

SPECS GmbH | Voltastrasse 5 | 13355 Berlin / Germany

Institute of Chemical Technology Prague

Department of Inorganic Chemistry

Technicka 5

166 28 PRAHA 6

TSCHECHISCHE REPUBLIK

Customer Number
101870.002.01

Date
31. May 2017

Sales
Měřicí technika Morava s.r.o

Contact

Telephone
+

Fax

E-mail

TECHNICAL BID AN161939.006a

Page 1 / 36

Item	Part No.	Quantity	Unit Price	Net EUR
1	<p>System Module for Electron Spectroscopy Consisting of:</p> <p>0012000098 Analysis Chamber</p> <ul style="list-style-type: none"> cylindrical μ metal analysis chamber, \varnothing238 mm, L = 488 mm with flanges for hemispherical energy analyzer, X ray source, UV source, flood gun, electron source, LEED, ion source, sample manipulator, sample introduction system, vacuum pumping system, pressure measurement, viewports and reserve flanges manual gate valve at sample transfer port <p>2017840166 FlexVac pumping configuration for base pressure better than 9×10^{-10} mbar after 72 h bake out and 48 h cool down, and final end pressure better than 2×10^{-10} mbar, complete with power supplies / controllers and cables.</p>	1		

SPECS

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USt-IdNr. DE136564155

Deutsche Bank Berlin AG
BLZ 100700 00 | Konto 829 200 500
Swift Code DEUTDEBB
IBAN DE90 1007 0000 0829 2005 00

Item	Part No.	Quantity	Unit Price	Net EUR
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- Ion Getter Pump,
pumping speed: 240 l/s (N2),
integrated Titanium sublimation pump with
cryoshield, comb. pumping speed: 720 l/s (N2),
mounting flange: DN160CF
- Turbomolecular pump,
type: Pfeiffer HiPace 300,
pumping speed: 260 l/s (N2),
mounting flange: DN100CF,
automatic vent valve
- Scroll Pump
type: Edwards nXDS10i

2017840053
UHV Gate Valve

- type: VAT, DN100CF, pneumatic

2017840211
Sample transfer (active)

- magnetically coupled linear transfer rod with port aligner
- system adapted translation travel
- 360° polar rotation
- active transfer tool for SH 2/12 type sample plates

2017840001
UHV pressure measurement

- Bayard Alpert passive hot cathode ionisation gauge
- pressure range: 1x10⁻¹⁰ to 1x10⁻⁴ mbar
- mounting flange: DN40CF

2017840210
System Mounting Frame

- rigid Aluminium profile system frame
- with metal side and top covers

2017840062
FlexBake bake out package

Item	Part No.	Quantity	Unit Price	Net EUR
	<ul style="list-style-type: none"> • for dual system module • flexible insulating bakeout cover • rigid support framework • Fan heaters for bakeout • bakeout control unit with timer for max. bakeout time of 99 h 			
	<p>210002418 19 inch Electronic Cabinet</p> <ul style="list-style-type: none"> • 38 height units per cabinet • Intelligent 3 phase power management unit • Interlock control unit included when used as systems main cabinet • Network interface with string based protocol • Lockable rear panel 			
2	<p>5-axes (XYZPAz) Sample Manipulation</p> <p>Consisting of:</p> <p>SPECS 5-axes manipulator XYZPAz; Z500</p> <p>SPECS 5-axes Sample Manipulator specifications:</p> <ul style="list-style-type: none"> • X = ±12.5 mm linear shift • Y = ±12.5 mm linear shift • Z = 500 mm linear movement • P = ±180° polar rotation • Az = ±90° azimuthal rotation <p>non-magnetic sample holder</p> <ul style="list-style-type: none"> • applicable sample bias • integrated thermocouple type K <p>sample holder cooling</p> <ul style="list-style-type: none"> • liquid nitrogen cooling down to 120 K 	1		
		1		

Item	Part No.	Quantity	Unit Price	Net EUR
	sample handling	1		
	<ul style="list-style-type: none"> • SH 2/12 type sample plates • sample size up to 12 mm x 12 mm • standard sample thickness 0.5 mm 			
	motorization for 5 axes	1		
	<ul style="list-style-type: none"> • 5 motors with TCP/IP interfaces for easy control per axis 			
3	One additional position for manipulator	1		
	<ul style="list-style-type: none"> • SH 2/12 type sample plates (1 inch) • sample size up to 25 mm x 25 mm • standard sample thickness 0.5 mm • suitable for XPS measurements <p><u>Please note: NO heating/cooling capability for this additional position. Only x/y/z linear shift and polar rotation are possible.</u></p>			
4	Wobblestick for sample handling for manipulator	1		
	<p>PHOIBOS 150 2D-CCD Energy Analyzer Package (items 5-8)</p> <p>Energy analyzer package for XPS, UPS, ARPES, AES, SAM, ISS and LEIS. Including PHOIBOS 150 hemispherical analyzer, 2-dimensional CCD detector, spectrometer control unit, data acquisition software.</p>			

