probing up to 1200°C**
- **RF probing up to 600°C+**
- **Customization services**
- **Sales, Support and Service from Boulder, CO - USA**

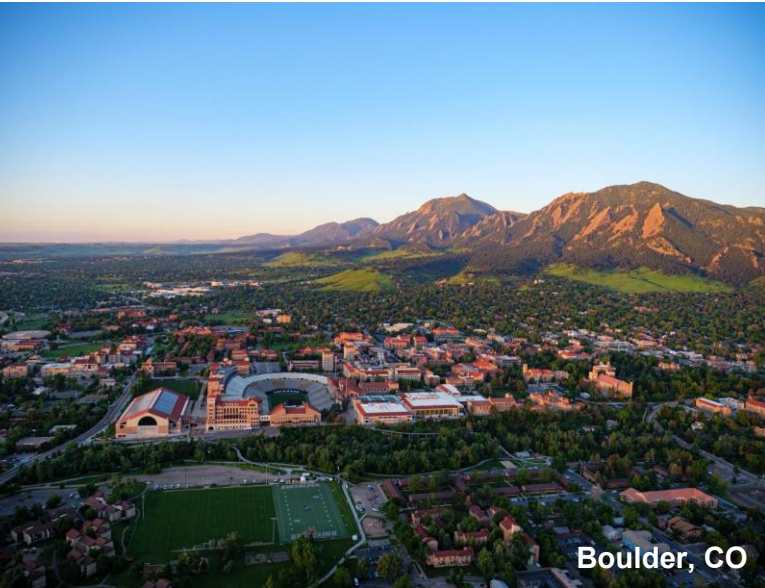


Contents

Pg 5. -PM Electrical Probing stages
Pg 8. -MP(S) Modular Probing Stations
Pg 11. -PS Advanced Probing Stations
Pg 13-. Hall-Effect Tools
Pg 16. Specialty Probing Solutions
Pg 17. Fully-Custom Projects
Pg 19. Thermal Chucks
Pg 24. Add-on Options for Stages/ Plates



DOWNLOAD CATALOG



INSTEC is a scientific instrument (INS) technology (TEC) company focused on precision thermal control.

Founded in 1984 by a group of pioneering liquid crystal physics researchers from the University of Colorado Boulder, our goal has always been to create unique scientific instruments in diverse fields and industries.



Technical Sales

Our technical sales team takes the time to learn your unique application, and recommend the ideal product to best suit your needs.



Global Service

Instec offers precision instrument technology globally, either through direct sale or through our network of trusted dealers.



Comprehensive Technical Support

Dedicated technical support from experienced engineers and technicians – no call centers. Call or email for quick and effective support.

Complete Product Summary/ Categories

Instec offers a huge range of instruments, tools, and accessories for any application. Instec solutions can broadly be categorized into five categories: Thermal Stages, Electrical Probing Solutions and Thermal Chucks, Thermal Plates, Liquid Crystal equipment, and Electronics Systems such as temperature controllers, cooling systems, and measurement tools. This catalog focuses on Electrical Probing Solutions and Thermal Chucks, but information on other categories can be found at www.instec.com.

Thermal Stages

Hot and Cold Stages for optical systems such as upright or inverted microscopes, or FTIR



This Catalog

Electrical Probing Systems and Thermal Chucks

Electrical probing tools ranging from miniature test cells to modular probing stations with full temperature and environmental control



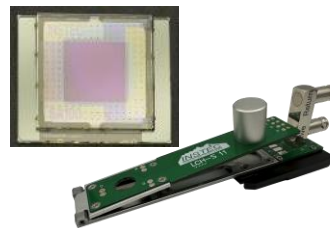
Thermal Plates

Compact or benchtop thermal plates ideal for spectroscopy, additive manufacturing, heavy-duty applications



Liquid Crystal Research Tools

LC Materials, cells, fixtures and measurement systems including our Automated Liquid Crystal Testing system platform - ALCT



Temperature Controllers, Cooling Systems, and Other Accessories

Precision temperature controllers, LN2 cooling systems, suction pumps, electrical measurement tools and more!



Electrical Probing Products Summary – “At a Glance”



-PM Miniature Probing Stages

Miniature stages with manually positioned electrical probes

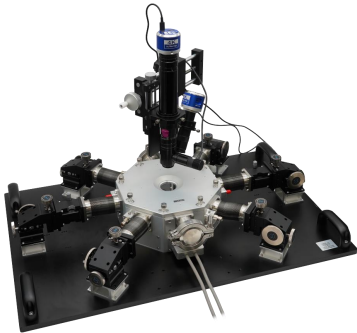
[Details on Page 5](#)



-MP and -MPS Modular Probers

Miniature electrical probing stations with modular configurations

[Details on Page 8](#)



-PS Advanced Probing Stations

Full-size electrical probing stations with advanced capabilities such as motorized sample movement or high-temp RF probing

[Details on Page 11](#)



Hall Effect Tools

Test cells, Magnets, and Measurement Tools for Hall-Effect characterization

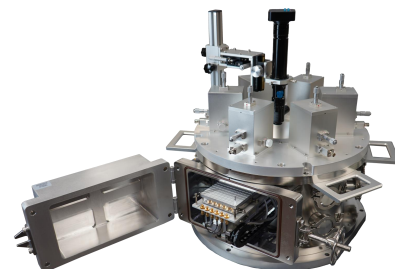
[Details on Page 13](#)



Specialty Probing Tools

Special tools with unique features for non-standard applications

[Details on Page 16](#)



Fully-Custom Solutions

Collaborative design services for developing unique and optimized tools

[Details on Page 17](#)



Thermal Chucks

Precision thermal chucks with vacuum hold down zones for wafers or other flat samples

[Details on Page 19](#)



Feedthroughs for Stages/Plates

Optional electrical feedthroughs for Instec Thermal Stages and Plates

[Details on Page 24](#)

-PM Series Probing Solutions

Miniature test cells with integrated electrical probing and temp control

HCP621G-PM, HCP421V-PM, HCP621G-PMH, HCP421V-PMH, TP102V-PM, HP1000V-PM, P02S-PM, P02S-PMH



DESCRIPTION

Instec's -PM (Miniature Probing) systems are built for applications requiring a compact, easy-to-use test cell flexible enough for a wide range of applications.

-PM probing stations incorporate integrated electrical probes, precision temperature control, optical access, and a sealed environment to offer excellent control over sample characteristics during device characterization. Instec offers a wide selection of temperature ranges, a number of electrical probes, and optical access options for the -PM series to fit any application.



HCP621G-PM

KEY FEATURES

Precision Temperature Control

Most -PM models have precision temperature control capability, offering sample temperature control from -190°C up to 400°C/600°C, and room temperature up to 1000°C. TEC sample areas are also available for convenient heating and cooling between -40°C and 150°C+ without the need for cryogens.

Manually Adjustable Electrical Probers

Independent cantilever probes are manually positioned on the sample to perform electrical measurements on a range of samples. Probers are free to rotate and slide for easy landing and are flexible to accommodate for thermal expansion. For wire-bonded samples, the probes can be removed and replaced with a single wire-terminal screw.

Optical Access

Each model is optimized for use with optical systems of all kinds. Short working distances, large observation windows, and frame geometry design make -PM models compatible with most optical tools. Windows are field-replaceable and can be exchanged for IR/UVIS compatible windows for use with specialized instruments.

Customizable Features with -MP or -MPS model

While customization features are limited on most -PM products, Instec offers the -MP and -MPS series, which can be customized to optimize the probe station for any unique application, including:

- More or less electrical probes
- Electrically floating sample area
- Larger or smaller windows
- Transmission apertures
- Custom lids
- Monitoring sensors
- Magnetized sample holders
- High voltage feedthroughs
- SMA, Triax or custom connectors

Turnkey Operation

Every -PM model is available as a turnkey system including the probing station, temperature controller, and InstecApp software. Simply connect each component, power it on, and start measuring samples.

Easy Sample Access

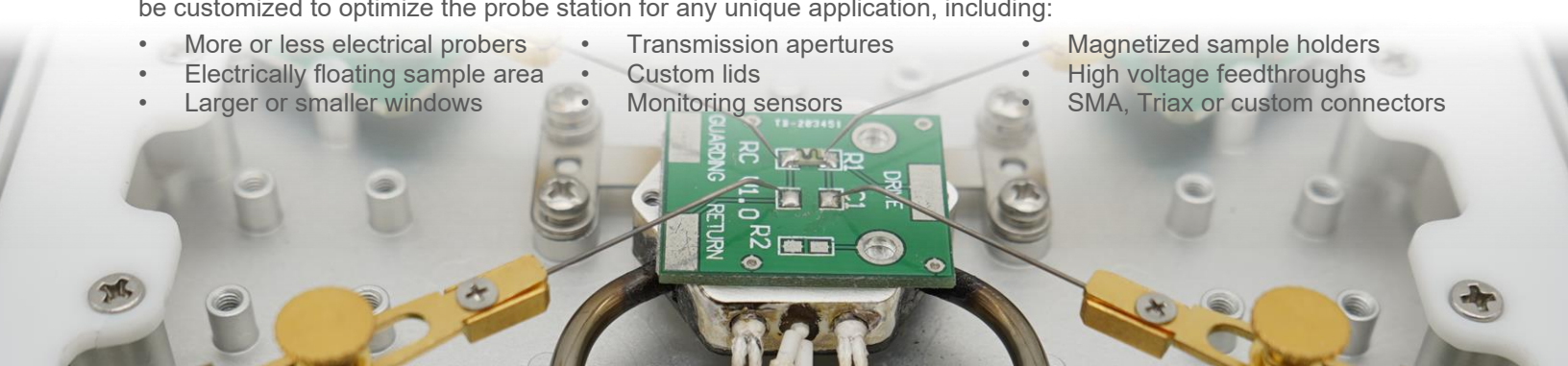
Changing samples is as simple as loosening spring-loaded thumb screws on the gastight cover, then sliding it out of place and loading the sample. Optional sample clips are available for added stability or use with vertical mounting adaptors.

Compact Size

-PM models utilize water cooling to keep the frame as compact as possible no matter the sample temperature. They are small enough to use with electromagnets or optical systems.

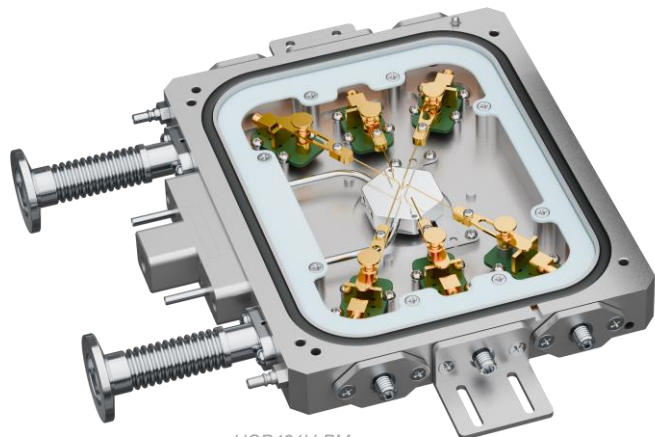
Atmospheric Control

Gastight or vacuum-tight chamber options make it easy to prevent condensation or sample oxidation or to simulate environmental conditions.



