From Eye to Insight

ORDER LIST
EM ACE600

Version 06/19

EM ACE600 – High Vacuum Coaters
230 V / 50 – 60 Hz; 115 V / 60 Hz
Basic unit consisting of:

The instrument is pre-configured
(Defined when ordered, assembled in factory, no later change possible except for single sputter and single carbon thread coater. They can be upgrade to a sputter and carbon thread instrument by a service field technician. See service upgrade packages.)

The options are:

EM ACE600 Options include:

- **Sputter coater**

- **Carbon Thread coater**

- **Carbon Rod coater**

- **e⁻ - beam coater**

- **Double Sputter coater**

- **Sputter and Carbon Thread coater**

- **Sputter and Carbon Rod coater**

- **Sputter and e⁻ - beam coater**

- **Double e⁻ - beam coater**

- **Optional: Glow Discharge**
  For details see below

		The basic unit is pre-configured as one of the following options (Defined when ordered, assembled in factory, no later change possible except for single sputter and single carbon thread coater)

		Sputter coater

	16771525	- Basic unit consisting of:
		  • Metal vacuum chamber 200 mm 150 mm 195 mm
		  • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump
		  • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals
		  • Automated stage rotation at room temperature
		  • LED vacuum chamber light
		  • Internal metal vacuum chamber shield, easily removable for cleaning
		  • Removable door with large exchangeable safety glass window
		  • Integrated power supply for sputtering, continuously adjustable up to 150mA
		  • Mains cable
		  • USB port for log file download, USB stick
		  • Two blind flanges for cryo upgrade option
		
		- Planar magnetron sputter head
		  • Easy target exchange system. No tools or screws required
		
		- Automated target shutter, easily removable
		- Integrated touch screen for automated process programming and saving of log files
		- Triple safety system (door, cover and software sensors)
		- Operating manual

		Carbon thread coater
	16771530	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supply for carbon thread evaporation • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - Carbon thread head • Easy target exchange system. No tools or screws required • Torx wrench for loading carbon thread • Brush for cleaning thread remains from head • 25m carbon thread spool - Automated target shutter, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

		Carbon rod coater
	16771531	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals. • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supply for carbon rod evaporation • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - Carbon rod head • Easy target exchange system. No tools or screws required • 4 Copper clamps for to perform carbon evaporation • Allen key for loading carbon rod • 6 carbon rods for evaporation - Automated target shutter, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

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		e⁻ - beam coater
	16771521	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supply for e⁻ - beam evaporation • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - e⁻ - beam head • Easy target exchange system. • Easy reloading of carbon rod • 10 tungsten cathodes, 6 carbon rods, 10 carbon rods for platinum evaporation, 10 platinum inserts - Automated target shutter, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

		Double sputter coater
	16771527	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supply for sputtering (continuously adjustable up to 150mA) • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - Two planar magnetron sputter heads • Easy target exchange system. No tools or screws required - Two automated target shutters, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

		Sputter and carbon thread coater
	16771526	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supplies for sputtering (continuously adjustable up to 150mA) and carbon thread evaporation • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - Planar magnetron sputter head and carbon thread head • Easy target exchange system. No tools or screws required • Torx wrench for loading carbon thread • Brush for cleaning thread remains from head • 25m carbon thread spool - Two automated target shutters, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

		Sputter and carbon rod coater
	16771528	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supplies for sputtering (continuously adjustable up to 150mA) and carbon rod evaporation • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - Planar magnetron sputter head and carbon rod head • Easy target exchange system. No tools or screws required • 4 Copper clamps for to perform carbon evaporation • Allen key for loading carbon rod • 6 carbon rods for evaporation - Two automated target shutters, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

		Sputter and e⁻ - beam coater
	16771520	- Basic unit consisting of: - Metal vacuum chamber 200 mm 150 mm 195 mm - Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump - Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals - Automated stage rotation room temperature - LED vacuum chamber light - Internal metal vacuum chamber shield, easily removable for cleaning - Removable door with large exchangeable safety glass window - Integrated power supplies for sputtering (continuously adjustable up to 150mA) and e⁻ - beam evaporation - Mains cable - USB port for log file download, USB stick - Two blind flanges for cryo upgrade option - Planar magnetron sputter head and e⁻ - beam head - Easy target exchange system. - Easy reloading of target material 10 tungsten cathodes, 6 carbon rods, 10 carbon rods for platinum evaporation, 10 platinum inserts - Two automated target shutters, easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