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Item	Part No.	Quantity	Unit Price	Net EUR
5	PHOIBOS 150 Hemispherical Energy Analyzer	1		
	<ul style="list-style-type: none"> • 150 mm analyzer mean radius. • Mounting flange DN 100CF. • 8 entrance and 3 exit slits. • Integrated double mu metal shielding. • Working distance: 40 mm. • Magnification, angular resolving and transmission lens modes. • Acceptance angle: $\pm 15^\circ$ in angle resolved and in transmission. • Energy resolution: < 2 meV (with CCD detector). • Angular resolution: $< 0.1^\circ$ (with CCD detector). • Small spot capability: $< 100 \mu\text{m}$. • Large detector flexibility, retrofitable with all 1D, 2D and Spin detectors. 			
6	2D-CCD Detector	1		
	<ul style="list-style-type: none"> • For PHOIBOS 150/225 analyzers. • MCP Chevron, 45mm diameter. • Fast P43 phosphor screen (545nm, 90/10% 1ms). • PCO Pixelfly CCD camera. • Lateral resolution $< 100 \mu\text{m}$. • 1392x1024 Pixel. 			
7	HSA 3500 plus Spectrometer Control Unit	1		
	<ul style="list-style-type: none"> • For PHOIBOS energy analyzers with 2D detector. • Voltage range: 3500V, 400V, 100V, 10V. • High precision 21 bit DAC with maximum settle time < 3 ms. • Dedicated AES, ISS, XPS and UPS modes of operation for lowest ripple and step widths. • Fixed Analyzer Transmission and Fixed Retard Ratio operation. • Pass energy range: 0-660 eV. • EC10 Ethernet/CAN Bus interface package. • Incl. SpecsLab Prodigy software with automated measurement routines and periodic library. 			

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Item	Part No.	Quantity	Unit Price	Net EUR
8	<p>PC-Package for SPM/XPS</p> <p>DELL Precision Workstation consisting of:</p> <ul style="list-style-type: none"> • Intel Xeon Processor • 8GB Memory • 500GB Hard Disk • Windows 7 Operating System • Configuration with two DELL 24" HD Screens 	1		
9	<p>UVS 300 UV Source Package for Monochromator</p> <p>For state of the art ARPES studies in conjunction with a TMM monochromator. The source is factory-equipped with a monochromator adaptation kit. Package includes UVS 300 UV source and UVS 300 power supply.</p> <p>Please note: TMM monochromator, gas inlet, pumps and pressure gauges are not included but are required for operating the source.</p> <p>Consisting of:</p> <p>UVS 300 VUV-Source for monochromator</p> <p>Based on the Duo Plasmatron principle, design for excellent long term stability</p> <ul style="list-style-type: none"> • Photon flux > 1 E16 photons/sr s (as a stand-alone device) • FWHM < 2 meV • Ratio HeII/HeI up to 1/3 in HeII mode • Long term stability $\Delta I/I = 0.014\%$ per hour • < 0.1 mbar pressure in the ionization chamber, E-5 mbar in the differential pumping stage • Can also be used with H, Ne and Ar • Integrated microvalve for the separation of source and UHV chamber for easy maintenance • Designed to be mounted to a TMM monochromator • Requires water cooling 0.5 bar, 1.5 l/min <p>UVS 300-A power supply</p>	1		

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Item	Part No.	Quantity	Unit Price	Net EUR
	<ul style="list-style-type: none"> • Voltage module anode, 0-150 V / 0-3 A • Voltage module filament, 0-6 V / 30 A • Digital display for anode voltage, anode current and filament current • LED indication of optimum filament current • Safety interlocks: two steps for bakeout and operation temperature • Built in a 19" rack 			
10	<p>TMM 304 Toroidal Mirror Monochromator for HeI/HeII with frame</p> <p>The TMM 304 provides high transmission for state of the art UV spectroscopy in combination with SPECS UV sources UVS 300 or UVLS. The monochromator includes a monochromator chamber including system frame and an exchangeable cassette assembly with two cassettes for the optical elements consisting of a toroidal mirror and a plane grating. Two cassettes for HeI and HeII and a small spot ellipsoidal transfer capillary (ETC) are already included in this package. Package includes TMM 304 incl. system frame, HeI and HeII cassette and ETC capillary.</p> <p>Please note: Gas inlet, pumps and pressure gauges are not included but are required for operating the monochromator.</p> <p>Consisting of:</p>	1		
	<p>TMM 304 Toroidal Mirror Monochromator with ETC</p> <ul style="list-style-type: none"> • Insertion depth: 584mm • Working distance: 10 mm • Achievable spot diameter on sample < 500 µm at 10mm working distance • Line width < 1meV • Mounting flange DN35CF • Bakeable up to 120°C • Frame with z retract, rotation base and tilt for beam alignment 	1		

Item	Part No.	Quantity	Unit Price	Net EUR
	Helium I Cassette for TMM 304	1		
	<ul style="list-style-type: none"> grating with 1200 grooves/mm 			
	Helium II Cassette for TMM 304	1		
	<ul style="list-style-type: none"> grating with 600 grooves/mm 			
11	<p>Differential pumping stages for TMM 304 basic</p> <p>For pressures < 5E-9 mbar in analytical chamber consisting of:</p> <ul style="list-style-type: none"> Turbo pump for monochromator chamber Pfeiffer HiPace 300 Turbo pump for capillary cross Pfeiffer HiPace 80 oil-free roughing vacuum system All necessary tubing and fittings 	1		
12	<p>Gas Inlet System GI-1</p> <p>consisting of:</p> <ul style="list-style-type: none"> high precision UHV gas inlet valve gas line (CF16 flange) <p>Please note: No gas bottle included.</p>	1		
13	<p>Differential Pumping Package for UVLS/UVS 300</p> <p>Consisting of:</p> <ul style="list-style-type: none"> Turbo molecular pump Pressure gauge Scroll pump for oil-free vacuum All necessary tubing and fittings 	1		