Unique models with application-optimized capabilities

The -PM series includes many different models with different capabilities to suit different applications



HCP421V-PM

'HCP' Resistive Heating and LN2 Cooling Models

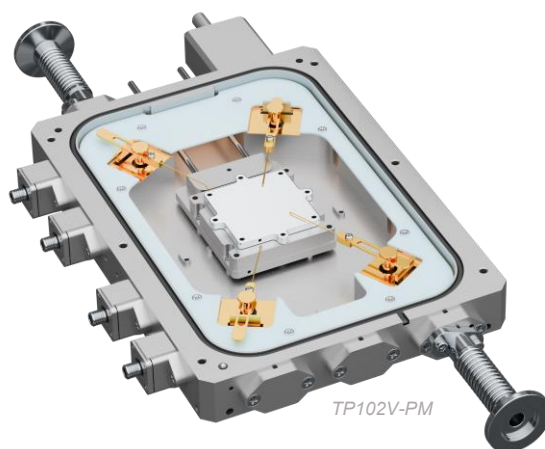
HCP models are the most versatile in heating/cooling capabilities. These models provide heating up to 600°C in ambient conditions or 400°C in a vacuum, while an optional LN2 cooling system enables sample temperatures as low as -190°C. HCP models support a vacuum-tight chamber capable of reaching at least $9.9 \times 10^{-3} \text{ mBar}$, or less than $9.9 \times 10^{-5} \text{ mBar}$ with an optional vacuum upgrade.

Models include: HCP621G-PM, HCP421V-PM, HCP621G-PMH, HCP421V-PMH

'TP' Thermoelectric Heating and Cooling Models

TP models are the most convenient to use for applications requiring a small to moderate temperature range. These models provide rapid and precise heating and cooling from -30° to 150°C+ without the need for cryogenics. TP models support a vacuum-tight chamber capable of reaching less than $9.9 \times 10^{-3} \text{ mBar}$, or less than $9.9 \times 10^{-5} \text{ mBar}$ with an optional vacuum upgrade.

Models include: TP102V-PM



TP102V-PM

'HP' High-Temperature Models

HP models use specially designed ceramic heating blocks to allow sample temperatures up to 1000°C. HP models do not have active sample cooling capabilities, but can be purged with cool-dry gas to accelerate passive cooling. HP models support a vacuum-tight chamber capable of reaching less than $9.9 \times 10^{-3} \text{ mBar}$, or less than $9.9 \times 10^{-5} \text{ mBar}$ with an optional vacuum upgrade.

Models include: HP1000V-PM

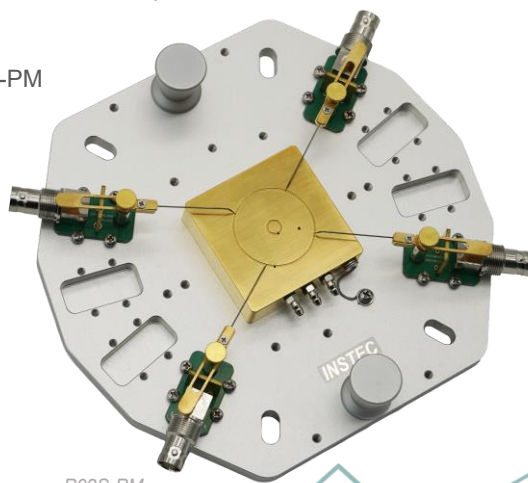


HP1000V-PM

'P02S' Simplified Models

'P02S' models are stripped down to focus on simplicity, compact size, and ease of use. These probe stations are open to the air and have no active temperature control capabilities. In exchange, P02S models are inexpensive, easy to use, and are highly customizable- accepting 8 or more electrical probes, custom mounting holes, transmission apertures and much more with ease. P02S models can also be used with a magnetic breadboard and external XYZ positioner modules to allow for precise probe landing. See P02S-PM-XYZ4 for a miniature precision XYZ capable stage.

Models include: P02S-PMx, P02S-PMHx



P02S-PM



-PM Series Specifications by Model

Series Family	‘HCP’ Models				‘TP’ Models	‘HP’ Models	‘P02S’ Models	
Model	<u>HCP621G-PM</u>	<u>HCP621G-PMH</u>	<u>HCP421V-PM</u>	<u>HCP421V-PMH</u>	<u>TP102V-PM</u>	<u>HP1000V-PM</u>	<u>P02S-PM</u>	<u>P02S-PMH</u>
Non-paramagnetic construction (50mm radius around sample area)		✓		✓				✓
Temperature Controller	LVDC Output mK2000B				Bi-directional LVDC Output mK2000B	LVDC Output mK2000B	N/A	
Controller Power Requirements	150W max				80W max	650W max	N/A	
Standard Temperature Range	-190°C to 600°C		-190°C to 400°C		-30°C to 120°C (-40°C and +150°C+ Upgrade available)	Room Temperature to 1000°C	N/A	
Cooling Method	LN2 Circulation				Thermoelectric	No Active cooling		
Temperature Sensor	Embedded 100 Ohm RTD					Embedded S-type thermocouple	N/A	
Temperature Resolution	±0.01°C					0.1°C	N/A	
Temperature Stability	±0.05°C (>25°C), ±0.1°C (<25°C)				±0.05°C	±1°C	N/A	
Max Heating Rate	+120 °C/m @100°C**		+30 °C/m @100°C**			+50°C/m <850°C, +20°C/m >850°C**	N/A	
Max Cooling Rate	-50°C/m @100°C**		-30 °C/m @100°C**		-20°C/m @37°C**	N/A	N/A	
Thermal Block Material	Silver				Anodized Aluminum	Silicon Carbide	Gold-Plated Copper	
Thermal Area Electrical Bias	Grounded (standard), floating, or triax-floating***					Floating (non-conductive)	Grounded (Standard), floating or triax-floating***	
Standalone Electrical Feedthroughs	0 (Standard), up to 2X additional***						None	
Electrical Probers	4x or 6x hand-positioned electrical probers***				4x hand-positioned electrical probers***		4x, 6x, 8x+ hand-positioned electrical prober options	
Electrical Prober Connections	SMA Coaxial Feedthroughs (Coaxial BNC, Triaxial BNC/ SMA options)***						Coax BNC (Coaxial BNC, Triaxial BNC/ SMA options)***	
Optical Access	Visual access via reflection (transmission aperture available with custom order***)							
Minimum Objective Working Distance	8mm				10mm	9.5mm (low working distance available with customization)	0mm	
Observation Window	Ø18mm viewing aperture (Ø22mm x 0.5mm Glass)				Ø45mm viewing aperture, (Ø50mm x 1.5mm Glass)	Ø27mm viewing aperture, (Ø31.75mm x 1mm Glass)	N/A	
Top Viewing Angle	±45°				±60.7°	±48°	±90°	
Window Defrost	External window defrost fixture							
Sample Area	26mm Hex	42mm x 38mm	26mm Hex	42mm x 38mm	40mm x 40mm	25mm x 25mm	50mm x 50mm	
Inner Chamber Height	5mm				5.5mm	5mm	N/A	
Atmospheric Control Ratings	Gas Purging Max Pressure: +0.5 BAR Rough Vacuum: less than 100mBar		Gas Purging Max Pressure: +0.5 BAR Low Vacuum: less than 9.9*10 ⁻³ mBar Vacuum Upgrade: less than 9.9*10 ⁻⁵ mBar				N/A	
Frame Cooling	Integrated water block for frame cooling with optional chiller system (recommended above 200°C)				Integrated water-cooling block for TEC	Integrated water block for frame cooling (required above 200°C)	N/A	
Mounting	Standard models include tapped holes on the frame and removable L-brackets Mounting adaptors for specific instruments available by request							
Frame Dimensions	appx 180mm x 130mm x 27mm				200mm x 145mm x 33mm	180mm x 130mm x 26.5mm	180mm x 140mm x 15mm	
Weight [Aluminum Frame]	1500g					1550g	~500g (Configuration dependent)	

Listed specifications are subject to change at any time without prior notice as products evolve

** Increased heating/cooling rates may be available by request

***Customization available by upgrading to '+' version of a given mode

R250804

-MP / -MPS Series Probing Stations

Modular benchtop probing stations with external micromanipulators

HCP421V-MPS, HCP621G-MPS, HCP402V-MPS, TP102V-MPS, HP1000V-MPS, P02SV-MP, HCP402V-MP, HCP602V-MP



DESCRIPTION

Instec's -MP (Modular Probe) and -MPS (Modular Probe Station) systems are convenient benchtop solutions ideal for characterization, and electrical measurements.

-MP and -MPS systems are a step up in performance over the standard mini-probing stages, offering larger sample sizes, better probing control, and customizability through the modular attachment system. The small size, controlled atmosphere and optical access offer an ideal test environment for samples up to 50mm x 50mm.

Choose between the -MP and -MPS options based on your sample type, pad size, and experimental requirements.



HCP421V-MPS

Each Modular Prober can be configured with different numbers of prober needles, standalone electrical feedthroughs, gastight/vacuum feedthroughs, and many more options to optimize functionality for a specific application. Temperature-controlled sample areas enable precision temperature control from -190°C up to 400°C/600°C, or room temperature up to 1000°C. Thermoelectric sample areas are also available for convenient heating and cooling between -40°C and 150°C+ without the need for cryogenics.

KEY FEATURES

Precision Temperature Control

Choose between "HCP", "TP" and "HP" thermal cores to enable precision temperature control with stability as high as $\pm 0.05^\circ\text{C}$.

Optical Access

-MPS models come standard with large optical windows to allow for easy probe landing once the chamber is sealed. All windows are easily removable and replaceable for cleaning, replacement, or optimization for different wavelengths.

