



## NEW! Low Cost XPS System

Item	Qty.	Unit	Description
<b>1</b>	<b>1</b>	<b>SET</b>	<b>Load Lock</b>
1.1	1	set	<p><b>Vacuum Chamber</b> in UHV standard, made of SS316. It's equipped with connecting flanges in UHV standard different sizes.</p> <p>The following flanges are included.</p> <ul style="list-style-type: none"> <li>● One DN38CF for transfer arm;</li> <li>● One DN38CF for Ion Gauge;</li> <li>● One DN63CF for gate valve to connected to Analysis chamber;</li> <li>● One DN35CF for Viewport;</li> <li>● One DN63CF for Fast Entry Door;</li> <li>● One DN63CF for Turbo pump;</li> <li>● One DN100CF for Viewport;</li> </ul> <p>Base pressure below <math>5 \times 10^{-8}</math> mbar after complete bakeout at 150 degree Celsius.</p>
1.2	1	set	<b>Fast Entry Door, DN63CF, O-ring sealing with Viewport</b>
1.3	1	set	<p><b>Vacuum pumps for Load Lock including:</b></p> <ul style="list-style-type: none"> <li>● Pfeiffer HiPace80 turbo pump, DN63CF, 80L/s pumping speed;</li> <li>● Edwards RV5 pump with FL20K Oil Filter, 5 m<sup>3</sup>/h pumping speed;</li> <li>● Pumping line;</li> <li>● Safety valve and vent valve;</li> </ul>
1.4	1	set	<b>Agilent Wide Range Gauge</b> , vacuum measurement range: $5 \times 10^{-9}$ mbar ~ 1000 mbar.
1.5	1	set	<p><b>Sample Parking and Transfer Arm</b></p> <ul style="list-style-type: none"> <li>● DN40CF;</li> <li>● 600mm travel length;</li> <li>● DN40CF Port Aligner;</li> <li>● Sample Parking Position: 6;</li> </ul>
1.6	1	set	<b>VAT DN63CF UHV gate valve, Manual, with Position Indicator, between the analysis chamber and Load Lock chamber.</b>
1.7	1	set	<p><b>Accessories</b></p> <p>All Spare flanges will be covered by viewports and blanks.</p>
<b>2</b>	<b>1</b>	<b>Set</b>	<b>Analysis Chamber Assembly</b>
2.1	1	set	<b>Vacuum Chamber</b> in UHV standard, made of mu-metal. It's equipped with connecting flanges in UHV standard different sizes

