

MPI TS200-IFE | 200 mm Manual Probe System with IceFreeEnvironment™ for mmW, Load-pull and Product Engineering

FEATURES / BENEFITS

Universal Use

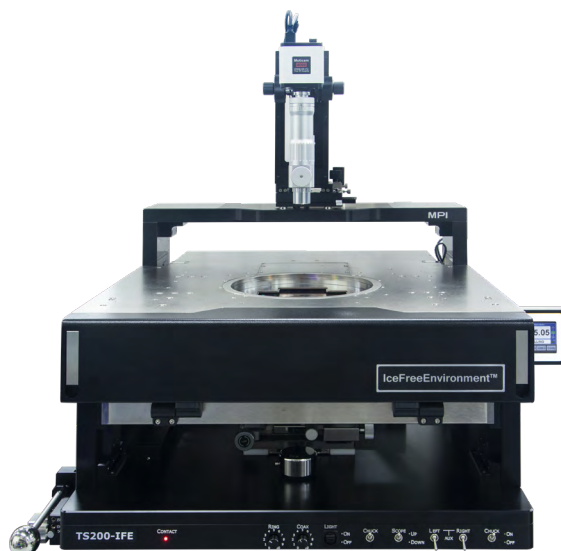
- Designed for a wide variety of applications such as Device Characterization, Modeling, RF and mmW Wafer Level Reliability, and Failure Analysis

MPI IceFreeEnvironment™ for flexible low-temperature measurements

- Simultaneous use of probe cards and MicroPositioners
- Measurements at negative temperatures down to -60 °C
- Convenient internal node probing with active/passive high impedance probes
- Optimized design with minimal tip drop for RF/mmW and Load Pull measurements on 200 mm wafers

Ergonomic Design and Options

- Unique puck controlled air bearing stage for quick single-handed operation
- Available with various chuck options and a wide range of accessories such as DC/RF/mmW MicroPositioners, microscopes and IceFreeEnvironment™



SPECIFICATIONS

Chuck XY Stage (Standard)

Travel range	225 x 260 mm (8.9 x 10.2 in)
Fine-travel range	25 x 25 mm fine micrometer control
Fine-travel resolution	< 1.0 µm (0.04 mils) @ 500 µm/rev
Planarity	< 10 µm
Theta travel (standard)	360°
Theta travel (fine)	± 5.0°
Theta resolution	7.5 x 10 ⁻³ gradient
Movement	Puck controlled air bearing stage

Chuck Z Stage

Travel range	5 mm (0.2 in)
Fine-travel resolution	< 1.0 µm (0.04 mils) @ 500 µm/rev
Load stroke	20 mm, pneumatically

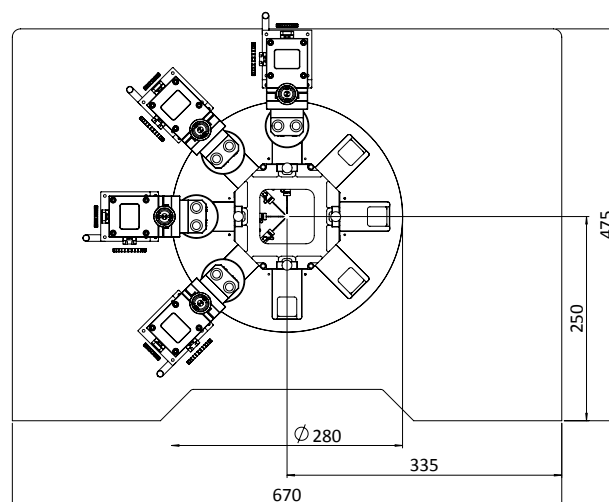
Manual Microscope Stage (Linear)

Movement range	50 x 50 mm (2 x 2 in)
Resolution	< 5 µm (0.2 mils)
Scope lift	Manual, tilt-back or vertical (depending on microscope type)
Movement	Independently controlled X and Y movement with locking screws