Atmospheric Control

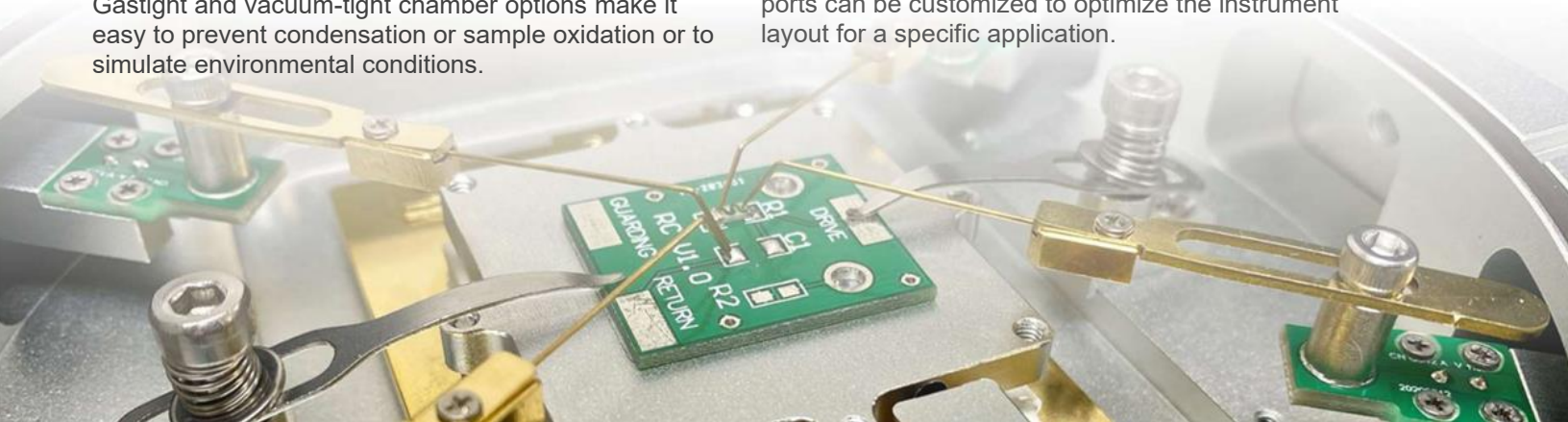
Gastight and vacuum-tight chamber options make it easy to prevent condensation or sample oxidation or to simulate environmental conditions.

Turnkey Operation

Every -MPS model is available as a turnkey system including the probing station, temperature controller, InstecApp software, and electrical analysis tools. Simply connect each component, power on, and start measuring samples.

Modular Structure

Modular Probers utilize a compact "blank" system with a standardized geometry that accepts a number of Instec ports, feedthroughs, and accessories. Everything from the number of probers to the position of ports can be customized to optimize the instrument layout for a specific application.





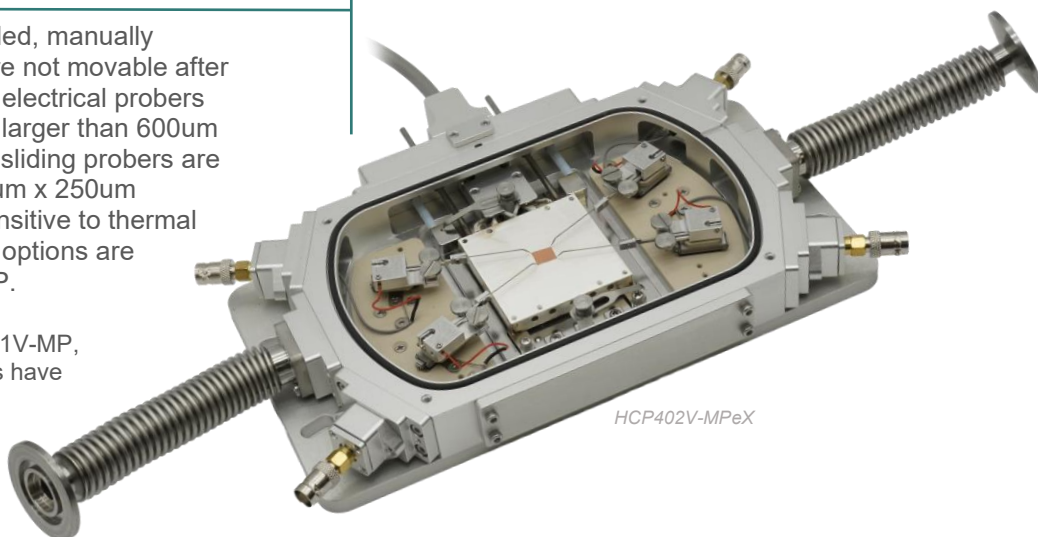
-MP and -MPS series model variations

Choose the ideal -MPS model for your application

-MP (Modular Prober)

-MP series probes utilize spring-loaded, manually positioned electrical probes which are not movable after the chamber is sealed. The standard electrical probes are recommended for electrical pads larger than 600um x 600um, while the upgraded -MPeX sliding probes are recommended for smaller pads (250um x 250um minimum), or for samples that are sensitive to thermal expansion. All standard thermal core options are supported, including TP, HCP and HP.

Models include: HCP621G-MP, HCP421V-MP, HCP602G-MP, HCP402V-MP. All options have a MPeX upgrade option.



HCP402V-MPeX



HCP402SV-MPS8T+

-MPS (Modular Probe Station)

-MPS series probing stations support discrete probe XYZ modules with a 10mm x 10mm x 5mm travel range. Each probe is independently controlled and may be moved inside the sealed chamber without breaking the vacuum, perfect for small electrical contacts or for testing multiple devices in a single run. All standard core options are supported, including TP, HCP and HP.

-MPS probe arms are available in either an upright or downward orientation. The advantage of downward oriented probes are better clearance for microscopes, and easier sample loading/unloading.

Models include: HCP621G-MPS, HCP421V-MPS, HCP402-MPS and More...

Customizable Features with the -MP and -MPS series

The layout and features of each modular prober model can be customized to enable unique capabilities. Some past customizations include:

- # of electrical probes
- Electrically floating sample area
- Larger or smaller windows
- Transmission apertures
- Custom lids
- Monitoring sensors
- Magnetized sample holders
- High voltage feedthroughs
- SMA, Triax or custom connectors





-MP/ -MPS Series Specifications by Model

Series Family	‘HCP Models’			‘TP’ Models	‘HP’ Models	‘P02SV’ Models
Model	<u>HCP621G-MP(S)</u>	<u>HCP421V-MP(S)</u>	<u>HCP402SV-MP(S)</u>	<u>TP102V-MP(S)</u>	<u>HP1000V-MP(S)</u>	<u>P02SV-MP(S)</u>
Temperature Controller	LVDC Output mK2000B			Bi-directional LVDC Output mK2000B	LVDC Output mK2000B	N/A
Controller Power Requirements	150W max		250W max	80W max	650W max	N/A
Temperature Range	-190°C to 600°C	-190°C to 400°C		-30°C to 120°C (-40°C limit available with CW5000 chiller, 150°C Upgrade available)	Room Temperature to 1000°C	N/A
Cooling Method	LN2 Circulation (optional, but required for active cooling)			Thermoelectric	No Active cooling	
Temperature Sensor	Embedded 100 Ohm RTD				Embedded S-type thermocouple	N/A
Temperature Resolution	0.01°C				0.1°C	N/A
Temperature Stability	±0.05°C (>25°C), ±0.1°C (<25°C)			±0.05°C	±1°C	N/A
Max Heating Rate	+30 °C/m @100°C**				+50 °C/m <850°C, +20 °C/m >850°C**	N/A
Max Cooling Rate	-30°C/m @100°C**		-15°C/m @100°C**	-25°C/m @37°C**	N/A	N/A
Thermal Block Material	Silver			Anodized Aluminum	Silicon Carbide	Anodized Aluminum
Thermal Area Electrical Bias	Grounded (Standard), floating or triax-floating***				Floating (non-conductive)	Grounded (Standard), floating or triax-floating***
Standalone Electrical Feedthroughs	0 (Standard), up to 8X+ additional***					
Electrical Probers	0x to 6x DC to 500MHz XYZ probers*** [20 um resolution, 10mm x 10mm x 4mm travel range with -MPS] 7+ electrical probers and RF probe tips available with customization					
Electrical Prober Connections	Coaxial BNC (Standard) coaxial SMA, Triaxial BNC, and Triaxial SMA available with +Model***					
Optical Access	Visual access via reflection (transmission aperture available with custom order***)					
Minimum Objective Working Distance	12mm					
Observation Window	Ø27mm viewing aperture (Ø31.75mm x 1.5mm Glass) for -MPS Ø50mm viewing aperture (Ø55mm x 1.5mm Glass) for -MPS					
Top Viewing Angle	±60°			±58°		±60°
Window Defrost	External Window Defrost Fixture					
Sample Area	Ø26mm hexagon		50mm x 50mm	40mm x 40mm	25mm x 25mm	50mm x 50mm
Inner Chamber Height	8mm				8.5mm	8mm
Atmospheric Control Ratings	Gas purge: +0.5 BAR Rough Vacuum: less than 100mBar	Gas purge: +0.5 BAR Low Vacuum: less than 9.9*10^-3 mBar Vacuum Upgrade: less than 9.9*10^-5 mBar				
Frame Cooling	Integrated water block for frame cooling with optional chiller system (recommended above 200°C)			Integrated water-cooling block for TEC	Integrated water block for frame cooling (required above 200°C)	N/A
Mounting	Standard models include tapped holes on the frame and removable L-brackets Mounting adaptors for specific instruments available by request					
Frame Dimensions	Max: 440mm x 270mm x 106mm [Configuration-specific drawings available by request]					
Max Weight [Aluminum Frame]	4000g		4600g	4600g	5000g	4000g

Listed specifications are subject to change at any time without prior notice as products evolve

** Increased heating/cooling rates may be available by request

***Customization available by upgrading to '+' version of a given mode

R250804

-PS Series Advanced Probing Stations

Custom Full-size Probing Stations with Advanced Features

HCP421V-PS, TP102V-PS, HP1000V-PS, P02SV-PS, HCP421V-PSRF+, HP1000V-PSRF+



DESCRIPTION

Instec's -PS (-Probe Station) systems are powerful tools for advanced testing of large samples with the most challenging environmental requirements. The deep chamber volume supports advanced features such as motorized sample area movement, and overhead 50GHz+ RF probes. The chamber is vacuum-tight, supporting evacuation down to at least $9.9 \times 10^{-3} \text{ mBar}$, or positive-pressure gas purge up to 0.5 Bar. The system may be used under standard atmosphere, vacuum, or inert gas-purge, simulating a huge range of environmental conditions. -PS probing stations are fully customizable and can be optimized for any sample size, environmental requirement, or electrical test. Temperature control capabilities are supported with 'HCP', 'TP', and 'HP' variations to suit the application.

-PS+ models come with a Dual-FOV Camera system for probe landing and device characterization. Contact sales@instec.com to configure a -PS system and determine exact system specifications.

KEY FEATURES

Precision Temperature Control up to 1000°C

High-power heating up to 1000°C via specialized silicon-carbide heating elements provides incredible temperature control in either vacuum, ambient, or gas purge conditions. Optional alternative 'HCP' and 'TP' cores are available to enable active cooling with a smaller operating range. Samples smaller than 20mm diameter are highly recommended.