Item	Part No.	Quantity	Unit Price	Net EUR
14	Monochromated X-ray sources	1		
	<p>The FOCUS X-ray monochromator for UHV enables high resolution XPS measurements in the laboratory off the synchrotron. The high performance monochromator is available in two different sizes with different Rowland-Circle diameter. Therefore it is a perfect match for SPECS analysis. As well due to its overall compactness it also matches customer chambers as a bolt-on component. Two different X-ray source modules are available, a high performance Dual Anode or a high intensity Microfocus Source. Due the modular design the source configuration can be changed when necessary at a later time.</p> <p>Consisting of:</p> <p>XR 50 MF X-ray Source</p> <ul style="list-style-type: none"> • Microfocus high performance X-ray source • Al X-ray anode with long service life • Compatible to SPECS FOCUS monochromators <p>μ-FOCUS 500 X-ray Monochromator</p> <ul style="list-style-type: none"> • μ-FOCUS 500 X-ray Monochromator • Wide crystal area for highest transmission • Special crystal shape for extensive focusing • Easy to use crystal manipulator with three degrees of freedom • Rowland circle diameter of 500mm • Shutter with movable mylar X-ray window • For chamber flanges of DN 100 CF • For port lengths of 177 mm max. (flange sample distance) • Spare ports for pumping and pressure measurement available (DN 63 CF and DN 40 CF) • UHV high precision manipulator for optimized source positioning <p>In combination with a XR 50 MF X-ray Source: Spot size variable between 200μm (20W max.) and >1mm (180W max.)</p>	1		

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Item	Part No.	Quantity	Unit Price	Net EUR
	UXC 1000 Universal X-ray Source Control	1		
	<ul style="list-style-type: none"> • Microprocessor driven power supply for SPECS X-ray sources of the XR 50 family • Easy to use graphical user interface • Network interface with string based protocol • SpecsLab Prodigy Widgets (optional) • Maximum power 1 kW (max. usable power depends on source and anode configuration) • Maximum anode voltage 15 kV • Integrated arc protection guarantees long source and anode life time • Integrated safety electronics for both people and equipment protection • 3 height units case for 19 inch electronic racks 			
	UXC 1000 Cabling Package for XR 50 MF X-ray Source	1		
	CCX 70 Isolation Unit	1		
	<ul style="list-style-type: none"> • Integrated safety electronics for both people and equipment protection • Sensors for water temperature, flow and water pressure • Easy replaceable particle filters • 2 height units case for 19 inch electronic racks <p>Please note: A water cooling system with a pressure of at least $p \geq 8$ bar a flow of at least 4 l/min and a cooling power of at least 600W is required.</p>			
15	Closed-Cycle Water Cooling Module	1		
	<ul style="list-style-type: none"> • Air cooled, microprocessor driven module • Two closed-cycle water cooling circuits fed from a single reservoir • High cooling performance of 1000W at 20°C • Pumping power 5l/min at 9 bar max • Water level sensors with alarm output 			

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Item	Part No.	Quantity	Unit Price	Net EUR
	<ul style="list-style-type: none"> • RS232 remote control functionality • Suitable for mains voltage of 230V/60Hz 			
16	<p>IQE 12 Low Energy Ion Source Package</p> <p>The IQE 12 Low Energy is a scannable focused extractor type ion source for depth profiling or LEIS/ISS. Its low energy mode makes it an ideal source for charge compensation applications with SEM / SAM or PES. In combination with an electron source a dual beam-type charge compensation can be achieved. Its long-lifetime special Yttrium oxide coated Iridium filament makes the source suitable for reactive and inert gases. The package includes IQE12/38 ion source and PU-IQE 12/38 power supply</p> <p>Please note: Gas inlet system and differential pumping required.</p> <p>Consisting of:</p> <p>IQE 12 Low Energy Small Spot Ion Source</p> <ul style="list-style-type: none"> • for inert and reactive gases • provides high energy and low energy operation modes <p>High Energy Mode (0.2 - 5 keV):</p> <ul style="list-style-type: none"> • scan area 10 x 10 mm • spot size in small spot mode: 160µm guaranteed at 0.7µA/ 5 keV 125 µm achievable at 0.4 µA/ 3 keV • ion current in broad beam mode: 7 µA guaranteed at 5 keV 8 µA achievable at 5 keV <p>Low Energy Mode (10 - 200 eV)</p> <ul style="list-style-type: none"> • Flood gun type low energy ion beam • 70 nA @ 25 eV achievable 	1		
	<p>PU-IQE 12 Low Energy Power Unit Set</p>	1		

Item	Part No.	Quantity	Unit Price	Net EUR
	<ul style="list-style-type: none"> • Set of 2 power supplies with integrated deflection units for ion source IQE 12 Low Energy • High Energy (200 - 5000 eV) and Low Energy (10 - 200 eV) power units • interface busses for computer control (IEC 488, RS 232). • Gating for depth profiling • Key stone correction of scan area for tilted samples to generate flat crater ground x-y-exit for mapping • X-y-deflection for beam positioning in low energy mode 			
17	<p>Differential Pumping, IQE 12/38, System bypass for ion source IQE 12/38</p> <ul style="list-style-type: none"> • bypass to load lock system, • full metal angle valve • including all tubings and fittings 	1		
18	<p>Gas Inlet System GI-1</p> <p>consisting of:</p> <ul style="list-style-type: none"> • high precision UHV gas inlet valve • gas line (CF16 flange) <p>Please note: No gas bottle included.</p>	1		
19	<p>Flood Gun Package</p> <p>The Flood Gun is designed for general sample charge neutralization of positively charged insulators or semiconductors, especially for XPS applications. It provides a stable electron current and homogeneous current densities to achieve an effective charge neutralization on a large sample area. The power supply is equipped with a remote control option.</p> <p>Flood Gun</p> <ul style="list-style-type: none"> • Mounting flange DN40CF • Insertion length 146 mm 	1		