PROBE PLATEN

Specifications

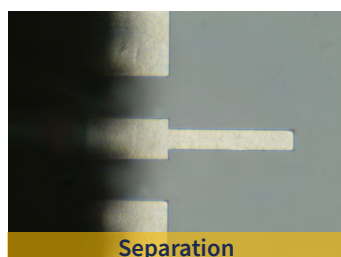
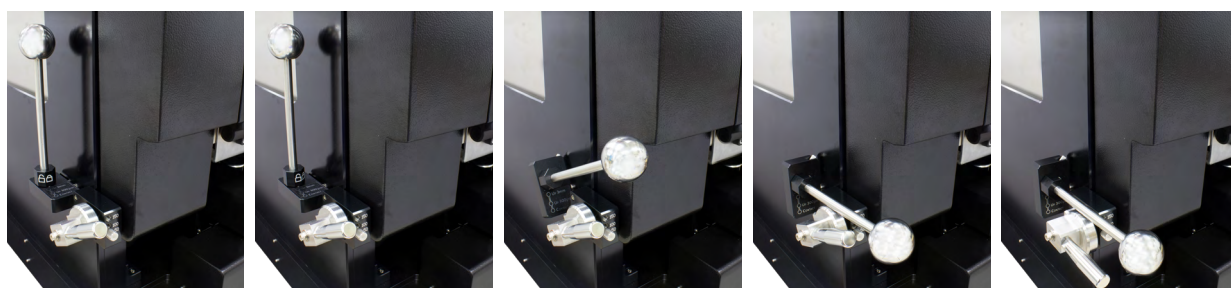
Material	Nickel plated steel
Dimension	See drawing
Max. No of MicroPositioners	8x DC or 4x DC + 2x RF or 2x DC + 4x RF or 4x DC + 4x RF setup
Platen lift control	3 positions - contact (0), separation (300 μ m), and loading (3 mm)
Separation repeatability	< 1 μ m (0.04 mils) by “automated” control
RF MicroPositioner mounting	Magnetic with guided rail
DC MicroPositioner mounting	Magnetic
300 °C thermal isolation	Depending on chuck configuration



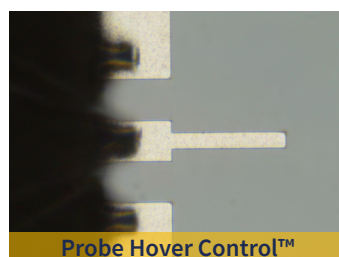
Universal probe platen design for up to 8 DC MicroPositioners

PLATEN LIFT with Probe Hover Control™

MPI Probe Hover Control™ comes with hover heights (50, 100 or 150 μ m) for easy and convenient probe to pad alignment.



Separation



Probe Hover Control™



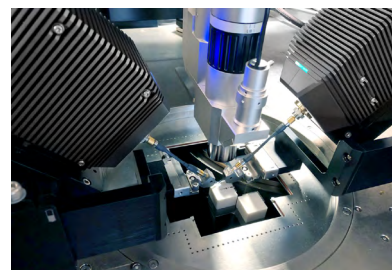
Probe in contact

■ TS200-IFE with IceFreeEnvironment™

As an alternative to the ShieDEnvironment™, MPI IceFreeEnvironment™ provides unique capability to perform measurements with probe cards and MicroPositioners simultaneously, especially at negative temperatures down to -60 °C.

Internal node probing with active/passive high impedance probes is very convenient.

The optimized design with minimal tip drop for highest dynamic range and gamma of mmWave and Load Pull measurements make the system an ideal choice for RF/mmW applications on 200 mm wafers.



■ THZ-SELECTION

It converts TS200-IFE system into a dedicated, mmW and THz probe station, as the first one on the market:

- Testing 200 mm wafers with unsurpassed measurement accuracy is possible now
- The MPI THZ-Selection incorporates MPI's innovative design of frequency extender's integration, developed for TS200-THZ, which hovers the extender over the entire 200 mm wafer
- This minimizes the distance to the DUT to a minimum in order to provide best possible measurement directivity and accuracy