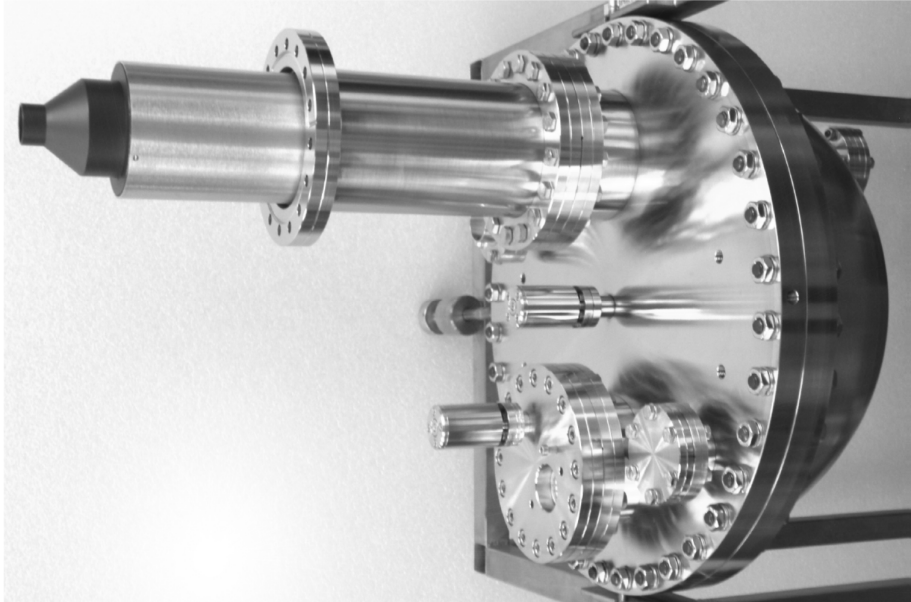


			<p>for connecting current and future equipment. Final design will be determined after the order.</p> <p>The following flanges are included.</p> <ul style="list-style-type: none"> <li>● One DN38CF for wobble stick;</li> <li>● One DN38CF for Ion Gauge;</li> <li>● One DN63CF to connected to sample transfer chamber;</li> <li>● One DN63CF for viewport;</li> <li>● One DN63CF for viewport;</li> <li>● One DN63CF for VUV Source;</li> <li>● One DN100CF for Turbo pump;</li> <li>● One DN63CF for manipulator;</li> <li>● One DN100CF for Analyzer;</li> </ul> <p>Residual Magnetic Field: &lt;20mGauss;</p> <p>Base pressure below <math>5 \times 10^{-10}</math> mbar after complete bakeout at 150 degree Celsius.</p>
2.2	1	set	<p><b>Vacuum pumps for Analysis Chamber including:</b></p> <ul style="list-style-type: none"> <li>● Pfeiffer HiPace300 turbo pump, DN100CF, 300L/s pumping speed;</li> <li>● Edwards RV5 pump with FL20K Oil Filter, 5 m<sup>3</sup>/h pumping speed;</li> <li>● Pumping line;</li> <li>● Safety valve and vent valve;</li> </ul>
2.3	1	set	<p><b>Agilent UHV-24P ion gauge</b>, including 25FT bakable cable, vacuum measurement range: <math>2 \times 10^{-11}</math> mbar ~ <math>1 \times 10^{-4}</math> mbar.</p>
2.4	1	set	<p><b>Agilent Pirani gauge, for the forevacuum between HiPace300 and RV5.</b></p>
2.5	1	set	<p><b>Agilent XGS-600 gauge controller, Max 6 channels for ion gauge and Pirani/Wide Range gauge.</b></p>
2.6	1	set	<p><b>Wobble stick for sample transfer</b></p> <ul style="list-style-type: none"> <li>● DN35CF;</li> <li>● Stroke: 180mm;</li> <li>● moving angle: <math>\pm 5^\circ</math> ;</li> <li>● Sample transfer head;</li> </ul>
2.7	1	set	<p><b>VAT DN16CF leak valve, Manual, for Ion Source</b></p> <ul style="list-style-type: none"> <li>● SS Gas line with VCR connectors;</li> <li>● Pumping line;</li> <li>● Gas Regulator;</li> </ul>
2.8	1	set	<p><b>Tilt-ble Linear Translator for X-ray Source</b></p>
2.9	1	set	<p><b>4-axis Manipulator for XPS</b></p>