Externally Controllable XYZ Probers

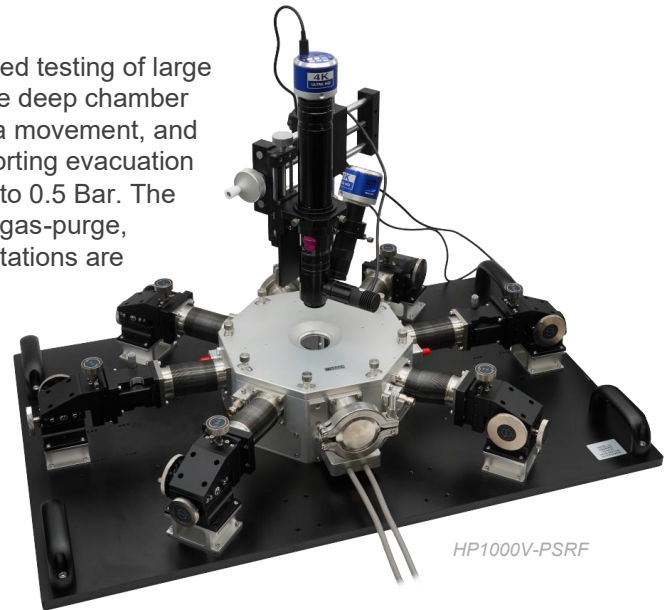
-PS+ probing stations support discrete prober XYZ modules with a base 10mm x 10mm x 5mm travel range (longer travel range upgrades are available). Each prober is independently controlled with micrometer precision, perfect for landing on small electrical contacts.

Atmospheric Control

Gas-tight and vacuum-tight chamber options make it easy to prevent condensation or sample oxidation or to simulate environmental conditions. Includes standard KF flanges for easy compatibility.

Fully Customizable

Customize nearly every aspect of the HP1000V-PS+ system to optimize performance for your unique application.



HP1000V-PSRF

Optional Sample Movement

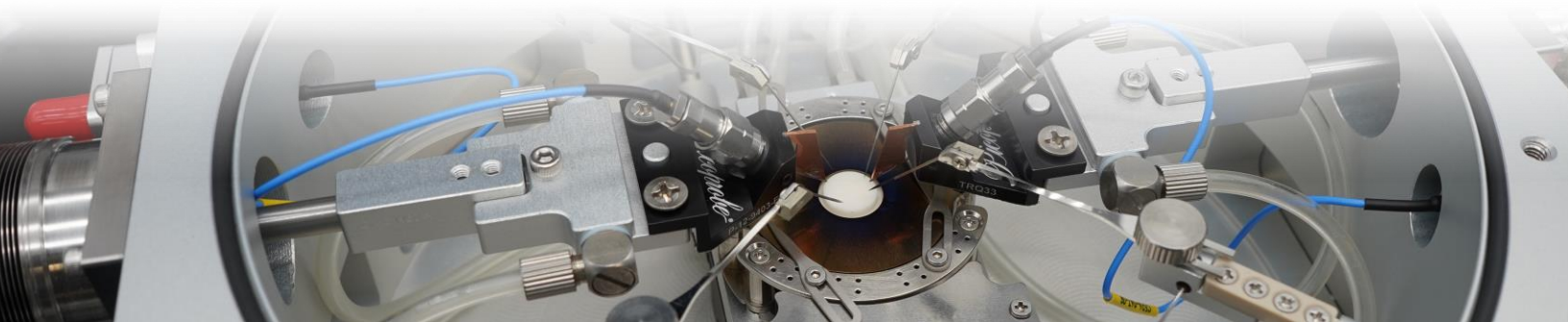
XYZ Φ (Phi/ rotation) sample movement allows the sample to be moved with up to 4 axes of freedom for prober alignment onto different devices on a single wafer.

DC and RF Probing

The HP1000V-PS+ supports both DC and RF probes and offers adjustable rotation controls for ensuring good prober contact. Most GGB probes are supported, as well as similar solutions from other manufacturers. Special high-temp RF probes with water-cooling for probing at 600°C+ are available by request. RF probes have full precision XYZ Θ (Theta/ Rotation) movement.

Optical Access with Dual-FOV Camera System

-PS+ models come standard with large optical windows to allow for easy probe landing or optical instrument compatibility once the chamber is sealed. All windows are easily removable and replaceable for cleaning, replacement, or optimization for different wavelengths. A dual-FOV camera system provides a detailed view for probe landing and a wide-angle view for sample positioning.





Customizable Features

-PS+ systems are almost always custom due to the wide range of applications and industries that benefit from a probing system with total temperature and environmental control. To configure your ideal -PS+, contact sales@instec.com and speak with one of our sales engineers. Instec will work with you to fully understand your application, and build a personalized instrument to match your needs.

Electrical Probers

Apply electric fields and measure device characteristics

- Coaxial BNC, Triaxial BNC, SMA and 2.4mm options
- DC and RF probe options
- Increase or decrease number of probers as needed up to 6x recommended)

Optical Access

Flexible optical access for microscopy or spectroscopy

- Field replicable windows for including quartz, CaF₂, ZnSe and more
- Standardized mounting points for microscope stands

Sample Movement

Move the sample for probe alignment or device mapping

- Rotation option for RF probe alignment
- Motorized motion platform option – up to 4x axis of movement
- Motorized side-loading option

Temperature Control

Precision temperature-controlled sample areas from 20mm x 20mm to 150mm x 150mm

- -190°C to 400°C (HCP), -40°C to 150°C+ (TP) and RT to 1000°C +("HP") models
- Stability up to $\pm 0.05^\circ\text{C}$
- Custom thermal block designs for higher temperatures or special samples

Benchtop or Standalone Options

Non-motorized models are available in a convenient benchtop format. Anti-vibration tables and isolators are available by request. Standalone anti-vibration tables are included with motorized systems.



H91 Temperature-Controlled Hall Effect System

For applications requiring electrical device or material characterization, Instec is proud to offer our modular **H91 Hall Effect Measurement System**. The H91 system is a combination of a temperature and environmentally controlled test cell from Instec, and the powerful M91 FastHall controller from Lakeshore. Synchronize electrical measurements with temperature control to study temperature dependent phenomena via Lakeshore's MeasureLINK Software. Choose from a number of temperature control options, accessories, and magnetic field options to optimize system performance for any sample or application.

KEY FEATURES

Instec Test Cells – Precision Temperature Control

Choose between the 3 options for temperature and environmental control test cells from the Instec -PM or -MP family, including

- **H91-Gyz** [-190°C* to 600° under gas]
- **H91-Vyz** [-190°C* to 400°C under vacuum]
- **H91-HTyz** [RT to 1000°C gas or vacuum]

Each test cell includes 4x or 6x manually positioned cantilever probes (also compatible with wire bonded samples), and an mK2000B temperature controller.

**Cooling below room temp requires optional LN2 cooling system*



Basic H91 characterization system utilizing Instec HCP621G-PMH probing stage(H91-G Option), mK2000B temperature controller, and Lakeshore M91 FastHall controller

Lakeshore M91 FastHall Controller

The MeasureReady® M91 is versatile all-in-one Hall Effect measurement system. With automated measurement optimization, fast measurement speeds, and easy to use interface, the M91 makes analyzing samples under 4-point or Hall Bar incredibly simple. Measure up to 10Mohm with the standard model, or up to 200Gohms with the HR model.

- **H91-xy Standard M91**
- **H91-xy-HR High-resistance capable M91**

Use the M91 to measure a number of properties:

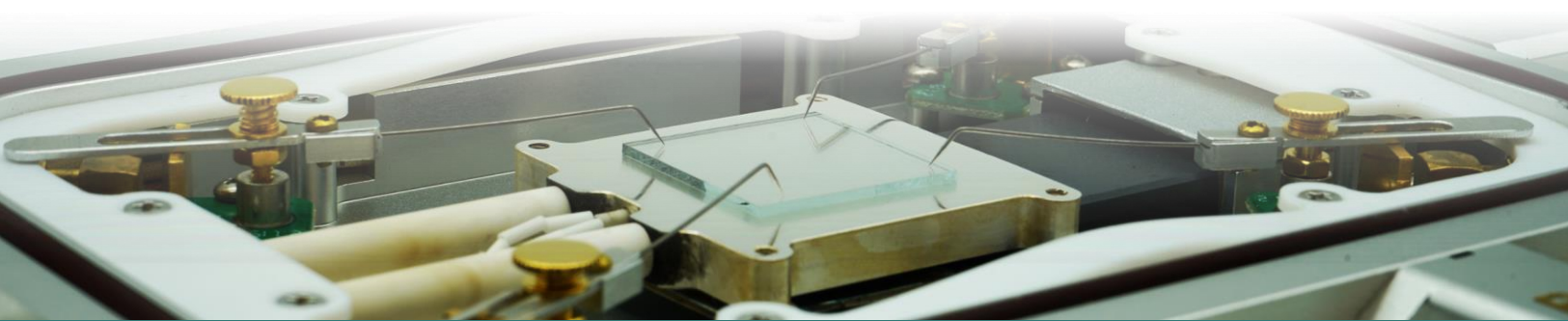
- 2 wire resistance
- Contact Check
- 4 wire resistance
- Hall Voltage
- Sheet Resistance
- Mobility
- And More!

Magnetic Field Application Options

Hall-effect measurements require a strong and uniform magnetic field. Provide your own magnetic field source, or choose between a permanent magnet, or upright electromagnet system. All test cells utilize water cooling to keep the frame as compact as possible no matter the temperature range or magnetic field option.

MeasureLINK Software Integration

Control the Instec mK2000B temperature controller via Lakeshores MeasureLINK software Via the INSTEC Application Pack. Automate device measurement along with temperature control and magnetic field application. Plot, analyze or export data as needed.