		Double e⁻ - beam coater
	16771522	- Basic unit consisting of: • Metal vacuum chamber 200 mm 150 mm 195 mm • Integrated oil free pumping system with turbo pump and membrane (diaphragm) pump • Integrated film thickness monitor (QSG-quartz crystal measurement) 0.1 nm accuracy. Includes 10 crystals • Automated stage rotation room temperature • LED vacuum chamber light • Internal metal vacuum chamber shield, easily removable for cleaning • Removable door with large exchangeable safety glass window • Integrated power supply for e⁻ - beam evaporation • Mains cable • USB port for log file download, USB stick • Two blind flanges for cryo upgrade option - Two e- - beam heads • Easy target exchange system. • Easy reloading of target material • 20 tungsten cathodes, 12 carbon rods, 20 carbon rods for platinum evaporation, 20 platinum inserts - Two automated target shutters easily removable - Integrated touch screen for automated process programming and saving of log files - Triple safety system (door, cover and software sensors) - Operating manual

Glow discharge option for EM ACE600
No later upgrade is possible

<table>
<tr>
<td></td>
<td>16771534</td>
<td>Glow discharge unit for an EM ACE600 coater including a sputtering process (Nr: 16771525, 16771526, 16771527, 16771528, 16771520)
- Integrated power supply adaptation for glow discharge
- Large area glow discharge electrode
- Operating software

This is an <u>optional</u> outfit for a coating unit including a sputtering process.</td>
</tr>
<tr>
<td></td>
<td>16771535</td>
<td>Glow discharge unit for an EM ACE600 coater <u>without</u> a sputtering process (Nr: 771530, 771531, 771521, 771522)
- Integrated power supply for glow discharge
- Large area glow discharge electrode
- Operating software

This is an <u>optional</u> outfit for a coating unit <u>not</u> including a sputtering process.</td>
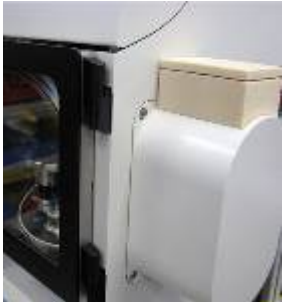</tr>
</table>

The basic unit <u>must be</u> configured with at least one of the following stages: Motorized, Manual and/or Cryo-Stage.

<table>
<tr>
<td></td>
<td>16771537</td>
<td>Motorized stage
- 3 axis (rotation, height, tilt) motorized stage with touch screen interface
- 104mm table holds 25 standard SEM specimen mounts with Ø3.2mm pin

Hint: This stage is recommended for best utilization of ACE600 features. It can be easily exchanged with a manual or cryo stage.</td>
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<tr>
<td></td>
<td>16771536</td>
<td>Rotating (manual) stage
- 1 axis (rotation) motorized stage with manual height and tilt adjustment
- Scale for optimal table height adjustment
- 104mm table holds 25 standard SEM specimen mounts with Ø3.2mm pin

Hint: This stage can be easily exchanged with a motorized or cryo stage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cryo stage → Please choose from the cryo configurations.</td>
</tr>
</table>

EM ACE600 Load lock configurations
If not at point of order, installation by service technician (charges are not included)