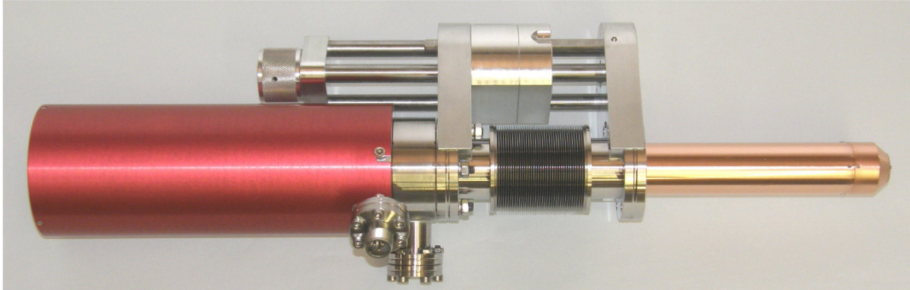


			<p><b>Sample stage for standard Flag-type Sample Holder.</b></p> <p><b>Sample Current Measurement with Current Meter to 200 nA, Sample Bias Option included.</b></p> <p><b>Angular motion range:</b></p> <ul style="list-style-type: none"> <li>● Polar rotation;</li> <li>● Range: <math>\pm 180^\circ</math></li> <li>● Resolution: <math>&lt; 0.1^\circ</math> motorized;</li> <li>● Backlash* <math>&lt; 0.1^\circ</math>;</li> </ul> <p><b>*: backlash after software correction.</b></p> <p><b>Translating motion range:</b></p> <p>X and Y movement</p> <ul style="list-style-type: none"> <li>● Range: <math>\pm 8</math>mm</li> <li>● Resolution: 0.05 mm, manual;</li> </ul> <p>Z Movement</p> <ul style="list-style-type: none"> <li>● Range: 100 mm;</li> <li>● Resolution: 0.01 mm, motorized;</li> </ul> <p><b>Motorization:</b> Stepping motors for z-movement and polar rotation with optical encoders, industrial power supply, and PC-compatible motion software.</p> <p><b>Mechanical specification:</b></p> <ul style="list-style-type: none"> <li>● Mounting flange DN 63 CF.</li> <li>● Max. Bakeout temperature (without stepping motors) <math>150^\circ</math>.</li> <li>● Weight: ca.30kg.</li> </ul>
2.10	1	set	<b>CCD camera for sample monitor.</b>
2.11	1	set	<b>Accessories</b>
			All Spare flanges will be covered by viewports (Lead Glass Covered) and blanks.
2.12	1	set	<b>Main Frame</b>
			Adjustable Aluminum Alloy steel frames for System, large wheel for easy relocation.
2.13	1	set	<b>19" Cabinet for all electronics units</b>
2.14	1	set	<b>Control System</b>
			<ul style="list-style-type: none"> <li>● Integration of vacuum pumps control, vacuum protection, bakeout protection et al;</li> <li>● User-friendly interface, easy to use and maintain;</li> <li>● Manipulator Control;</li> <li>● CCD Monitor;</li> </ul>
2.15	1	set	<b>Bakeout set</b>