Instec Probing Chamber Options and Specifications

Optimize system performance for any application

Test Cell Package	H91-Gyz (HCP621G-PMH)	H91-Vyz (HCP421V-MPH)	H91-HTyz (HP1000V-PMH)
Non-paramagnetic construction (50mm radius around sample area)	✓	✓	✓
Temperature Controller	LVDC Output mK2000B		
Power Requirements	150W max		650W max
Temperature Range	-190°C to 600°C	-190°C to 400°C	Room Temperature to 1000°C
Cooling Method	LN2 Circulation		No Active cooling
Temperature Sensor	Embedded 100 Ohm RTD		Embedded S-type thermocouple
Temperature Resolution	0.01°C		0.1°C
Temperature Stability	±0.05°C (>25°C), ±0.1°C (<25°C)		±1°C
Max Heating Rate	+30 °C/m @100°C	+30 °C/m @100°C	+50 °C/m <850°C, +20 °C/m >850°C
Max Cooling Rate	-50°C/m @100°C	-50°C/m @100°C	N/A
Thermal Block Material	Silver		Silicon Carbide
Electrical Probers	4x or 6x hand positioned electrical probers		
Electrical Prober Connections	Triaxial BNC		
Optical Access	Visual access via reflection (transmission aperture available with custom order*)		
Minimum Objective Working Distance	8mm		8.8mm
Observation Window	Ø18mm viewing aperture (Ø22mm x 0.5mm Glass)		Ø27mm viewing aperture (Ø31.75mm x 1mm Glass)
Top Viewing Angle	±48°		±60°
Window Defrost	External Window Defrosting Fixture		
Sample Area	42mm x 38mm	42mm x 38mm	25mm x 25mm
Inner Chamber Height	5.5mm		6mm
Atmospheric Control Ratings	Gas purge: 0.5 BAR Rough Vacuum: 1mBar	Gas purge: 0.5 BAR Low Vacuum: 10uBar High vacuum Upgrade: 10nBar	Gas purge: 0.5 BAR Low Vacuum: 10uBar High vacuum Upgrade: 10nBar
Frame Cooling	Integrated water block for frame cooling with optional chiller system (recommended above 200°C)		Integrated Water block for frame cooling (required above 200°C)
Mounting	Standard models include tapped holes on frame and removable L-brackets Mounting adaptors for specific instruments available by request		
Appx Frame Dimensions	180mm x 130mm x 26.5mm	174mm x 180mm x 25mm	180mm x 130mm x 26.5mm
Weight [Aluminum Frame]	1500g		1550g

R250804

Magnetic Field Options

The M06T permanent magnet station provides a convenient method for applying a magnetic field to samples for hall effect measurements. The 0.5T permanent neodymium magnet can be flipped to reverse the field direction for non-FastHALL measurements.

For higher strength magnetic fields, or for variable field measurements, several variable electromagnetic field sources are available. Contact Sales@instec.com for more information about electromagnet systems.

- H91-x0 No Magnetic Field Source
- H91-x1 0.5T Permanent Magnet M06T
- H91-x2 0.5T Electromagnet Station
- H91-x3 1.5T+ Electromagnet Station



M06T Permanent Magnet Station

Hall Effect Measurement Solutions

HP1000V-MPSH High-Temp Hall Effect System



H1000V-MPSH+

To address the growing demand for wide band gap semiconductor testing tools, the HP1000V-MPSH extreme-environment Hall Effect system offers DC probing from RT to 1000°C under vacuum or ambient conditions, all while supporting a permanent DC magnet source. This system combines all the benefits of an Instec -MPS benchtop prober with a miniature Hall effect system, enabling In-Situ testing of high-temperature samples. The included baseplate combines the probe station, permanent magnet and microscope system into an integrated, portable package. Use the system for die-level probing of devices, or for material studies – all in one tool.

Add Lakeshore's M91 FastHALL controller and the INSTEC MeasureLINK software plugin to synchronize electrical measurements with temperature control to study temperature dependent phenomena.

HP1000V-MPSH System with portable breadboard, Dual FOV microscope system, and integrated 0.5T magnet

KEY FEATURES

Precision Extreme-Temperature Control

Control sample temperature from RT to 1000°C over a 20mm x 20mm sample area. Integrated water-cooling channels built into the -MPS frame ensure the system stays near room temperature even while heating. Temperature stability as high as $\pm 1^\circ\text{C}$.

Lakeshore M91 FastHall Controller

The MeasureReady® M91 is an immensely powerful and versatile all-in-one Hall Effect measurement system. With automated measurement optimization, fast measurement speeds, and easy to use interface, the M91 makes analyzing samples under 4-point or Hall Bar incredibly simple. Measure up to 10Mohm with the standard model, or up to 200Gohms with the HR model.

Use the M91 to measure a number of properties:

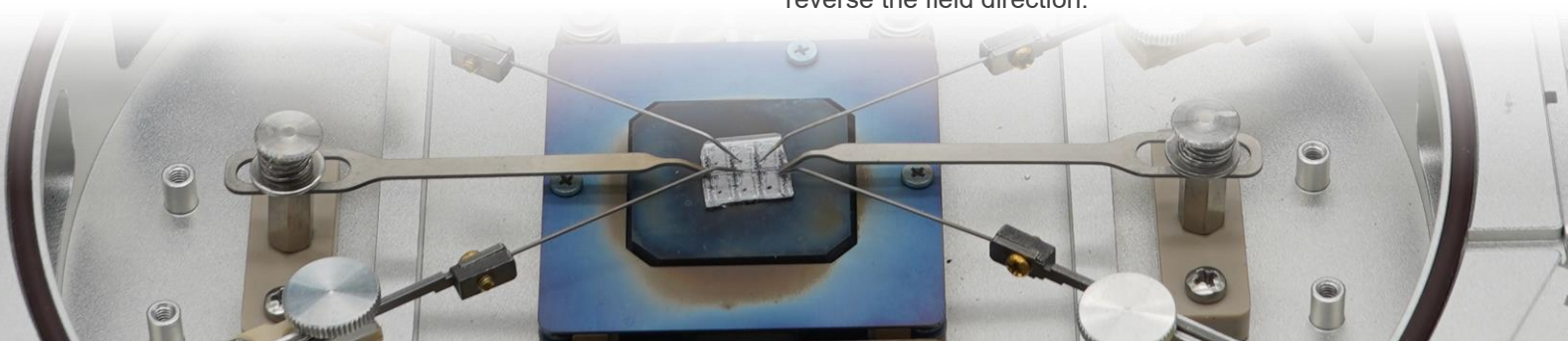
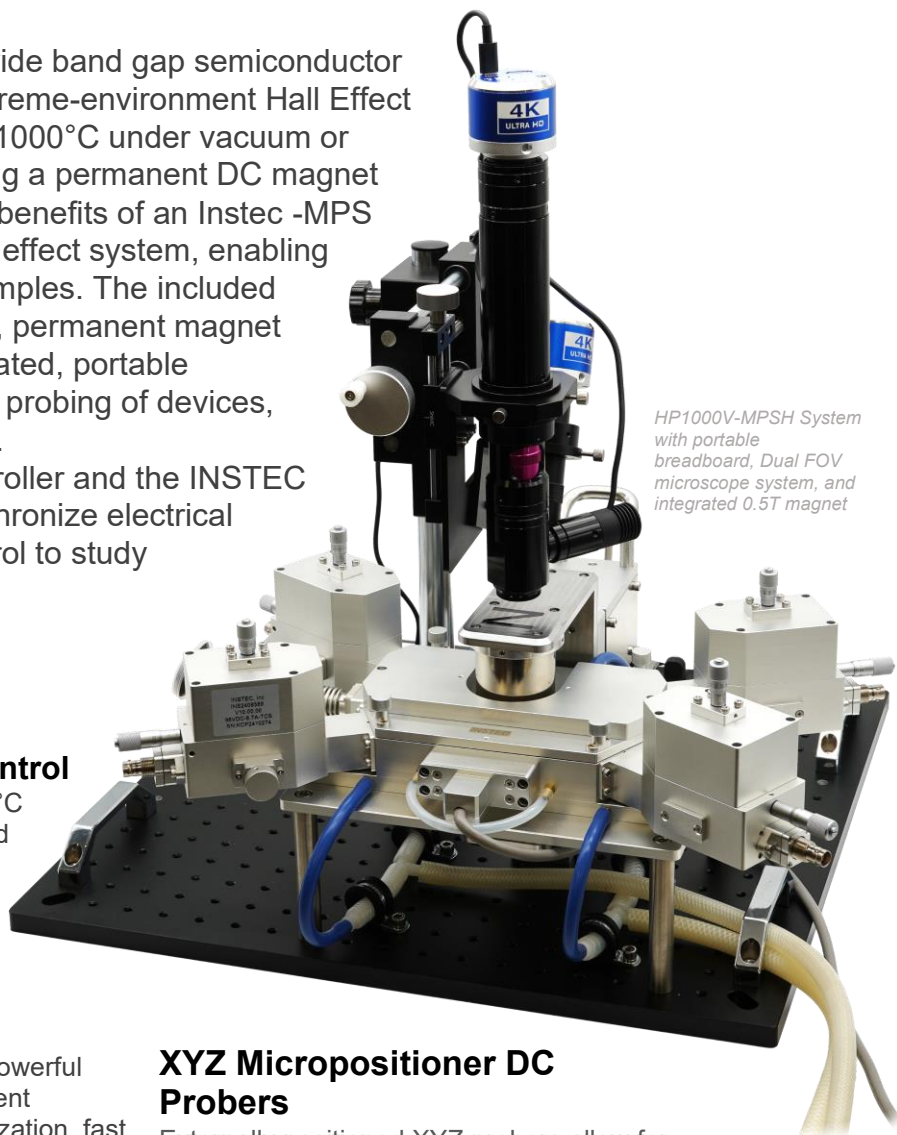
- 2 wire resistance
- Contact Check
- 4 wire resistance
- Hall Voltage
- Sheet Resistance
- Mobility
- And More!

XYZ Micropositioner DC Probers

Externally positioned XYZ probers allow for precise probe landing under a microscope, as well as re-adjustment under vacuum. Use the built-in microscope to land the probe, then apply the magnetic field and perform your measurements. Probe both singulated devices and bulk material samples with confidence.

Integrated Permanent Magnet

Includes an integrated 0.5T permanent magnet with a 50mm pole diameter. Slide the magnet along the linear bearing to apply a field, and rotate the magnet head to reverse the field direction.