NON-THERMAL CHUCKS

Standard Wafer Chuck

Connectivity	Coax BNC (f)
Diameter	210 mm
Material	Stainless steel
Chuck surface	Planar with centric engraved vacuum grooves
Vacuum grooves sections(diameter)	3, 27, 45, 69, 93, 117, 141, 164, 194 mm
Vacuum actuation	Multizone control - All connected in meander shape, center hole in 3 mm diameter
Supported DUT sizes	Single DUTs down to 5 x 5 mm size or wafers 50 mm (2 in) thru 200 mm (8 in)*
Surface planarity	$\leq \pm 5 \mu\text{m}^{**}$
Rigidity	$< 15 \mu\text{m} / 10 \text{ N @edge}$

*Single DUT testing requires higher vacuum conditions dependent upon testing application.

**By using SENTIO® topography

RF Wafer Chuck (Triaxial)

Connectivity	Kelvin Triax (f)
Diameter	210 mm with 2 integrated AUX areas
Material	Nickel plated aluminum (flat with 0.5 mm holes)
Chuck surface	Planar with 0.5 mm diameter holes in centric sections
Vacuum holes sections (diameter)	3, 27, 45, 69, 93, 117, 141, 164, 194 mm
Vacuum actuation	Manual switch between Center (4 holes), 100, 150, 200 mm (4, 6, 8 in)
Supported DUT sizes	Single DUTs down to 5 x 5 mm size or wafers 100 mm (4 in) thru 200 mm (8 in)*
Surface planarity	$\leq \pm 5 \mu\text{m}^{**}$
Rigidity	$< 15 \mu\text{m} / 10 \text{ N @edge}$

*Single DUT testing requires higher vacuum conditions dependent upon testing application.

**By using SENTIO® topography

Auxiliary Chuck

Quantity	2 AUX chucks
Position	Integrated to front side of main chuck
Substrate Size (W x L)	Max. 25 x 25 mm (1 x 1 in)
Material	Ceramic, RF absorbing material for accurate calibration
Surface planarity	$\leq \pm 5 \mu\text{m}$
Vacuum control	Controlled independently, separate from chucks

Electrical Specification (Coax)

Operation voltage	In accordance with EC 61010, certificates for higher voltages available upon request
Maximum voltage between chuck top and GND	500 V DC
Isolation	$> 2 \text{ G}\Omega$

Electrical Specification (RF - Triax)

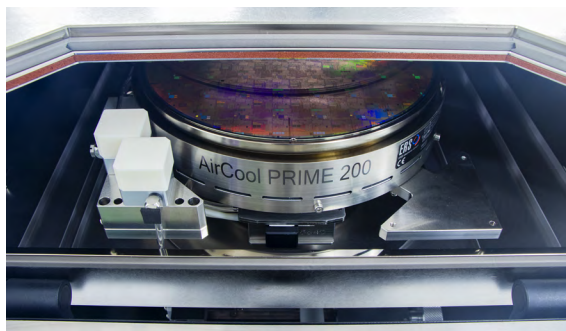
Chuck isolation	Standard Chuck (10 V)
Force to guard	$\geq 1 \text{ T}\Omega$
Guard to shield	$\geq 1 \text{ T}\Omega$
Force to shield	$\geq 5 \text{ T}\Omega$

THERMAL CHUCKS

Specifications of MPI ERS AirCool® Technology

	Ambient to 150/200 °C	20 °C to 150/200 °C	-40 °C to 150/200 °C
Connectivity	Coax BNC (f)	Coax BNC (f)	Coax BNC (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.1 °C	0.1 °C	0.1 °C
External touchscreen display operation	N/A	N/A	N/A
Temperature stability	±0.5 °C	±0.5 °C	±0.5 °C
Temperature accuracy	±1 °C	±1 °C	±1 °C
Control method	DC/PID	DC/PID	DC/PID
Chuck pinhole surface plating: 200 °C	Nickel	Nickel	Nickel
Vacuum distribution	In center for 5x5 mm (4 holes) 100, 150, 200 mm (4, 6, 8 in)		
Temperature sensor	Pt100 1/3DIN	Pt100 1/3DIN	Pt100 1/3DIN
Temperature uniformity	< ±1 °C	< ±1 °C	< ±1 °C
Surface flatness and base parallelism	< ±15 µm	< ±15 µm	< ±15 µm
Max. voltage Force-to-GND	< ±15 µm	< ±15 µm	< ±15 µm
Heating rates*	35 to 150 °C < 12 min 35 to 200 °C < 18 min	20 to 150 °C < 12 min 20 to 200 °C < 23 min	-40 to 25 °C < 12 min 25 to 200 °C < 16 min
Cooling rates*	150 to 35 °C < 15 min 200 to 35 °C < 18 min	150 to 20 °C < 18 min 200 to 20 °C < 30 min	200 to 25 °C < 20 min 25 to -40 °C < 36 min
Leakage @ 10 V	N/A	N/A	N/A
Electrical isolation	> 0.5 T Ω at 25 °C	> 0.5 T Ω at 25 °C	> 0.5 T Ω at 25 °C
Capacitance	< 750 pF	< 750 pF	< 750 pF