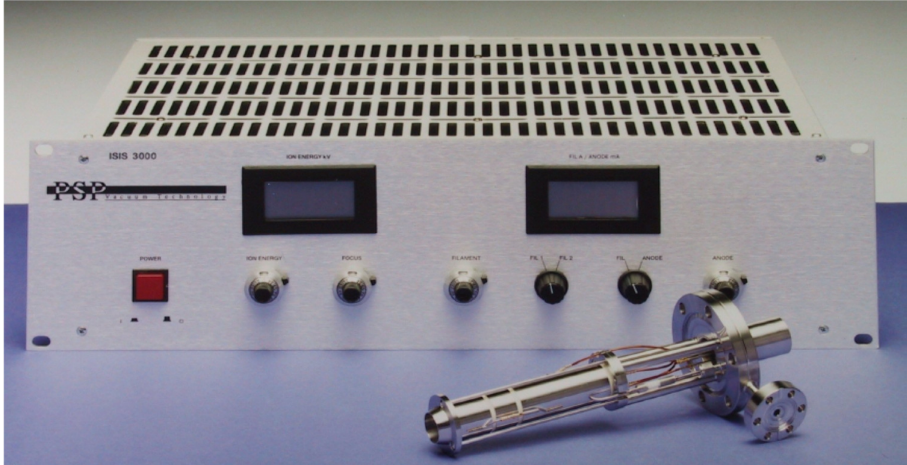


			Time and Temperature control for system bake out, tent design for quick setup and remove.
2.16	10	pcs	<b>Flag-type sample holder, Copper, Gold Coated</b>
2.17	1	set	<b>Consumable Package (Gasket, Plate Nuts and Screws in metric)</b>
<b>3</b>	<b>1</b>	<b>Set</b>	<p><b>Electron Energy Analyzer</b></p>  <p>RESOLVE 120 MCD 5 hemispherical analyzer.</p> <ul style="list-style-type: none"> <li>● 120mm mean radius hemispherical electron energy analyzer;</li> <li>● Multi-element input lens;</li> <li>● Multi-channel detection MCD, 5 x CEM;</li> <li>● Multi-position input slit (1, 2.5, 5mm dia, 1 x 10, 2.5 x 10, 5 x 10mm slits);</li> <li>● Adjustable exit slit 5 x (5 x 10mm), 5 x (1 x 10mm);</li> <li>● Mu-metal shielded;</li> <li>● RESOLVE Control unit 0 to 2000eV kinetic energy;</li> <li>● Pass energies: 1, 2, 5, 10, 20, 50, 100eV in CPE mode (constant pass energy);</li> <li>● Retard Ratios: 2, 5, 10, 20, 50, 100 in CRR mode (constant retard ratio).</li> </ul> <p>SPECTRA v8 data system for PC, includes COLLECT data acquisition software, PRESENTS data post processing software and SPCI721F pci interface card.            PC is not included. Requires PC with Windows 7 32 bit Home Premium or Windows 10 32 bit with vacant full size pci slot (not PCI express).</p>



			<p>Model #705 pre-amplifier/discriminator with 5 x TTL output. All cables.</p> <p>Using Mg k-alpha radiation at 300W (or pro rata) on clean Ag sample (Ag 3d 5/2).</p> <p>The performance will meet or exceed a curve defined by the following values for large area mode using the largest entrance and exit slits.</p> <table border="1"> <thead> <tr> <th>Energy resolution FWHM (eV)</th> <th>Count rate cps</th> </tr> </thead> <tbody> <tr> <td>0.80</td> <td>70,000</td> </tr> <tr> <td>0.85</td> <td>335,000</td> </tr> <tr> <td>1.00</td> <td>1,250,000</td> </tr> </tbody> </table>	Energy resolution FWHM (eV)	Count rate cps	0.80	70,000	0.85	335,000	1.00	1,250,000
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4	1	SET	<p><b>CTX400 twin anode x-ray source (Mg/Al).</b></p>  <ul style="list-style-type: none"> <li>● Twin Anode X-ray Source ( updated compact version );</li> <li>● Choice of Anode Materials;</li> <li>● May be differentially pumped or pumped directly through the mounting port;</li> <li>● 70mm O.D. CF mounting flange;</li> <li>● PZ100 Retractor option gives 100mm retraction from sample region;</li> <li>● Insertion length made to suit your chamber at no extra cost;</li> <li>● Long life Ytria coated Tungsten twin filaments;</li> <li>● Quick and reliable connections to filament, anode and water cooling;</li> <li>● Water, safety cover and pressure interlocks;</li> <li>● Aluminium foil window between source and sample;</li> <li>● Source end shaped to allow close approach to sample for optimum flux;</li> <li>● Rugged, high stability electronic control units.</li> </ul>								
5	1	SET	<p><b>Sample Cleaning Ion Source</b></p>								



			 <ul style="list-style-type: none"> <li>● A UHV compatible, high beam current, variable energy ion source for cleaning of sample surfaces under UHV;</li> <li>● Variable energy 100 – 3000eV suitable for all types of sample;</li> <li>● Lower beam energies are used to minimize damage to delicate sample surfaces such as single crystals;</li> <li>● Higher beam energies are used for rapid etching of oxides and semiconductor;</li> <li>● High beam currents available even at low energy;</li> <li>● Used with any inert gas, which is leaked directly into the discharge chamber, no differential pumping required;</li> <li>● Broad 10mm spot, no raster unit required to clean large area;</li> <li>● Long working distance to avoid conflict with other instrumentation;</li> <li>● Cost effective solution for sample cleaning under UHV.</li> </ul>
<p><b>6</b></p>	<p><b>1</b></p>	<p><b>SET</b></p>	<p><b>Installation / Training / Warranty</b></p> <p>Installation performed by the FERMION Instruments engineer team will follow successful completion of the site survey confirming that the requirements of the Site Preparation Guide are met and will comprise the following:</p> <ul style="list-style-type: none"> <li>• Assembly of the instrument to the layout detailed in the current specification documents.</li> <li>• System start-up and basic functionality testing.</li> <li>• Operation and performance testing.</li> <li>• Performance and documentation of agreed specifications.</li> <li>• Training in the operation of the system.</li> </ul>