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	<ul style="list-style-type: none"> • Bakeable up to 200°C • Variable beam energy and emission current 			
	<p>Power Supply</p> <ul style="list-style-type: none"> • manual or remote operation • CAN and RS 232 interface 			
20	<p>ErLEED 150 Package</p> <p>High performance reverse view LEED/AES optics and control electronics. The LEED optics is mounted on a DN150CF flange (ErLEED 100 on request).</p> <p>This package includes the ErLEED 150 optics in 4 grid configuration for LEED and AES applications (2 or 3 grids on request), with 100mm low friction z retract mechanism (50mm z-retract or fixed length optics on request), the multi segment shutter, and the fully digitally operated ErLEED 3000D Control Unit.</p>	1		
	<p>Consisting of:</p> <p>ErLEED 150/4G/Z-retract 100/Shutter optics</p>	1		
	<p>High performance reverse view LEED/AES optics Specifications:</p> <ul style="list-style-type: none"> • Mounting flange DN150CF • Integrated 100mm z-retraction (50mm on request) • Integrated multi segment shutter • Sample to flange distance: 254 to 354 mm (fully extended) • Sample working distance: 20 mm off center at shutter mounting: 3 mm • 4 grid optics, grid material: gold coated molybdenum (2 or 3 grids optics on request) • Light shielded miniature electron gun, filament material: thoria coated iridium hairpin, LaB6 filament available as optional upgrade. • Gun energy range: 0 - 3000eV • Beam current: > 15 µA at 1 keV (LEED) 			

Item	Part No.	Quantity	Unit Price	Net EUR
	<ul style="list-style-type: none"> > 4 5µA at 3 keV (AES) • Beam diameter: <1 mm at 1 µA and 100 eV • Screen material: glass coated with ITO conducting layer and P43 cadmium free phosphorus • µ-metal shielding • Bakeout temperature: 250°C 			
	<p>Control Unit ErLEED 3000D</p> <p>Fully digitally operated LEED/AES control unit with integrated Lock In amplifier and RFA PC software for standard LEED applications and Auger electron spectroscopy (AES). Specifications:</p> <ul style="list-style-type: none"> • Fully floating unit allows true beam current measurement • Primary energy: 0 - 1000 eV (LEED) and 0 - 3000 eV (AES) • Screen voltage: 0 - 10 kV • Independent high precision HV modules • Internal ramp generator with 0 - 2000 eV detection energy (AES) • Preamplifier, filter and matching unit • Integrated lock in amplifier • 18 bit D/A A/D converters for control and read out of voltages • Large screen dot matrix LC display with backlighting • Non volatile memory to store and recall complete parameter sets • Fully externally operationable by PC via RS232 interface 	1		
21	<p>Sample Observation Camera, USB</p> <p>consisting of:</p> <ul style="list-style-type: none"> • Color sample observation camera for high resolution of the sample stage and surface • Field of view of 80x60mm to 24x18mm at a working distance of 200mm • high resolution near distance corrected zoom objective lens (varifocal lens) • USB 2.0 	1		

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	<ul style="list-style-type: none"> • software included • easy to use all-axis alignment camera holder • very high reproducibility after remounting (better than 0.5mm at 200mm working distance) • very high mechanical stability • chamber mount via rigid clamp on customer DN-40CF viewport 			
	<p>Vibrational isolation required for later SEM/SAM capability with 1µm resolution:</p>			
22	<p>Vibration Isolation System passive damping system •type: Newport •with 4 feet •including level adjustment</p>	1		
23	<p>FlexPM - System Module for Scanning Probe Microscopy</p>	1		
	<p>Consisting of:</p> <p>Analysis Chamber for SPM</p> <ul style="list-style-type: none"> • stainless steel spherical chamber, Ø260 • with flanges for SPM Aarhus 150, specimen parking, ion sources for sample and tip preparation, in situ evaporation, in-situ optical access, sample introduction system, pressure measurement, vacuum pumping system, viewports and reserve flanges • manual gate valve at sample transfer port 	1		
	<p>FlexVac pumping configuration</p> <p>for base pressure better than 9E-10 mbar after 72h bake out and 48h cool down and final end pressure better than 5E-10mbar, complete with power supplies/controllers and cables.</p> <ul style="list-style-type: none"> • Ion Getter Pump, 	1		

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Item	Part No.	Quantity	Unit Price	Net EUR
	<p>pumping speed: 240 l/s (N₂), integrated Titanium sublimation pump with cryoshield, comb. pumping speed: 720 l/s (N₂), mounting flange: DN160CF</p>			
	UHV Gate Valve	1		
	<ul style="list-style-type: none"> type: VAT, DN160CF, manual 			
	Sample transfer (passive)	1		
	<ul style="list-style-type: none"> magnetically coupled linear transfer rod with port aligner system adapted translation travel 360° polar rotation passive transfer tool for SH 2/12 type sample plates 			
	UHV pressure measurement	1		
	<ul style="list-style-type: none"> Bayard Alpert passive hot cathode ionisation gauge pressure range: 1x10⁻¹⁰ to 1x10⁻⁴ mbar mounting flange: DN40CF 			
	System Mounting Frame	1		
	<ul style="list-style-type: none"> rigid Aluminium profile system frame with metal side and top covers 			
	FlexBake bake out package	1		
	for single system module			
	<ul style="list-style-type: none"> flexible insulating bakeout cover rigid support framework Fan heaters for bakeout bakeout control unit with timer for max. bakeout time of 99 h 			

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Item	Part No.	Quantity	Unit Price	Net EUR
	19 inch Electronic Cabinet	1		
	<ul style="list-style-type: none"> • 38 height units per cabinet • Intelligent 3 phase power management unit • Interlock control unit included when used as systems main cabinet • Network interface with string based protocol • Lockable rear panel 			
24	VAT UHV-Schieber DN100CF-F pneumat.	1		
25	<p>STM Aarhus 150 HT SPM Package</p> <p>High stability STM/AFM with permanent cooling for ultimate temperature stability. Including Aarhus SPM head, radiative heater for all samples (metals, semiconductors), base electronics, Nanonis scan electronics, wobble stick, computer, data acquisition and data processing software.</p> <p>Consisting of:</p> <p>Aarhus HT SPM head</p> <ul style="list-style-type: none"> • Miniature SPM head in gold plated Copper block • Two stage suspension, damping via elastomer (no stray magnetic field) • Permanent wire cooling • Optical access to the sample, in and out, and additional access for in situ evaporation • Maximum scan region 1500 nm x 1500 nm (1000 nm x 1000 nm @ T>350 K) • Maximum x/y offset +/- 1000 nm • Sensitive z region +/- 175 nm • Mounting flange DN 150CF, horizontal set up • Temperature range: 90 K 1300 K with STM tip, 650 K with KolibriSensor (cooling via LN2 flow cooler) • radiative heater for all samples (metals, semiconductors) • Short therm stability: max rate <0,03 K / min 	1		