*Typical data for all chucks based on FPS requirements.



Specifications of MPI ERS AirCool® PRIME Technology

	Ambient to 200/300 °C	20 °C to 200/300 °C	Ambient to 200/300 °C	20 °C to 200/300 °C
Chuck type	RF	RF	Ultra low noise	Ultra low noise
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes	Yes
Temperature stability	±0.08 °C	±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy	±0.1 °C	0.1 °C	0.1 °C	0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Chuck pinhole surface plating: 200 °C / 300 °C	Nickel / Gold	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 5x5 mm (4 holes) and 75 mm (3 in) In center for 150, 200 mm (6, 8 in)			
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism	< ±12 µm	< ±12 µm	< ±12 µm	< ±12 µm
Max. Voltage between				
Force-to-GND	600 V DC	600 V DC	600 V DC	600 V DC
Force-to-Guard	100 V DC	100 V DC	600 V DC	600 V DC
Guard-to-GND	400 V DC	400 V DC	400 V DC	400 V DC
Heating rates*	35 to 200 °C < 16 min 35 to 300 °C < 20 min	20 to 200 °C < 15 min 20 to 300 °C < 22 min	35 to 200 °C < 18 min 35 to 300 °C < 26 min	20 to 200 °C < 16 min 20 to 300 °C < 28 min
Cooling rates*	200 to 35 °C < 23 min 300 to 35 °C < 31 min	200 to 20 °C < 27 min 300 to 20 °C < 32 min	200 to 35 °C < 24 min 300 to 35 °C < 32 min	200 to 20 °C < 35 min 300 to 20 °C < 34 min
Leakage @ 10 V	N/A	N/A	< 15 fA at 25 °C < 30 fA at 200 °C < 50 fA at 300 °C	< 15 fA at 25 °C < 30 fA at 200 °C < 50 fA at 300 °C
Electrical isolation	> 5 T Ω at 25 °C > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	> 5 T Ω at 25 °C > 1 T Ω at 200 °C > 0.5 T Ω at 300 °C	N/A	N/A
Capacitance				
Force-to-Guard	< 1600 pF	< 1600 pF	< 600 pF	< 600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF	< 2000 pF

*Typical data for all chucks based on FPS requirements.