### 3. Site Preparation Guide

<p><b>LABORATORY SPACE REQUIREMENTS</b></p>	<p>The general system drawing is shown in Part-1, and the layout will be present after the order confirmation. Space is required for access around the system so the minimum working space will be also shown. If any options or specials are chosen the factory should be contacted for updated dimensions. It is suggested that at least 1 metre be left between the analytical modules and the room walls or other fixed objects. This will provide adequate access for maintenance and general cleaning. Similarly the Electronics Rack should be positioned with enough space in front and behind to open doors to gain easy access during servicing.</p> <p>The laboratory height required to allow for maintenance of the Vacuum System is 3.5 m.</p>						
<p><b>ACCESS DIMENSIONS</b></p>	<p>To ensure that the system can be moved into the laboratory easily the overall dimensions and minimum door width required for the instrument is quoted below. In addition to the laboratory door, any door or other restriction between the customer's delivery point and the instrument's chosen site should be considered. As corners in corridors can be a problem instruments lengths are also quoted.</p> <table border="1" data-bbox="626 999 1481 1367"> <tr> <td data-bbox="626 999 805 1121">Vacuum System dimensions</td> <td data-bbox="805 999 1481 1121">Width 150 cm × length 150 cm × height 160 cm (approx.)</td> </tr> <tr> <td data-bbox="626 1121 805 1243">Electronics Rack dimensions</td> <td data-bbox="805 1121 1481 1243">Width 60 cm × length 80 cm × height 160 cm</td> </tr> <tr> <td data-bbox="626 1243 805 1367">Minimum door width required</td> <td data-bbox="805 1243 1481 1367">150 cm</td> </tr> </table>	Vacuum System dimensions	Width 150 cm × length 150 cm × height 160 cm (approx.)	Electronics Rack dimensions	Width 60 cm × length 80 cm × height 160 cm	Minimum door width required	150 cm
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<p><b>WEIGHT DISTRIBUTION</b></p>	<p>Once in place the weight is distributed over four 5 cm diameter feet at the Vacuum System corners. For movement castors are fitted to each of the Vacuum System corners.</p> <p>The instrument's weight also means that steps, even small ones, are to be avoided if possible. Poorly secured carpets can hinder movement of the instrument, sheet steel (of greater than 2 mm thickness) laid on a carpet can be used to overcome the problem (not supplied by FERMION Instruments).</p>						
<p><b>BUILDING FLOOR LOADS</b></p>	<p>The heaviest component of the instrument is the Vacuum System. The laboratory floor upon which the system rests should be able to support the system that has the following approximate weights.</p> <table data-bbox="626 1822 1045 1877"> <tr> <td>XPS Vacuum System</td> <td>500 kg</td> </tr> <tr> <td>Electronics Rack</td> <td>100 kg</td> </tr> </table>	XPS Vacuum System	500 kg	Electronics Rack	100 kg		
XPS Vacuum System	500 kg						
Electronics Rack	100 kg						