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	<ul style="list-style-type: none"> (3 kg Copper block is used as thermal buffer) • Long therm stability: thermal equilibrium from T > 180 K, read out accuracy +/- 2 K / hour • Temperature drift below thermal equilibrium: approximately 10 K / hour @ 145 K, approximately 5 K / hour @ 160 K • Drift (180 K < T < RT) < 0.05 nm/min (vert), < 0.15 nm/min (lat) • Stability: < 5 pm 			
	SH-SPM power supply	1		
	<ul style="list-style-type: none"> • High stability power supply for radiative heating • Including cable 			
	KolibriSensor™ for SPM Aarhus 150	3		
	High speed and high sensitivity nc-AFM sensor based on a length extension resonator with tungsten tip.			
	VTC 20 Base electronics for Aarhus STM	1		
	<ul style="list-style-type: none"> • Temperature control for STM and sample • Separate analogue heater for STM head and sample, temperature displays, alarm control for both temperatures and external interlock • Preamplifier for Aarhus 150 STM Version 3 with improved bandwidth and performance • MEPI Motor End Position Indicator for safe sample exchange • Remote head phones for direct monitoring of the tunneling current • Including all cables 			
	Wobblestick for Aarhus SPM	1		
	<ul style="list-style-type: none"> • transferring the sample between transfer rod, sample storage and SPM 			

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Item	Part No.	Quantity	Unit Price	Net EUR
	PC-Package for SPM/XPS	1		
	DELL Precision Workstation consisting of:			
	<ul style="list-style-type: none"> • Intel Xeon Processor • 8GB Memory • 500GB Hard Disk • Windows 7 Operating System • Configuration with two DELL 24" HD Screens 			
	SPECS Nanonis package for Aarhus SPM	1		
	consisting of:			
	Nanonis BP5 Control System Base Package for STM and AFM			
	<ul style="list-style-type: none"> • Nanonis RC5 Real time Controller with pre-configured FPGA card • Nanonis SC5 Signal Conversion unit (low voltage I/O, ± 10 VDC) • License for V5 base package software • Software updates within the same software version • Support for one year 			
	Nanonis OC4 Oscillation Controller			
	<ul style="list-style-type: none"> • Nanonis OC4 Oscillation Controller • Software module for dynamic AFM modes • Nanonis PLL phase lock loop (frequency range 100 Hz - 5 MHz) • Nanonis PerfectPLL™ auto tune of PLL parameters 			
	Nanonis HVA4-0214 High Voltage Amplifier (Normal)			
	<ul style="list-style-type: none"> • Nanonis HVA4-0214 Normal 6-channel high voltage amplifier for $\pm X$, $\pm Y$, Z and AUX 			
	Specifications:			
	<ul style="list-style-type: none"> • Bandwidth: 2 kHz • Switchable gain of 1, 4, 7, 14 and digital interface to software 			

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Item	Part No.	Quantity	Unit Price	Net EUR
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Nanonis HVS4 High Voltage Power Supply

- **Nanonis HVS4** high voltage power supply (lowest noise, optimized for SPM applications)

Nanonis AKAH Adaptation Kit Aarhus SPM

- **Nanonis AKAH** pin compatible adaptation kit for plug and play integration with Aarhus SPM

Nanonis AT5 Atom Tracking Software Module

- Atom tracking module for Nanonis BP5
- Automatic compensation of constant drift effects by tracking surface topography extrema
- Double lock in software detector in (X,Y) and controller for drift tracking
- Fully integrated with spectroscopy and other modules

Nanonis LD5-1 Software Lock In Detector Module

- Single dual-phase lock-in module for Nanonis BP5
- Modulates any output or input signal with up to 40 kHz
- Demodulates any channel at first or higher harmonic at up to 100 kHz
- Two independent demodulators with advanced filtering: slope up to 8th order and variable time constant, sync-filtering up to 40 kHz
- Configurable AC-coupling with variable cut-off and filter slope
- Sweep modulation frequency to record transfer function

SPECS KolibriPreamp™ Kit for KolibriSensor™

- **KolibriPreamp™** by FEMTO with 15 MHz bandwidth
- **Low noise cabling** for connecting KolibriPreamp™ power, sensor excitation and oscillation signals to

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Item	Part No.	Quantity	Unit Price	Net EUR
	OC4 Station or OC4, cabling length: 5 m			
26	<p>IQE 11/35 3kV ion source package</p> <p>The IQE 11/35 is a very stable extractor type ion source operating with a long-lifetime special Yttrium oxide coated Iridium filament. It is a robust, compact and easy-to-handle source for sputter cleaning of samples in UHV. Including IQE11/35 ion source and PS-IQE11 A analog power supply.</p> <p>Consisting of:</p> <p>IQE 11/35 Ion Source</p> <ul style="list-style-type: none"> • extractor type ion source • variable insertion length: 62.5 mm, 120 mm, 190 mm or 250 mm • if necessary, a 24 mm adapter flange is included to accomodate port length • suitable for inert or reactive gases • beam currents up to 20 µA (Argon) <p>Please note: Gas inlet system required.</p>	1		
	<p>Analog Power Supply PS-IQE11 A 3 kV</p> <ul style="list-style-type: none"> • power supply for ion source IQE 11/35 • ion energy range up to 3 keV • emission current selectable 3 mA, 6 mA or 10 mA • easy manual control • 19" (W) x 88 mm (H) • weight 10 kg • 230/115 V, 70 VA, 50/60 Hz 	1		

