Indian Institute of Technology Bombay

Materials Management Division

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Technical Specifications for Scanning Kelvin Probe – 1 No.

Sl. No.	Specifications	Description	Compliance (Yes/No)
A.	SKP system		
1.	Head	Double coil	
2.	Head Electronics	Needle SMD PREAMP	
3.	Translation Stages	Linear Stage with DC Motor, (Travel range:100mm, Resolution:0,1µm) for X, Y Axis: 8MT167-100DCE,- Vertical Lift Positioning Table; (Travel range:13mm, Resolution: 0,1µm) for Z Axis: 8MVT40-13-DC - Motion Controller for Stepper and DC Motors, 3 Axis 8SMC5-USB-B8-B9)	
4. SKP Mechanical Specifications			
4.1 Granit Construction Specification			
	Height	100 mm	
	Width	430 mm	
	Depth	430 mm	
	Weight	30.84 kg	
	Feet	Steel Ball Inserts	
	Installation	Base plate bedded on three points	
4.2 Stainless Steel Chamber Construction Specification			
	Material	DIN 1.4031	
	Width (inside)	220 mm	
	Depth (inside)	220 mm	
	Height (inside)	210 mm	
	Weight	36kg	
4.3 Z-Motor Holder Construction Specification			
	Material	DIN 1.4031	
	Diameter x Height	298 mm x 10mm	

	*(inside the granite constr.)		
	Weight	8.5 kg	
4.4 Head Housing Specification			
	Material	DIN 1.4301	
	Weight	1kg	
	Table Specification Material	DIN 1.4301	
	POM Weight	1 kg	
	Depth	100mm	
	Width	100 mm	
4.5 Z-Linear Stage 8MVT40-13-DC Specification			
	Travel range	13 mm	
	Linear encoder accuracy	0.1µm	
	Material	anodized aluminum	
	Weight	0.45 kg	
4.6 X/Y -Linear Stages: 8MT167-100DCE Specification			
	Travel range	100 mm	
	Design accuracy	0.1µm	
	Material	anodized aluminum	
	Weight	1.4kg	
4.7 Overall Construction Dimensions			
	Height	500 mm	
	Width	430 mm	
	Depth	430 mm	
	Weight	100 kg	
5. Standard Requirements			
5.1 Power Requirements			
	Supply Voltage Options	110/230 AC [V]	
	Frequency	50/60 Hz	
	Power	500 [W]	
	ECM compatibility	Directive 2014/30/EU	
5.2 Ambient Requirements			
	Light	direct sunlight should be avoided	
	Ambient temperature	Temperature stability: +/- 1°C, if high accuracy VCPD measurement desired.	
	ELV (maximum amount of vibration) DIN 4150	Frequency Range:1-10Hz	
6. SKP Electronics			
	Signal Processing	PC based system, utilizing a single PCI data acquisition board	
	Measurement method	An off-null approach is applied with the AM modulation of the SKP Signal with Backing Signal	
	SKP Signal	1kHz, V(pp)max=300mV	

	Backing Signal	20Hz, V(pp)=1V	
	Vibration actuator	Coil with permanent magnet, 12V, 400mA, 1KHz	
	Preamplifier	Low noise SMD PAMP integrated with the SKP tip	
	Filtering	High selectivity double Pi-Filter	
	Crosstalk Compensation	RC based crosstalk compensator	
	Signal Amplification Unit	The amplification factor=2000	
	Power Supply	Input: 230V A, 50Hz; Output: Coil Driver- +/-15V reg.vol., Signal Cond.- +/-23V not reg.vol.	
7. Motorization			
	X, Y Axis	8MT167-100DCE (travel range: 00mm, resolution: 0.1µm)	
	Z Axis	8MVT40-13-DC (travel range: 13µm, resolution: 0.1µm)	
	X, Y, Z – Axis Controller	8SMC5-USB-B8-B9 (controller for XYZ) (Stepper & DC Motor Controller)	
8. SKP Features			
	Work function resolution	Range of work function resolution depending on a sample feature: 1- 4meV	
	Scanning area	X- Axis Range: 100mm Y-Axis Range: 100mm Z-Axis Range: 13mm	
	Lateral resolution	The lateral resolution is mainly determined by a tip diameter (up to 30µm) and could be increased if applying an overlapping scan by a factor 7.	
	Modular Software		
	Automatic Climatic Control		
	Granite Base		
	NI DAQ System	USB-6363, NI USB-6363, X Series DAQ Device SHC68-68-EPM Shielded Cable, 68-D-Type to 68 VHDCI	

		SCB-68A Noise Rejecting, Shielded I/O Connector	
9. Computer			
	PC components	Intel Core i7 13700KF 16 (8+8) 3.40GHz ASUS ROG Strix Z790-F Gaming WIFI Mainboard Sockel Intel LGA1700 (ATX, DDR5, 4x M.2, PCIe 5.0) Corsair Vengeance RGB schwarz DIMM Kit 64GB, DDR5-5600, CL36-36-36-76, on-die ECC Samsung 980 PRO M.2 NVMe SSD (MZ-V8P2T0BW), 2 TB, PCIe 4.0, 7.000 MB/s reading, 5.000 MB/s writing, Internes Solid State Drive.	
10. Miscellaneous			
	Vibration Dampers	FEABI 75	
	Sample stage for simultaneous Potentiostatic- and SKP measurements: SKP Head working on the lower side and Electrochemical Cell fixed on the upper side of the sample.		
	Measurement Chamber for humidity regulation and gas exchange		
	SKP Head with cooling system		
	Flow cell for electrochemical experiments General System	Maximal sample size: 100 mm; Work function resolution: 1 - 5 meV; The maximal spatial resolution of 40 µm depending on the probe tip	
	FMC for N2 and FMC for O2 flow control	Range: 0-5ln/min diameter.	
	SKP Software		
	Humidity control, gas exchange system installation and commissioning		