Specifications of MPI ERS AirCool® PRIME with Fusion Chiller Technology

	-10 °C to 200/300 °C	-40 °C to 200/300 °C	-60 °C to 200/300 °C
Chuck type	RF	RF	RF
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes
Temperature stability	±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy	0.1 °C	0.1 °C	0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noiseDC/PID
Interfaces	RS232C	RS232C	RS232C
Chuck pinhole surface plating: 200°C / 300°C	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 5x5 mm (4 holes) and 75 mm (3 in) In center for 150, 200 mm (6, 8 in)		
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism	< ±12 μm	< ±12 μm	< ±12 μm
Max. Voltage between			
Force-to-GND	600 V DC	600 V DC	600 V DC
Force-to-Guard	100 V DC	100 V DC	100 V DC
Guard-to-GND	400 V DC	400 V DC	400 V DC
Heating rates*			
25 °C	-10 to 25 °C < 2 min	-40 to 25 °C < 4 min	-60 to 25 °C < 5 min
200 °C	25 to 200 °C < 13 min	25 to 200 °C < 12 min	
300 °C	25 to 300 °C < 22 min	25 to 300 °C < 22 min	
Cooling rates*			
AC3 Mode	300 °C	300 to 25 °C < 11 min	300 to 25 °C < 12 min
	200 °C	200 to 25 °C < 6 min	200 to 25 °C < 8 min
	25 °C	25 to -10 °C < 5 min	25 to -40 °C < 10 min 25 to -60 °C < 16 min
TURBO Mode	300 °C	300 to 25 °C < 11 min	300 to 25 °C < 11 min
	200 °C	200 to 25 °C < 6 min	200 to 25 °C < 6 min
	25 °C	25 to -10 °C < 5 min	25 to -40 °C < 7 min 25 to -60 °C < 15 min
Leakage @ 10 V	N/A	N/A	N/A
Electrical isolation	> 5 T Ω at 25 °C or below > 1 T Ω at 200 °C, > 0.5 T Ω at 300 °C		
Capacitance			
Force-to-Guard	< 1600 pF	< 1600 pF	< 1600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF

*Typical data for all chucks based on FPS requirements.

Specifications of MPI ERS AirCool® PRIME with Fusion Chiller Technology

	-10 °C to 200/300 °C	-40 °C to 200/300 °C	-60 °C to 200/300 °C
Chuck type	Ultra low noise	Ultra low noise	Ultra low noise
Connectivity	Kelvin Triax (f)	Kelvin Triax (f)	Kelvin Triax (f)
Temperature control method	Cooling air / Resistance heater	Cooling air / Resistance heater	Cooling air / Resistance heater
Coolant	Air (user supplied)	Air (user supplied)	Air (user supplied)
Smallest temperature selection step	0.1 °C	0.1 °C	0.1 °C
Chuck temperature display resolution	0.01 °C	0.01 °C	0.01 °C
External touchscreen display operation	Yes	Yes	Yes
Temperature stability	±0.08 °C	±0.08 °C	±0.08 °C
Temperature accuracy	0.1 °C	0.1 °C	0.1 °C
Control method	Low noise DC/PID	Low noise DC/PID	Low noise DC/PID
Interfaces	RS232C	RS232C	RS232C
Chuck pinhole surface plating: 200 °C / 300 °C	Nickel / Gold	Nickel / Gold	Nickel / Gold
SmartVacuum™ distribution	In front for single DUT 5x5 mm (4 holes) and 75 mm (3 in) In center for 150, 200 mm (6, 8 in)		
Temperature sensor	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired	Pt100 1/3DIN, 4-line wired
Temperature uniformity	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C	< ±0.5 °C at ≤ 200 °C < ±1 °C at > 200 °C
Surface flatness and base parallelism	< ±12 μm	< ±12 μm	< ±12 μm
Max. Voltage between			
Force-to-GND	600 V DC	600 V DC	600 V DC
Force-to-Guard	600 V DC	600 V DC	600 V DC
Guard-to-GND	400 V DC	400 V DC	400 V DC
Heating rates*			
25 °C	-10 to 25 °C < 3 min	-40 to 25 °C < 4 min	-60 to 25 °C < 5 min
200 °C		25 to 200 °C < 15 min	
300 °C	25 to 300 °C < 26 min	25 to 300 °C < 26 min	25 to 300 °C < 26 min
Cooling rates*			
AC3 Mode	300 °C	300 to 25 °C < 12 min	300 to 25 °C < 14 min
	200 °C	200 to 25 °C < 8 min	200 to 25 °C < 10 min
	25 °C	25 to -10 °C < 6 min	25 to -40 °C < 12 min 25 to -60 °C < 26 min
TURBO Mode	300 °C	300 to 25 °C < 12 min	300 to 25 °C < 12 min
	200 °C	200 to 25 °C < 8 min	200 to 25 °C < 8 min
	25 °C	25 to -10 °C < 6 min	25 to -40 °C < 10 min 25 to -60 °C < 17 min
Leakage @ 10 V			
-10, -40 or -60 °C	< 30 fA	< 30 fA	< 30 fA
25 °C	< 15 fA	< 15 fA	< 15 fA
200 °C	< 30 fA	< 30 fA	< 30 fA
300 °C	< 50 fA	< 50 fA	< 50 fA
Capacitance			
Force-to-Guard	< 600 pF	< 600 pF	< 600 pF
Guard-to-Shield	< 2000 pF	< 2000 pF	< 2000 pF

*Typical data for all chucks based on FPS requirements.