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Item	Part No.	Quantity	Unit Price	Net EUR
27	SPM Aarhus 150 sample storage and preparation consisting of:	1		
	<ul style="list-style-type: none"> • UHV linear motion on DN63CF flange • Specimen parking space for 5 samples • Sample position for sputter/anneal cycles with shielded filament for electron bombardment and contacts for direct current heating • UHV 4 way feedthrough for electron bombardment and direct current heating • UHV double thermocouple feedthroughs <p>Please note: Completely wired, power supplies not included. Standard configuration for attachment on left hand side of chamber. Right hand side orientation and special configuration upon request.</p>			
28	IQE 11/35 Ion Source	1		
	<ul style="list-style-type: none"> • extractor type ion source • variable insertion length: 62.5 mm, 120 mm, 190 mm or 250 mm • if necessary, a 24 mm adapter flange is included to accomodate port length • suitable for inert or reactive gases • beam currents up to 20 µA (Argon) <p>Please note: Gas inlet system required.</p>			
29	Preparation Chamber Package Consisting of:	1		
	<p>Preparation Chamber for Sample Preparation</p> <ul style="list-style-type: none"> • MBE chamber • with flanges for ion sources, deposition sources, LEED/RHEED optics, sample introduction, vacuum pumping system, pressure measurement, viewports and reserve flanges • manual gate valve at sample transfer port 			

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Item	Part No.	Quantity	Unit Price	Net EUR
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Sample transfer (active)

- magnetically coupled linear transfer rod with port aligner
- system adapted translation travel
- 360° polar rotation
- active transfer tool for SH 2/12 type sample plates

UHV pressure measurement

- BARION Bayard Alpert passive hot cathode ionisation gauge
- pressure range: 1x10⁻¹⁰ to 1x10⁻⁴ mbar
- mounting flange: DN40CF
- including controller and read out

System Mounting Frame

- rigid Aluminium profile system frame
- with metal side and top covers

Bake out package

- for single system module
- flexible insulating bakeout cover
- rigid support framework
- Fan heaters for bakeout
- bakeout control unit with timer for max. bakeout time of 99 h

19 inch Electronic Cabinet

- 38 height units per cabinet
- Intelligent 3 phase power management unit
- Interlock control unit included when used as systems main cabinet
- Network interface with string based protocol
- Lockable rear panel

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Item	Part No.	Quantity	Unit Price	Net EUR
30	Upgrade: MBE Cooling Shield	1		
31	UHV Gate Valve <ul style="list-style-type: none"> • type: VAT, DN100CF, pneumatic 	1		
32	FlexVac pumping configuration for base pressure better than 9E-10 mbar after 72h bake out and 48h cool down and final end pressure better than 5E-10mbar, complete with power supplies/controllers and cables. <ul style="list-style-type: none"> • Ion Getter Pump, pumping speed: 240 l/s (N₂), integrated Titanium sublimation pump with cryoshield, comb. pumping speed: 720 l/s (N₂), mounting flange: DN160CF 	1		
33	UHV Gate Valve <ul style="list-style-type: none"> • type: VAT, DN160CF, manual 	1		
34	4-axes (XYZP) Sample Manipulation Consisting of: SPECS 4-axes Sample Manipulator <ul style="list-style-type: none"> • X = ±12.5 mm linear shift • Y = ±12.5 mm linear shift • Z = 200 mm linear movement • P = ±180° polar rotation <p>non-magnetic sample holder</p> <ul style="list-style-type: none"> • applicable sample bias • integrated thermocouple type K 	1		

Item	Part No.	Quantity	Unit Price	Net EUR
	sample holder cooling			
	<ul style="list-style-type: none"> liquid nitrogen cooling down to 100 K 			
	sample holder heating	1		
	<ul style="list-style-type: none"> electron beam heating up to 800 °C 			
	sample handling	1		
	<ul style="list-style-type: none"> SH 2/12 type sample plates sample size up to 12 mm x 12 mm standard sample thickness 0.5 mm 			
35	UHV Heating Stage DN63CF Flange with single-sample heating stage	1		
	<ul style="list-style-type: none"> electron beam heating molybdenum stage 1500 °C in UHV achievable without special requirement to geometry 2000 °C in UHV achievable with optimized sample and holder geometry flange includes water cooling requires active transfer or wobblestick for transfer power supply included 			
36	Wobblestick for sample transfer for heating stage	1		
37	IQP 10/63 Ion Source The Penning type ion source IQP 10/63 produces ion beams by a cold discharge, thus without the need of hot filament. Because of its flat and broad beam profile with a diameter of up to 20mm it is especially suitable for homogeneous cleaning of larger samples.	1		
	Consisting of:			

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Item	Part No.	Quantity	Unit Price	Net EUR
	IQP 10/63 Ion Source	1		
	<ul style="list-style-type: none"> • Penning type ion source • Ion energy 0.5 keV up to 6.0 keV • Beam diameter controllable between 8 and 20 mm with a flat beam profile above 10mm • Typical beam current of 20µA at 3.0 keV Ar⁺ • Maximum beam current density of 150 µA/cm² • DN63CF mounting flange • DN16CF mounting flange for gas dosing valve <p>Please note: A separate gas inlet and dosing valve is required</p>			
	IQP 10-A Ion Source Control	1		
	<ul style="list-style-type: none"> • Control unit for IQP 10/63 ion sources • Integrated safety circuitry for equipment protection (interlock connector) • 3 height units case for 19 inch electronic racks 			
38	Gas Inlet System GI-1	1		
	<p>consisting of:</p> <ul style="list-style-type: none"> • high precision UHV gas inlet valve • gas line (CF16 flange) <p>Please note: No gas bottle included.</p>			
39	Multi-Pocket E-beam evaporator EBE-4-2L2F package	1		
	<p>Four pocket e beam evaporator on NW35CF (2.75") flange with two fixed length holders and two linear motion holders for simultaneous co evaporation of up to four different materials from rods or crucibles. The highly stable digital power supply for the EBE 4 allows independent control of all four pockets.</p> <p>Specifications:</p> <ul style="list-style-type: none"> • Easy evaporation of (for example) W, Ta, Mo, C, Pt, 			