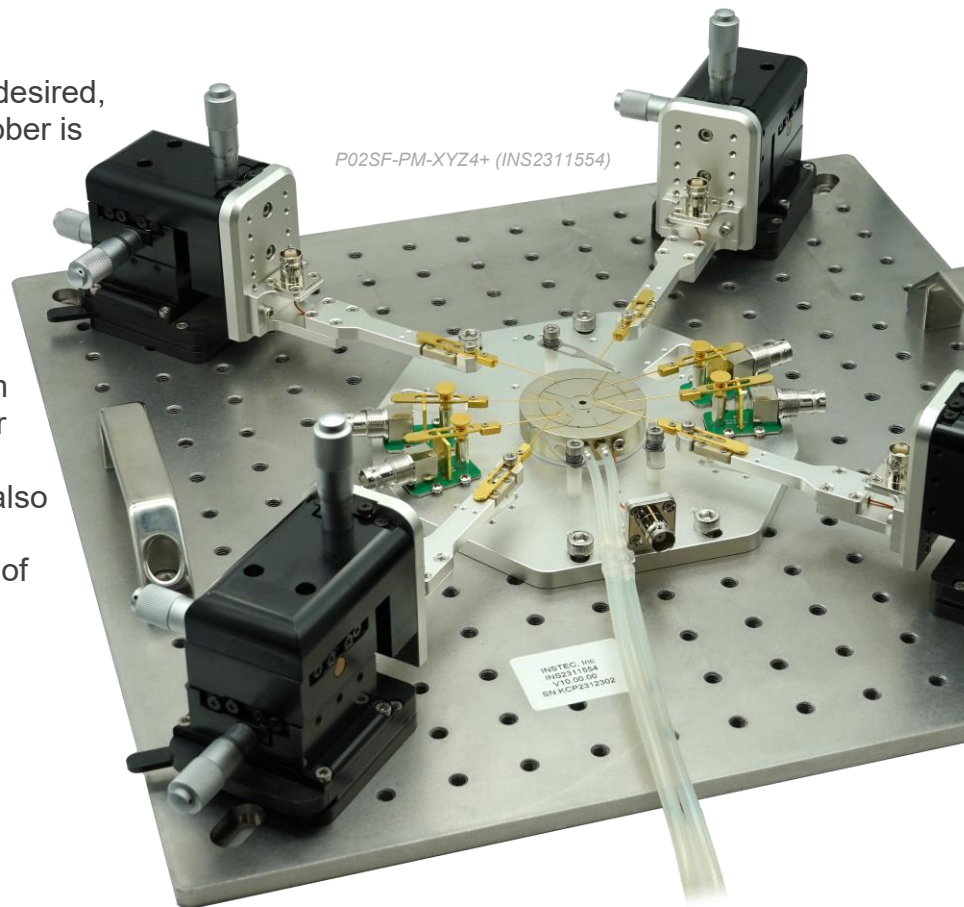


Magnetic Breadboard with External XYZ probers

For situations where the convenience and portability of a miniature probing stage is desired, but the accuracy of a micro-positioned probe is needed, Instec offers magnetic optical breadboards with externally positioned

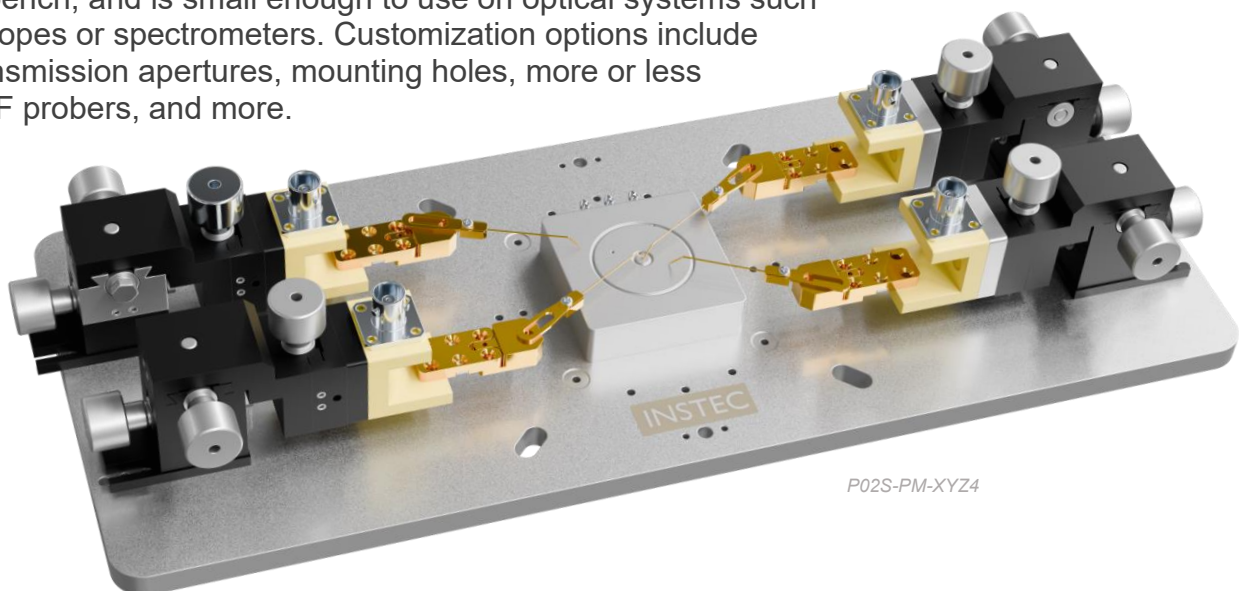
XYZ modules, adding precision probing capability to the P02S-PM mini-probe stage, or to small Instec Thermal Chucks. Magnetic baseplates come equipped with convenient carrying handles, making them perfect for moving between work areas, or sliding under optics.

Motorized micro-positioner modules are also available to enable even more precise movement, or for semi-automatic probing of benchtop samples.



P02S-PM-XYZ4

Combining the small form-factor and portability of the P02S-PM platform with the precision probing capabilities of the -PS series, Instec offers the XYZ4 sub-model of the P02S-PM. The P02S-PM-XYZ4 has 4 XYZ micro-positioners for landing DC probers onto the sample, supporting electrical pads as small as 50um. Vacuum suction zones or spring-loaded sample clips secure the sample in place during probing. The XYZ4 takes up minimal space on a workbench, and is small enough to use on optical systems such as microscopes or spectrometers. Customization options include adding transmission apertures, mounting holes, more or less probers, RF probers, and more.

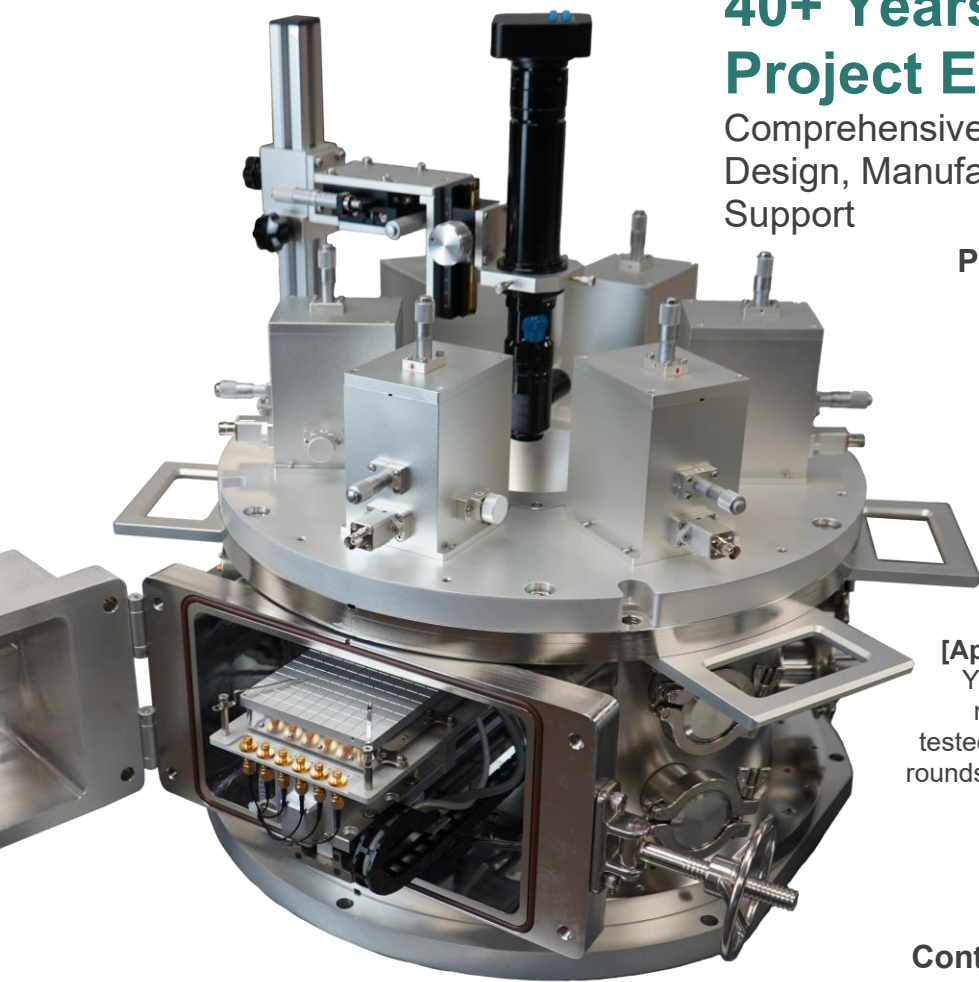


DESCRIPTION

For more than 40 years, Intec has taken pride in offering fully custom tools and instruments for any application. Custom project scopes range from small customizations to base-model projects, to unique tools built from the ground up for a single purpose, to scalable testing systems with multi-system integration and software support. Intec is flexible, experienced, and eager to work with you through our collaborative design process to build an optimized tool that precisely serves your application.

40+ Years of Custom Project Experience

Comprehensive project services including Design, Manufacturing, Qualification, and Support



TP104V-MPS+
(INS2301501)

Project Launch

Initial project discussion and planning with our sales team, after which an official order is placed

Collaborative Design Stage [Appx 3+ weeks]

We build a custom design based on your unique specifications, and refine the design together until you are satisfied

Production/ Evaluation

[Appx 12-16 weeks]

Your custom tool is manufactured and tested through multiple rounds of quality control and performance evaluation

Continued Support [1-year warranty, lifetime support]

Custom products receive a standard 1-year warranty and unlimited online support for the lifetime of the product

Product Delivery

Your custom solution is shipped to you along with detailed User's Manuals. Online or on-site training is available by request

Technical Capabilities

- Transmission, Reflection, or Spectroscopic Optical Systems
- Motorized or manually operated mechanical features
- Electrical probing systems including DC and RF probes, custom prober cards
- XRD, In-situ SEM, and TEM specializations
- Magnetic field sources including permanent magnets and electromagnets
- Aluminum Alloys, Stainless Steel, PEEK, Silicon Carbide, Aluminum Nitride, and more...
- Precision temperature control from -190°C up to 1500°C+
- High voltage (10kv+)
- High-vacuum (less than 5×10^{-5} mBar)
- PCB design, assembly, and test
- Custom companion software
- Much more...

Custom Project Gallery

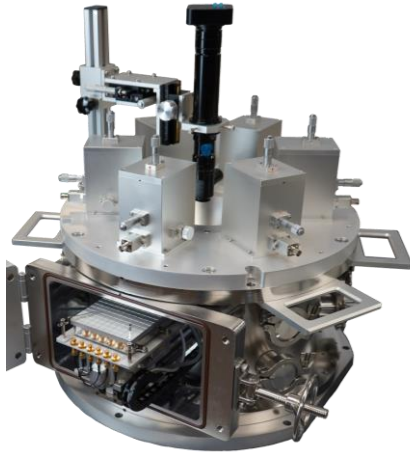
A small selection of past custom projects...