Thermal Controller Dimensions / Power and Air Consumption

System type	W x D x H (mm)	Weight (kg)	Power cons. (VA)	max. Air flow* (l/min)
20 to 200 °C / 300 °C	300 x 360 x 135	12	700	200

System Controller / Chiller Dimensions and Power / Air Consumption

System type	W x D x H (mm)	Weight (kg)	Power cons. (VA)	max. Air flow* (l/min)
20 to 200 °C / 300 °C	300 x 360 x 140	12	1000	200
-10 to 200 °C / 300 °C	420 x 355 x 450	50	1650	250
-40 to 200 °C / 300 °C	420 x 500 x 1020	140	2400	400
-60 to 200 °C / 300 °C	420 x 500 x 1020	140	2400	400

*All data are relevant for chucks in ECO mode.



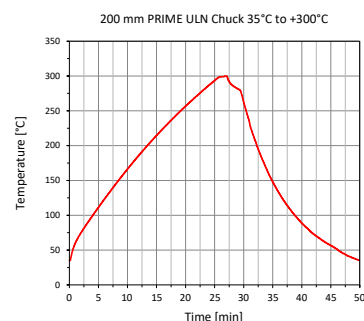
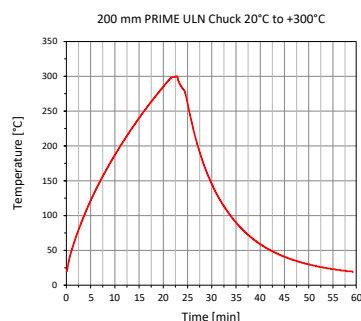
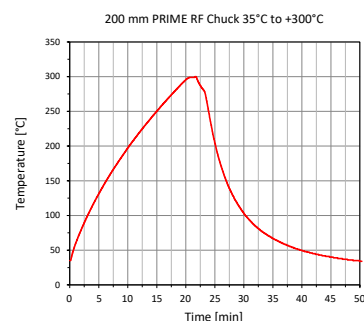
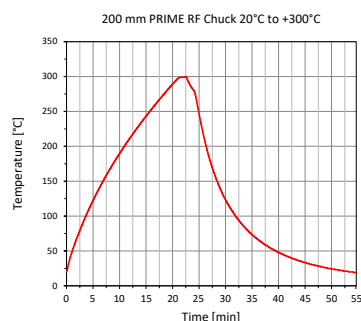
ERS AirCool® Fusion*, Controller
Integrated Chiller -40 °C / -60 °C