<b>ENVIRONMENTAL REQUIREMENTS</b>	<p><b>1. TEMPERATURE</b> For normal operation the temperature should be <math>20 \pm 5^{\circ}\text{C}</math> with a stability of <math>\pm 1^{\circ}\text{C}</math>.</p> <p>Under normal operating conditions the instrument has a heat dissipation of approximately 4 kW. During bake-out the heat dissipation is approximately 9 kW for the basic system.</p> <p><b>2. HUMIDITY</b> Humidity has an effect on the instruments ultimate performance and long-term stability. A relative humidity of less than 65 % is required during normal operation to avoid condensation.</p> <p><b>3. STRAY MAGNETIC AND ELECTRIC FIELDS</b> The room environment should be free of magnetic and electric fields. Such fields may be generated by power cables, transformers, electric motors, etc., and can limit the ultimate performance of the instrument.</p>
<b>UTILITY REQUIREMENTS</b>	<p><b>1. HEALTH AND SAFETY</b> Electrical supply to the instrument and all other local services must be installed and connected in accordance with local Health and Safety regulations by a suitably qualified engineer.</p> <p><b>2. INSTRUMENT ELECTRICAL SUPPLY</b> A supply fused isolation switch should be provided by the customer to isolate the instrument. It shall have connections to Live, Neutral and Protective Earth or Live, Live and Protective Earth. It shall also have provision to take a 0.75 " cable gland and have facilities to allow locking and tagging out if required by local regulations.</p> <p><b>3. CHILLIER ELECTRICAL SUPPLY</b> If there is a requirement for a water chiller additional standard electrical outlets should be provided by the instrument user. Additional electrical outlets may also be required for service tools and instruments.</p> <p><b>4. SYSTEM EARTH</b> A separate Earth provision, e.g. a copper stake in the ground, independent of building Earth is recommended.</p> <p><b>5. WATER SUPPLY REQUIREMENTS</b> Clean, filtered (200 <math>\mu\text{m}</math> coarse filter recommended) water is required for cooling the QCM and the Evaporators. The electrical conductivity of the cooling water should be less than 0.01 Siemens/Metre. The supply should be 6 litres/minute at 80 psi</p>





	<p>(5.5 bar) dynamic pressure and at an inlet temperature of 15 to 20 °C at the instrument.</p> <p><b>6. DRY NITROGEN</b>          Dry nitrogen is recommended for backfill of the fast entry chamber and for venting the instrument. If a large cylinder is used, a safe mounting to the wall is required. A regulator supplying Nitrogen/Oxygen at 0.3 kg/cm<sup>2</sup> (~5 psi) is necessary and must be supplied by the customer. The inlet is a plain 1/4" stainless steel tube (hose not provided).          Purity of Nitrogen supplied should be 99.998% or better with a dryness of &lt;8ppm H<sub>2</sub>O          Flow rate at specified pressure should be 12 – 16 l/min.</p> <p><b>7. COMPRESSED AIR</b>          Clean and dry compressed air is used to operate the pneumatic valves and shutters on the system at a pressure of 5-6kg/cm<sup>2</sup> (70-90 psi). Inlet accepts a 6 mm (OD) diameter nylon tube (push-fit) supplied by FERMION Instruments.</p> <p><b>8. ROTARY PUMP EXHAUST</b>          When pumping from atmospheric pressure, the rotary pump can displace 10 m<sup>3</sup>/h (2.78 L/s). Any exhaust ducting must accommodate this flow rate without the pressure at the pump outlet rising above 1.0 bar. We strongly recommend that this exhaust should be vented externally.</p>
<p><b>OTHER CONSIDERATIONS</b></p>	<p><b>SITE SURVEY</b></p> <p>A survey must be carried out by the customer confirming site compliance to the above specifications and a report should be submitted to the Systems Cell Leader at FERMION Instruments at least one month before delivery is due. To help with this a Site Preparation Questionnaire will be provided in advance of shipment.</p>

**4. System Acceptance Criteria**

<p><b>Specification Check</b></p>	<p>Check and confirm the vacuum layout of system complies with the system drawings.</p>
<p><b>Vacuum System</b></p>	<ol style="list-style-type: none"> <li>1. Analysis chamber: below 5x10<sup>-10</sup> mbar (after 72 hours bakeout).</li> <li>2. Load Lock chamber: below 5x10<sup>-8</sup> mbar (after 48 hours bakeout)</li> </ol>
<p><b>Electronic instruments</b></p>	<ol style="list-style-type: none"> <li>1. Gauge controller (Ion gauge and Pirani gauge).</li> <li>2. Pump control units (Turbo pump and forevacuum pump).</li> <li>3. Vacuum safety interlocks.</li> <li>4. Bake out heaters and power supply.</li> </ol>
<p><b>Manipulators</b></p>	<ol style="list-style-type: none"> <li>1. Check and confirm the sample transfer to the manipulator.</li> <li>2. Check and confirm the operation and stability of manipulator.</li> </ol>