TP104V-MPS+ (INS2301501)

Custom motorized
probing chamber

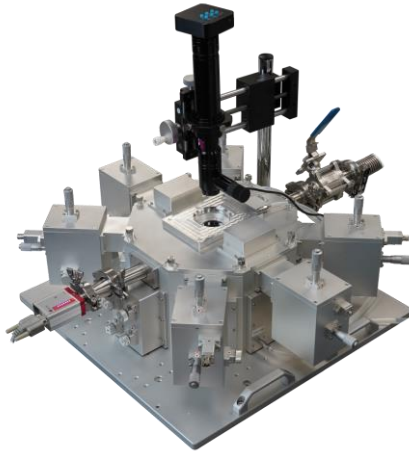
- -40°C to 150°C without cryogenics
- Supports 4" wafers
- Motorized XYZ sample movement with side-loading capability
- Overhead XYZ electrical probes



HP1000V-MPS+ (INS2307528)

Custom high-temp
probing station

- RT to 1000°C
- 50mm x 50mm sample area
- High-Temp RF probes (600°C+)
- Manual XYZ sample movement



HCC218S+ (INS2108466)

Custom SiC wafer chuck

- RT to 200°C
- Supports 8" wafers
- Custom vacuum-zone layout
- Optional air or LN2 cooling



HCP402SG-PM+ (INS2307528)

Custom coin cell
battery testing station

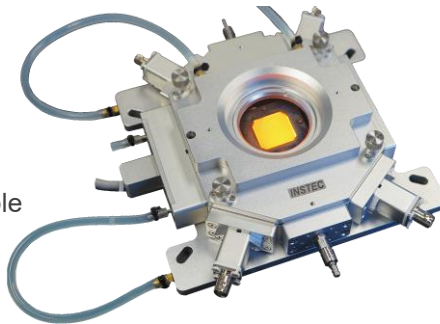
- -190°C to 200°C without cryogenics
- Supports up to 4x coin cell batteries
- Supports inert gas purge or evacuation for condensation prevention



HS1200G-MP+ (INS2207488)

Custom high-temp
probing stage

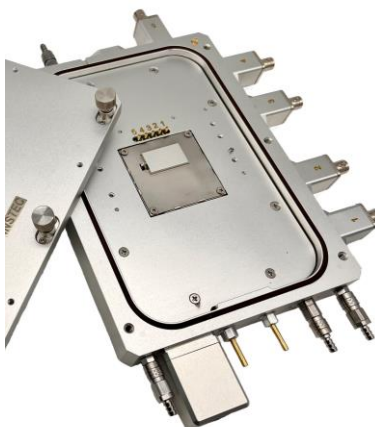
- RT to 1200°C
- 20mm x 20mm sample area
- Internal pogo pin connections
- Base and lid water cooling



TP102G-PM+ (INS2205476)

Customized TEC
probing stage

- -25°C to 90°C without cryogenics
- Pogo pins connect to unique magnetic sample holder
- Thermal block protrusion ensures good sample contact
- Optical access



See more at www.intec.com



Benchtop Thermal Chucks

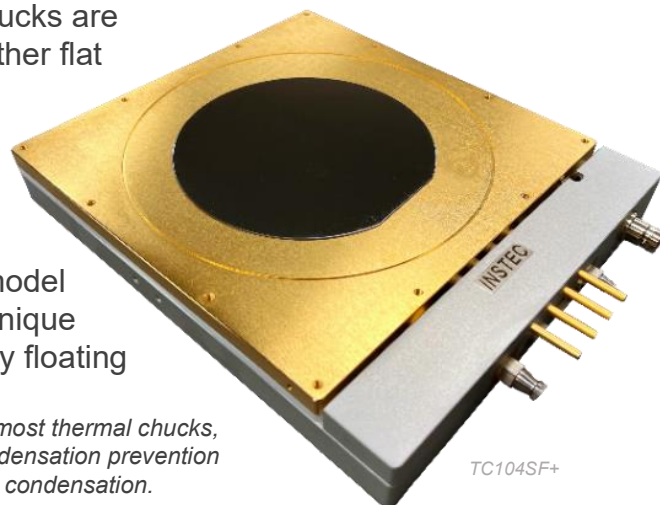
Benchtop thermal chucks ideal for use with traditional probing stations
HCCxxxS, HCCxxxR, TCxxx



DESCRIPTION

Instec's line of thermal chucks are convenient tools for precision temperature control of wafers or other flat samples. Available in a range of sizes from 2" x 2" up to 12" x 12", round or square, Instec has the perfect chuck for any situation. Instec thermal chucks are available in both "HCC" resistive heating/ LN2 cooling configurations, as well as "TC" thermoelectric heating and cooling configurations. The defining trait of Instec thermal chucks are suction hold-down grooves, which allow for wafer or other flat samples to be securely fixed to the chuck surface during testing. Benchtop thermal chucks are perfect for general-purpose use, wafer processing, or for adding temperature control to existing probing solutions. Gastight versions including full enclosures and lids are available by request. Upgrade to the + model of any type to customize your thermal chuck with a unique suction pattern, surface treatment, lift pins, electrically floating sample area, and more!

Note: While cooling well below ambient temperatures is possible with most thermal chucks, condensation will form on the sample at temperatures below 0°C. Condensation prevention measures such as inert gas purge must be taken to prevent excessive condensation.



TC104SF+

KEY FEATURES

Precision Temperature Control

Choose between "HCC", and "TC" options to enable precision temperature control with stability as high as $\pm 0.05^{\circ}\text{C}$ over your preferred temperature range. (see specifications table for detailed temperature range options). "HCC" models use an optional LN2 cooling system and a frame-cooling system to protect the work surface. "TC" models use thermoelectric heating and cooling, eliminating the need for expendable cryogenics. "TC" models include a recirculating water-cooling system, which is required to enable active TEC cooling

Electrically Floating or Grounded Surface

Pre-configure your thermal chuck with a standard electrically grounded sample area, or choose an electrically floating sample area. Electrically floating sample areas are fully isolated from the grounded aluminum chuck frame but include an electrical feedthrough (typically coaxial or triaxial BNC) to electrically bias the back of the sample

Surface Treatment Options

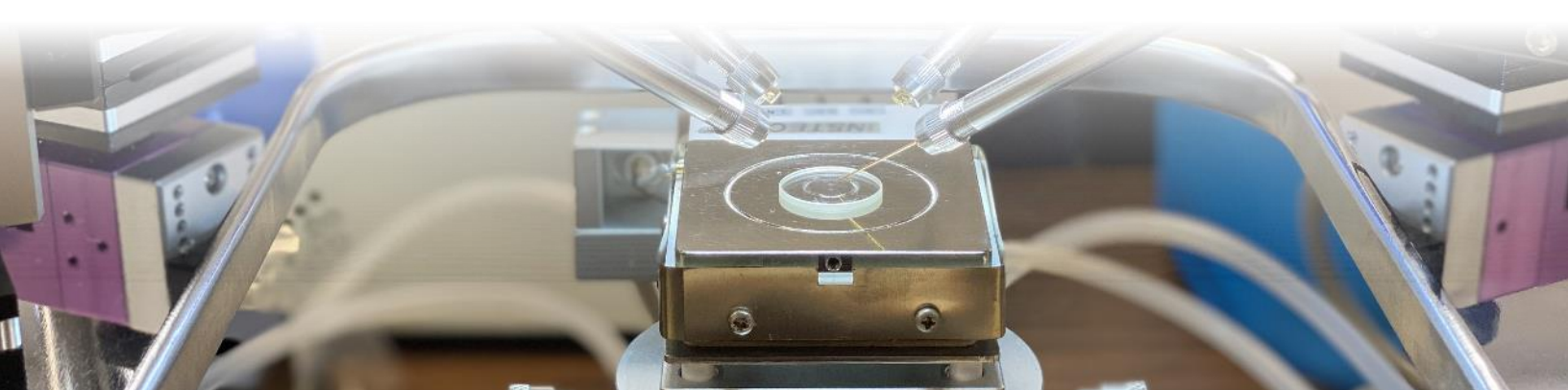
Customize the thermal chuck with a surface treatment optimized for the application. Hard or clear anodized aluminum is standard, with nickel, gold, and silver being good choices for electrically floating sample areas

Mounting Holes and Adaptors

Easily fix an Instec thermal chuck to an existing probe station or optical table using the integrated mounting holes, or provide a drawing of the instrument and order a customized mounting adaptor. Mechanical drawings are available by request

Vacuum Hold-down Grooves/ Points

Narrow grooves and pinholes on the chuck surface allow for flat samples to be securely held in place via suction. Instec VP01 single-zone suction pumps and VP04 multi-zone suction pumps are available for purchase alongside the thermal chuck





Benchtop Thermal Chuck Specifications by Standard Model

*Increased maximum temp may be available by request

**Increased maximum cooling rates may be available by request

***Customization available by upgrading to '+' version of a given mode

Listed specifications are subject to change at any time without prior notice as products evolve

Square "HCC" Benchtop Chucks

Standard Model	HCC602S	HCC212/312S	HCC214/314S	HCC216/316S	HCC218/318S
Variation	Grounded or floating	Grounded or floating	Triaxial Floating**	Grounded or floating	Triaxial Floating**
Overall Dimensions (mm)	100 x 62 x 32.55	93.5 x 62 x 29.5	140 x 105 x 39	192 x 157 x 39	338 x 300 x 38
Minimum Sample Size	3mm		15mm	40mm	40mm
Maximum Sample Size	50mm		100mm	150mm	200mm
Weight (kg)	0.5	<1.0	<2.0	<3.0	<5.0
Minimum Temperature**	-190°C (LN2-P4C)	-190°C (LN2-P4C)	-120°C (LN2-P8C) -190°C (LN2-VC1L)	-100°C (LN2-P8C) -190°C (LN2-VC1L)	-80°C (LN2-P8C) -190°C (LN2-VC1L)
Maximum Temperature*	600°C	200°C/ 300°C *			
Maximum Heating Rate @100°C	+30°C/min				+10°C/min
Maximum Cooling Rate @100°C*	-15°C/min*		-14°C/min*	-10°C/min*	-4°C/min

R240214

Round "HCC" Wafer Chucks

R240214

Square "TC" Thermoelectric Benchtop Chucks

R240214

Standard Features for ALL Benchtop Thermal Chucks

100 Ohm Platinum RTD	Integrated Base Cooling
0.01°C Temperature Resolution	Vacuum Suction Zones
±0.05°C Temperature Stability	CE Marking included (UL Field Certification available by request)
≤ 2% Temperature Uniformity	Included mK2000B Temperature controller

Customization Options Include

Custom Mounting Adaptors	LVDC controller upgrade for low electrical noise
Surface treatment Options	Low-flatness
Electrically floating surface area (BNC or Triaxial Structure)	Gastight frame and Lid with Optical Window ('G' version)
Lift Pins	High-voltage compatible (3KV+)

For more technical specifications, contact sales@instec.com

Accessories for Benchtop Chucks

Full-size probe stations, Suction Pumps, and Electrical Measurement Tools

PSM Probe Stations, PSM-VP4, PSM-VP1, Lakeshore M81



PSM-SM4 + TC104 Thermal Chuck

PSM Analytical Probe Stations

Instec benchtop thermal chucks can be easily bundled with full-size analytical probe stations with magnetic platens and optional magnetic-base external XYZ micro-positioned probers. Open-face probe stations like the SM-4 are perfect for 2" or 4" thermal chucks, and can be use with stereo or tube microscopes.