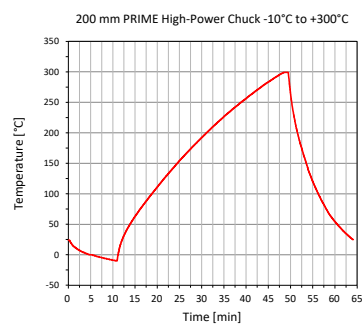
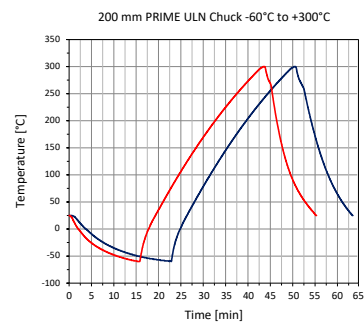
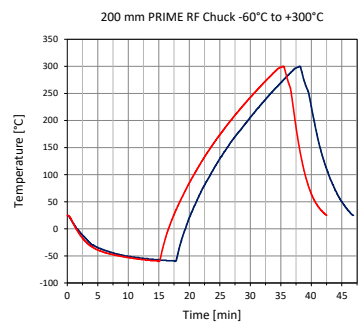
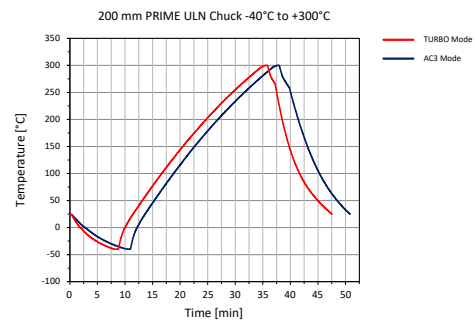
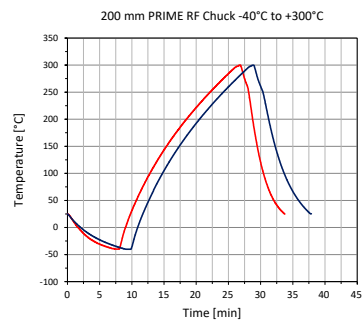
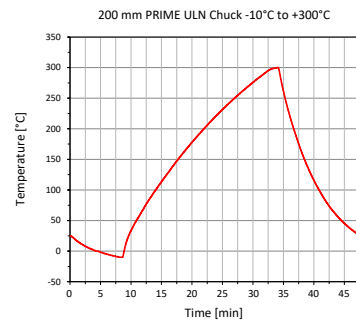
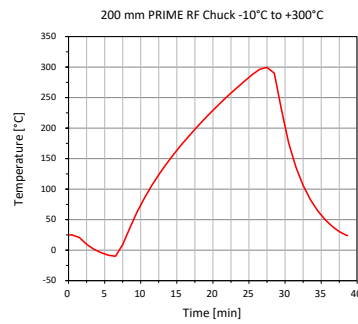


ERS AirCool® Fusion*, Controller
Integrated Chiller -10 °C

*ERS electronic GmbH patented solution

TYPICAL TRANSITION TIME





FACILITY REQUIREMENTS

Thermal Chuck Electrical Supply

Electrical primary connection	100 to 240 VAC auto switch
Frequency	50 Hz / 60 Hz

Compressed Air Supply

Operating pressure	6.0 bar (0.6 MPa, 87 psi) at specified flow rate
CDA dew point	$\leq 0\text{ }^{\circ}\text{C}$ for hot chuck system (ambient to 300 °C) $\leq -45\text{ }^{\circ}\text{C}$ for hot and cold chuck system (-60 °C to 300 °C)

General Probe System

Power	100-240 V AC 50/60 Hz for optical accessories* only
Vacuum	-0.5 bar (for single DUT) / -0.3 bar (for wafers)
Compressed air	4 ~ 7 bar

*e.g. microscope illumination, CCD cameras, monitors.

REGULATORY COMPLIANCE

- CE certified. TÜV compliance tested according to EN 61010, ISO 12100, and SEMI S2

WARRANTY

- Warranty*: 12 months
- Extended service contract: contact MPI Corporation for more information