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Item	Part No.	Quantity	Unit Price	Net EUR
	<p>Cr, Ti, Fe from rods (2 4 mm diameter) and Ag, Au, Al, Ni from crucibles (0.07 cc)</p> <ul style="list-style-type: none"> • If used with rods 25 mm of rod feed available. • Integral water cooling with fully enclosed filaments: avoids filament to substrate line of sight effects and thermal radiation. • Rod or crucible replacement by withdrawing the individual holder. • Easy filament replacement without the need to disassemble the evaporator. 			
	<p>Consisting of:</p> <p>Electron Beam Evaporator EBE-4-2L2F</p>	1		
	<p>consisting of:</p> <ul style="list-style-type: none"> • Four pocket electron beam evaporator EBE 4 • Motorized shutter • 2 linear motion holders • 2 fixed length holders • Set of four flux electrodes 			
	<p>Specifications:</p> <ul style="list-style-type: none"> • UHV compatible • Standard in vacuum length: 231 mm • Diameter: 34 mm 			
	<p>Power Supply EBE-M for EBE-4</p>	1		
	<p>consisting of:</p> <ul style="list-style-type: none"> • Filament and HV supply • Flux controller (for programmed deposition) • Shutter motor controller • complete with 8 m cables for EBE 4 connection 			
	<p>Features :</p> <ul style="list-style-type: none"> • Filament, emission current and flux independently controllable for all pockets • Programmed codeposition of up to four materials • Stepper motor driven shutter • Optional ethernet remote control 			

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Specifications:

- Voltage: 0-2 kV
- Emission current: max 200 mA (combined for all pockets)
- Filament current: 0-10 A
- Filament voltage: 0-10 V (max. filament power: 100 W)
- Power: max. 400 W combined for all pockets
max. 300 W for one pocket
- 19" rack mount (4 HU)

40

RHEED package

1

The RHEED electron gun is fully UHV compatible including all features and options required to take advantage of this powerful analysis technique. Capable of being operated over a wide range of pressures, RHEED can be used in a variety of applications in which some require the near ambient pressure extension.

Please note: near ambient pressure extension and pumps not included.

Consisting of:

RHD-30 RHEED Gun

1

Electron gun for reflection high energy electron diffraction experiments with magnetic ex vacuo x,y deflectors and focussing unit

Specifications:

- Beam current: < 0.01 - 50 µA
- Focal length: 200 - 1000 mm
- Spot size: < 100 µm
- x,y deflection: +/- 15°
- Operating pressure: 1x10⁻¹¹ - 1x10⁻⁵ mbar
- Bake out up to 120°C (200°C with isolators removed)

Please note: additional power supply required.

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Item	Part No.	Quantity	Unit Price	Net EUR
	RHD - 30 Power Supply	1		
	<p>High stability power supply for RHEED electron gun primary energy, focussing optics and deflection</p> <p>Specifications:</p> <ul style="list-style-type: none"> • Electron energy: up to 28.4 keV • remote control included • complete with HV cables (8m) 			
	Phosphor Imaging screen set 8"	1		
	<p>Specifications:</p> <ul style="list-style-type: none"> • NW160CF flange size • Al - or ITO coating to be specified with ordering 			
	Imaging Screen Shutter 8"	1		
	<p>Specifications:</p> <ul style="list-style-type: none"> • for 8" imaging screen • to prevent material deposition on the imaging screen 			
41	<p>Safire Software Package</p> <p>Safire Software</p> <p>Diffraction image acquisition and processing software, SAFIRE combines a powerful user interface with the live display of a camera picture on the same screen. One-, two and three dimensional data can be acquired simultaneously and at different time intervals. The multitasking concept of SAFIRE allows to start or stop measurements independently while others are running, or to analyze data during the acquisition of themselves. Hard disk recorder allows live streaming to hard disk and replay for subsequent analysis.</p>	1		

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Runs on Windows XP and Windows 7

SAFIRE has the following features:

- Arbitrary number, shape and size of areas of interest
- Variable image acquisition rate
- On-chip integration for minimum noise at low signal levels
- Multi-tasking technology for independent parallel measurements
- Extensive triggering capabilities
- Pre-trigger for easy adjustment and recording of data before measurement starts
- Multiple repetitions of measurement stored in the same data set for easy comparison and parallel evaluation
- Continuously growing library of processing and fitting algorithms:

- Lattice constant determination
- FWHM of reflections as a function of time
- Fourier transforms in space and time
- Integration in space and time for reduction of dimensionality
- Slicer to extract data
- Kikuchi line analysis
- Full length and running average sine fit
- Azimuthal scan for planar cuts through reciprocal space

CCD camera

- digital, monochrome, 1/3" sensor, S/N-Ratio >50 dB,
- objective lens 12 mm, f 1.4, C-Mount,
- 659 x494 pixels
- Computer interface
- Complete with all necessary cables length 6m

Camera holder

- Special holder to mount a camera in front of the LEED
- screen
- Adapted to a flange NW 160 CF
- X-, Y-, Z- movement (manually adjustable)
- With light tight bellow
- 360° rotation around the optical axis of the camera