Convenient sample chuck XYZ controls allow the thermal chuck to be moved around relative to the external XYZ probers, allowing multiple devices on a single wafer to be probed without adjusting each individual probe needle.

Applications include: IC / LD / LED / PD /PCB/ Packaged device / RF testing

Probe Station Model		SM-2	SM-4	SM-6
Overall Dimensions (mm)		320 x 280 x 180 (Platen)	400 x 400 x 450 (Platen)	580m x 460 x 450 (Platen)
Weight		20 kg	40 kg	40 kg
Chuck	Size & Rotation	2" & 360°	4" & 360°	6" & 360°
	XY Range/ Z Range	2" x 2" / 4mm	4" x 4" / 4mm	6" x 6" / 4mm
	Resolution	25mm per Revolution (Coarse), 1 µm (Fine)		
	Chuck Options	Coaxial/ Triaxial Bias construction, surface treatment customization, Benchtop Thermal Chuck		
Platen	U-shape	Up to 6 Micro-positioners		Up to 8 Micro-positioners
Microscope	Movement Range	360°, 50.8 mm		
	Magnification Range	16 - 100X standard, 200X optional		
	Digital Camera Options	5MP/ 20MP / Dual-FOV		
Micro positioned Electrical Probers	XYZ Range	12 mm x 12 mm x 12 mm		
	Mechanical Resolution	10 µm, 2 µm, 0.7 µm		
	Leakage Current Range	10pA to 100 fA (with low-leakage version)		
	Electrical Connections	Banana-plug / Alligator Clip / Coaxial BNC / Triaxial BNC		
	Electrical Prober Types	DC/ RF/ High-Voltage		
Optional Accessories		Shielding Box	Anti-Vibration Table	Low current/capacitance testing
		Active Probe	Fine Mechanical Adjustment	Integral (Ulbricht) sphere
		Fixture for PCB/IC testing	Vibration Free Table	Fixture for fiber optic coupler testing

Listed Specifications are subject to change at any time without prior notice as products evolve R240306



PSM-VP1

PSM-VP1 Suction Pump

Single-zone, standalone suction pump. Convenient vacuum hold-down device for use with flat samples.

PSM-VP4 Suction Pump

4-zone standalone suction pump. Convenient vacuum hold-down device for use with benchtop thermal chucks with multiple zones and flat samples.



PSM-VP4

Lakeshore M81 SMU

The M81 Source Measurement Unit is a powerful simultaneous source module that is compatible with Instec chucks or probe stations. Using a modular architecture, the M81 can be optimized for a wide range of low-level measurement applications. All source/measure modules are capable of both DC and AC to 100Khz measurements, including high performance lock-in capabilities.



Lakeshore M81

-APC Automated Probing Chucks

Advanced thermal chucks ideal for use in automated probing applications

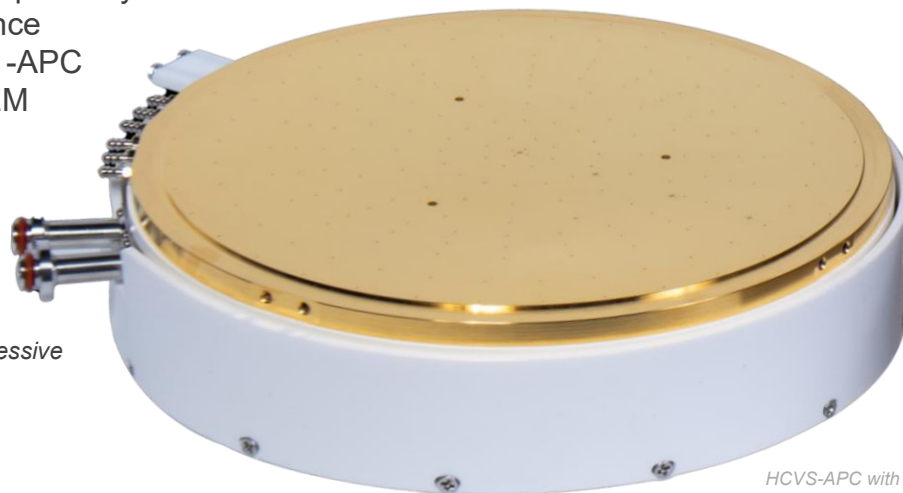
STCS-APC, LNCS-APC, HVCS-APC



DESCRIPTION

For applications requiring high precision or advanced features, Instec offers a line of Automated Probing Thermal Chucks, the “-APC” models. These chucks are available in either 8” or 12” variants and use a combination of electric heating and Compressed Dry Air (CDA) cooling to provide a temperature range from -65°C to +300°C. Three sub-models are available; Standard, Low-noise, and High-voltage (either Triax or Coax). Vacuum hold-down zones and customizable lift-pins are available for securing/ releasing samples. -APC chucks have high uniformity, flatness, and planarity over all temperatures. The high-performance specifications and reliability of the -APC series make it ideal for use for OEM motorized probing and automated loading/unloading systems.

Note: While cooling well below ambient temperatures is possible with most thermal chucks, condensation will form on the sample at temperatures below 0°C. Condensation prevention measures such as inert gas purge must be taken to prevent excessive condensation.



HCVS-APC with gold surface treatment

KEY FEATURES

Precision Temperature Control

Temperature control resolution of $\pm 0.05^{\circ}\text{C}$, and stability as high as $\pm 0.1^{\circ}\text{C}$. High-temperature uniformity of $\pm 0.5^{\circ}\text{C}$ / $\pm 0.5\%$.

Compressed Dry Air (CDA) Cooling

CDA system allows active cooling down to -65°C without consumable cryogenics, ideal for use inside cleanrooms or environmentally controlled environments or equipment.

High Planarity and Flatness

Chuck planarity is held below 16 μm , and surface flatness below 3 μm for any temperature.

3 Base Models – ST, LN and HV

Three base models of -APC are available to optimize performance. LN features a triaxial construction to minimize electrical noise and leakage current, while the HV model adds high-voltage compatibility up to 10KV.

10KV Compatible Option

Safely apply up to 10KV of test voltage with the HVCS-APC model, perfect for high-voltage semiconductor testing and development.

Mounting Holes and Adaptors

All -APC models are easily mounted into existing or custom electrical probing systems via integrated mounting holes. Custom mounting adaptors are also available by request.

Vacuum Hold-down Points/ Lift Pins

Suction hold-down grooves and zones for securing samples to the chuck surface, and customizable lift pins for sample unloading.



Automated Probing Thermal Chucks Specifications by Model

Base Model	STCS-APC	LNCS-APC	HVCS-APC
Description	Standard Chuck System	Low-Noise Chuck System	HV/ HC Chuck System
Chuck Size Options	8" or 12"		
Temperature Range	-65°C to +300°C		
Temperature Control Method	Resistive heating and Compressed Dry Air (CDA) Cooling		
Temperature Control Resolution	±0.01°C		
Temperature Stability	±0.1°C		
Temperature Uniformity	<±0.5°C/±0.5%		
Chuck Planarity at all temperatures	< 16µm		
Chuck Current Leakage	< 100pA @25°C@10V < 200pA @200°C@10V	< 1pA @25°C@10V < 2pA @200°C@10V	< 2pA@-55°C@10V* < 1pA @25°C@10V * < 2pA @200°C@10V * < 5pA @25°C@3000V * < 10pA @200°C@3000V * < 10pA @-55°C@3000V *
Max. Test Voltage	500V	500V	10kV
Sample Area Plating material	Nickel/Gold		Gold
Surface Flatness	< 3µm		
Vacuum Hold-down type	Circular grooves/ Vacuum-point Array	Vacuum-point Array	Vacuum-point Array
Vacuum Hold-down Layout	8" Size→ : 6" and 8" zones 12" Size→ : 8" and 12" zones	8" Size→ : 4", 6", 8", and Center (4mm x 4mm) zones 12" Size→ : 4", 6", 8", 12", and Center (4mm x 4mm) zones	
Electrical Connection Type	Coaxial	Triaxial	Coaxial or Triaxial
Max Heating & Cooling Rates**	8" Chuck +25°C→+200°C < 25min +200°C→+25°C < 15min (40min for Coax) +25°C→-60°C < 35min -60°C→+25°C < 15min 12" Chuck +25°C→+200°C < 30min +200°C→+25°C < 20min (60min for Coax) +25°C→-55°C < 55min -55°C→+25°C < 15min		
Minimum CDA Pressure	≥7bar		
Minimum CDA Flow Rate	≥500L/min		
Max Power Consumption	1000VA (No active cooling) 3500VA (With CDA active cooling system)		

Listed specifications are subject to change at any time without prior notice as products evolve

R240306

* Specs given for triaxial version

** Heating and cooling rates differ with different tube lengths

DESCRIPTION

Some applications require electric field application but do not need a dedicated electrical probing tool. In such cases, Instec offers a range of electrical feedthrough options for our stages and plates that add some electrical testing capabilities without compromising on the critical features of the stage or plate. Pogo-pin BNC feedthroughs are perfect for applying an electric field to a sample being measured with Raman spectroscopy. These options can be added to the customizable “+” models of most Instec Stages or Plates.



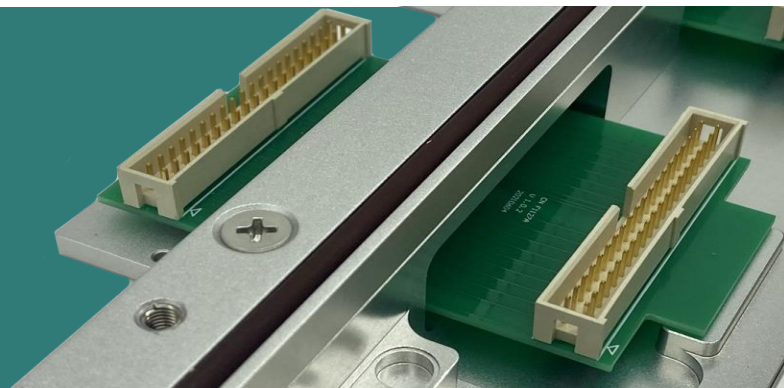
HCP621G+ with 2x F2V

Add electrical feedthroughs and contacts to almost any non-probing Instec Stage or Plate



INS2307530 custom Stage

Custom sample holders with electrical contacts



INS2103401 PCB Feedthrough

Custom PCB feedthroughs for adding 25+ electrical signals