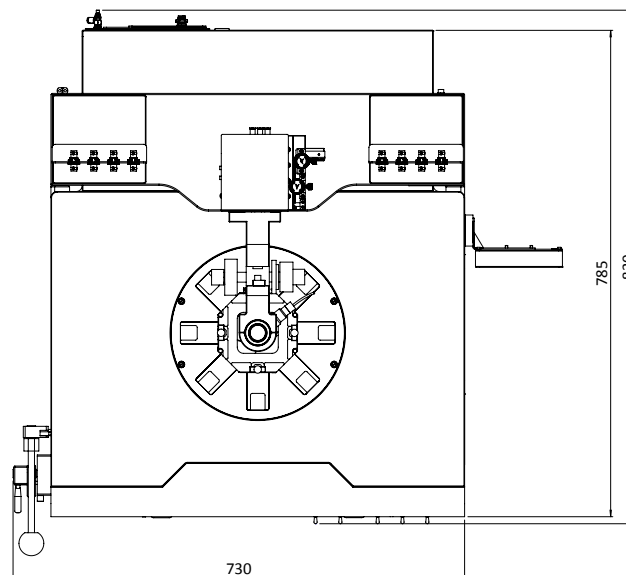
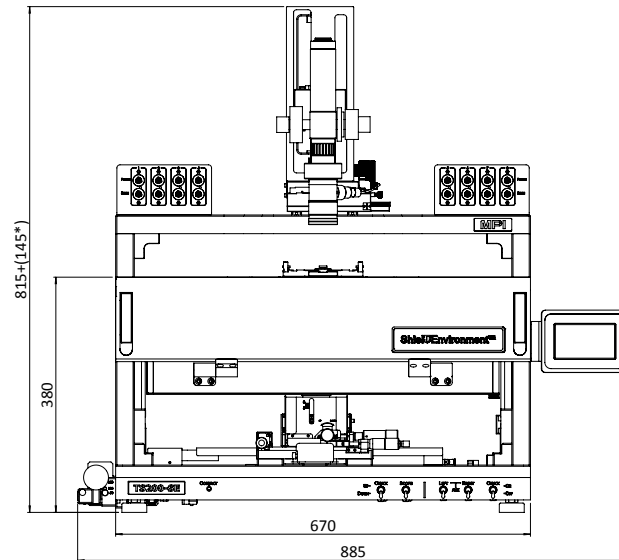
*See MPI Corporation's Terms and Conditions of Sale for more details.

PHYSICAL DIMENSIONS

Station Platform with Bridge*

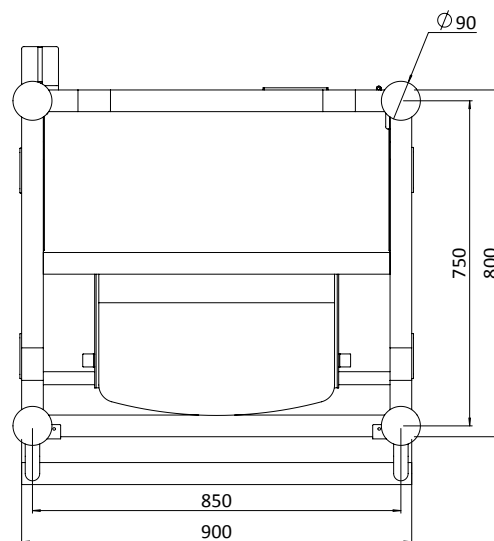
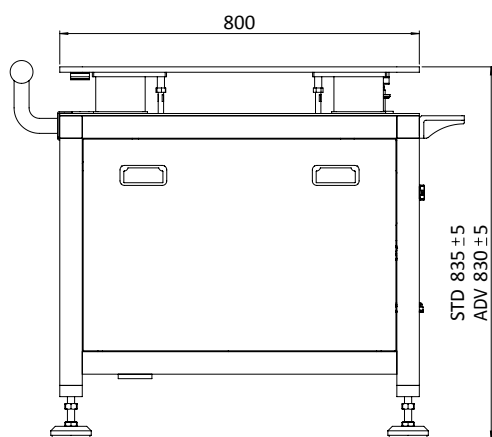
Dimensions (W x D x H)	670 x 785 x 815 mm (26.4 x 30.9 x 32.1 in)
Weight	~150 kg (330.7 lb.)

*Station accessories, such as different microscopes, cameras, or laser cutters, may change the total height.



Vibration Isolation Table

	Standard	Advanced
Dimensions (W x D x H)	900 x 800 x 835 mm (35.4 x 31.5 x 32.9 in)	900 x 800 x 830 mm (35.4 x 31.5 x 32.7 in)
Feature	Adjustable air damping system	Automatic load leveling
Keyboard / Mouse Tray Included	Yes	
Front protection bar	Yes	
Castors Included	Yes	
Shelves Included	Upper and Lower	
Accessories accepted	Monitor Stand(s) and Instrument Shelf	
Weight	Approx. 210 kg (463 lb.)	Approx. 210 kg (463 lb.)



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MPI global presence: for your local support, please find the right contact here:
www.mpi-corporation.com/ast/support/local-support-worldwide

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MPI Global Presence