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Item	Part No.	Quantity	Unit Price	Net EUR
42	Transfer System Module for Sample Distribution	1		
	Consisting of:			
	Small Transfer Chamber for Sample Distribution	1		
	<ul style="list-style-type: none"> • small spherical stainless steel chamber, Ø 162mm • viewport for easy sample handling • with flanges for sample storage, connection to preparation and analysis chamber, vacuum pumping system, pressure measurement and reserve flanges 			
	FlexVac pumping configuration for FlexIntro Plus	1		
	for base pressure better than 2E-8 mbar, complete with power supplies / controllers and cables.			
	<ul style="list-style-type: none"> • Turbomolecular pump, type: Pfeiffer HiPace 300, pumping speed: 260 l/s (N₂), mounting flange DN100CF, automatic vent valve • Scroll Pump, type: Edwards nXDS10i 			
	UHV Full Range Pressure Measurement System	1		
	<ul style="list-style-type: none"> • Pfeiffer PKR 251 full range pressure combined Pirani and Penning gauge • pressure range: 5 E-9 mbar to 1 bar • Pfeiffer TPG 361 single display unit 			
	Accessory Kit	1		
	for systems with SH 2/12 sample handling			
	<ul style="list-style-type: none"> • includes set of standard sample holders • includes special sample loading tool 			

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Item	Part No.	Quantity	Unit Price	Net EUR
	UHV Gate Valve	1		
	<ul style="list-style-type: none"> • type: VAT, DN100CF, pneumatic 			
	UHV Gate Valve	1		
	type: VAT, DN40CF, manual			
	Sample Storage for FlexIntro Plus	1		
	vertical z-shift with rotary sample storage			
	<ul style="list-style-type: none"> • for 8 samples SH2/12 			
	Sample transfer (active)	1		
	<ul style="list-style-type: none"> • magnetically coupled linear transfer rod with port aligner • system adapted translation travel • 360° polar rotation • active transfer tool for SH 2/12 type sample plates 			
	System Mounting Frame	1		
	<ul style="list-style-type: none"> • rigid Aluminium profile system frame 			
	FlexBake bake out package	1		
	for single system module			
	<ul style="list-style-type: none"> • flexible insulating bakeout cover • rigid support framework • Fan heaters for bakeout • bakeout control unit with timer for max. bakeout time of 99 h 			

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Item	Part No.	Quantity	Unit Price	Net EUR
43	HPC 20 High Pressure Cell consisting of:	1		
	<ul style="list-style-type: none"> • Halogen lamp for sample heating • Heating Control Unit (HCU) including 1200W power supply • Pressure measurement type Pfeiffer PKR 251 • Gas panel 			
	Specifications:			
	<ul style="list-style-type: none"> • 20bar maximum operation pressure • Sample temperature up to 600°C for He and H2, up to 800°C for nitrogen and all other gases at pressures up to 20bar. • Bolt-on solution for UHV-surface analysis systems • Small reaction volume • Operation with reactive gases including oxygen and hydrogen • Chamber-in-chamber design • Water cooled inner chamber 			
44	FlexIntro - System Module for Sample Introduction	1		
	Consisting of:			
	Load Lock Chamber FlexIntro Plus	1		
	<ul style="list-style-type: none"> • small spherical stainless steel chamber, Ø 162mm • quick access door for sample introduction (DN63CF) • viewport for easy sample handling (DN63CF) • with flanges for sample storage, attachment to the glovebox, vacuum pumping system, pressure measurement and reserve flanges 			
	FlexVac pumping configuration for FlexIntro	1		
	for base pressure better than 5E-8 mbar, complete with power supplies / controllers and cables.			

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Item	Part No.	Quantity	Unit Price	Net EUR
	<ul style="list-style-type: none"> • Turbomolecular pump, type: Pfeiffer HiPace 80, pumping speed: 67 l/s (N2), mounting flange DN63CF, automatic vent valve • Scroll Pump, type: Edwards nXDS10i 			
	UHV Full Range Pressure Measurement System	1		
	<ul style="list-style-type: none"> • Pfeiffer PKR 251 full range pressure combined Pirani and Penning gauge • pressure range: 5 E-9 mbar to 1 bar • Pfeiffer TPG 361 single display unit 			
	Accessory Kit	1		
	for systems with SH 2/12 sample handling			
	<ul style="list-style-type: none"> • includes set of standard sample holders • includes special sample loading tool 			
	UHV Gate Valve	1		
	type: VAT, DN40CF, manual			
	Sample transfer (active)	1		
	<ul style="list-style-type: none"> • magnetically coupled linear transfer rod with port aligner • system adapted translation travel • 360° polar rotation • active transfer tool for SH 2/12 type sample plates 			

SPECS

Surface Nano Analysis GmbH
Voltastrasse 5
13355 Berlin / Germany
www.specs.com

T +49 30 46 78 24-0
F +49 30 46 42 0 83
E info@specs.com
St.-Nr. 30/539/31731

Geschäftsführer: Dr. Ferdinand Bartels
Amtsgericht Charlottenburg 93
HRB 21390
USt-IdNr. DE136564155

Deutsche Bank Berlin AG
BLZ 100700 00 | Konto 829 200 500
Swift Code DEUTDEBB
IBAN DE90 1007 0000 0829 2005 00

Item	Part No.	Quantity	Unit Price	Net EUR
45	<p>Labstar Glovebox</p> <ul style="list-style-type: none"> • manufacturer MBraun • material stainless steel • with gas cleaning system • controlled residual Oxygen and water concentration < 1ppm • pressure regulation +/-15mbar over- or underpressure • two gloves • size of working volume: ~ 1200 (width) x 780mm (depth) x 920mm (height) • including connection to SPECS system (Load Lock) 	1		
46	<p>Additional software package</p> <p>including automated sputter depth profiling, automated flood gun adjustment and automated sample height adjustment</p>	1		
47	<p>Installation</p> <ul style="list-style-type: none"> • including 2 travel days and travel and accommodation costs • installation requirements will be provided 	17		
48	<p>Shipping</p>	1		

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Item	Part No.	Quantity	Unit Price	Net EUR
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Optional item (not included in final price):

49	Service visit in days	1		optional
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- price per day of visit

Please note that travel and accommodation costs are not included and are charged separately.

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