	16771517	**Load lock** - VCT500-dock - Load lock manipulator - Spare tip for load lock manipulator - VCT-holder receiving table (4 pieces) - Control unit integrated into EM ACE600 - Metal internal shielding for cryo outfit - Print for load lock operation - Automated stage alignment for VCT-holder transfer - Pumping of load lock integrated into EM ACE600 For this outfit the coater has to be equipped with a motorized stage. **Note:** For a **field upgrade** the upgrade kit **16771513** has to be ordered. **Note:** For an **e-beam coater <u>in addition</u>** the adapter set **16771516** has to be ordered. **Note:** Specimen holders are necessary for transferring the samples into the coater.
	16771515	**Load lock for coater with Meissner trap (16771599)** - VCT500-dock - Load lock manipulator - Spare tip for load lock manipulator - VCT-holder receiving table (4 pieces) - Control unit integrated into EM ACE600 - Automated stage alignment for VCT-holder transfer - Pumping of load lock integrated into EM ACE600 For this outfit the coater has to be equipped with a motorized stage. **Note**: For a **field upgrade** the upgrade kit **16771513** has to be ordered. **Note:** For an **e-beam coater <u>in addition</u>** the adapter set **16771516** has to be ordered. **Note**: Specimen holders are necessary for transferring the samples into the coater.
	16771523	**Load lock manipulator** - Load lock manipulator - Spare tip for load lock manipulator To use the load lock manipulator the coater has to be equipped with a VCT500 dock.

	16771513 (for coaters delivered before November 2018)	**Field upgrade kit** For a field upgrade with an EM ACE600 load lock or cryo configuration the field upgrade kit is needed. Please order 16771513 together with 16771596, 16771597, 16771598, 16771599, 16771515 or 16771517.
	16771516 (for coaters delivered before November 2018)	**E-beam adapter set** For the e-beam coater field upgrade a connector is needed for all load lock or cryo configurations. Please order 16771516 together with 16771596, 16771597, 16771598, 16771599, 16771515 and 16771517.

EM ACE600 Cryo configuration
If not at point of order, installation by service technician (charges are not included)

	16771599	**Meissner trap (cryo pump)** Cryo pump for higher vacuum - Dewar (0.75l) with bake out function - Metal internal shielding for cryo outfit **Note**: For a **field upgrade** the upgrade kit **16771513** has to be ordered. **Note:** For an **e-beam coater** <u>in addition</u> the adapter set **16771516** has to be ordered. For this outfit the coater has to be equipped with a motorized or manual stage.
	16771598	**Meissner trap VCT500 (cryo pump with VCT transfer)** Cryo pump with vacuum transfer dock for higher vacuum and protected sample and target. - VCT-holder receiving table (4 pieces) - VCT500-dock - Control unit integrated into EM ACE600 - Dewar (0.75l) with bake out function - Metal internal shielding for cryo outfit - Automated stage alignment for VCT transfer - Pumping of VCT integrated into EM ACE600 For this outfit the coater has to be equipped with a motorized stage. **Note**: For a **field upgrade** the upgrade kit **16771513** has to be ordered. **Note:** For an **e-beam coater** <u>in addition</u> the adapter set **16771516** has to be ordered. Note: An EM VCT500 shuttle and a specimen holder are necessary for transferring the sample.

	16771596	**Basic cryo-set** LN$_2$ cooled sample stage with vacuum cryo transfer dock (VCT500). - Cryo-table for VCT-holder - Lever to fracture sample in double replica holder - VCT500-dock - Control unit integrated into EM ACE600 - Dewar (0.75l) with bake out function - Cooling bands - Metal internal shielding for cryo outfit - Automated stage alignment for VCT transfer - Pumping of VCT integrated into EM ACE600 **Note**: For a **field upgrade** the upgrade kit **16771513** has to be ordered. **Note:** For an **e-beam coater <u>in addition</u>** the adapter set **16771516** has to be ordered. **Hint:** Once the cryo outfit is installed it can be exchanged with a motorized or manual stage. The fracturing tool 16771540 can also be used by exchanging the door.
	16771597	**Freeze fracture cryo-set** LN$_2$ cooled sample stage with vacuum cryo transfer dock (VCT500) and tungsten knife for freeze fracture. - Cryo-table for VCT-holder - LN$_2$ cooled microtome fracturing knife - Lever to fracture sample in double replica holder - VCT500-dock - Control unit integrated into EM ACE600 - Dewar (0.75l) with bake out function - Cooling bands - Back light between knife and sample - Magnifying glass - Metal internal shielding for cryo outfit - Automated stage alignment for VCT transfer - Pumping of VCT integrated into EM ACE600 **Note**: For a **field upgrade** the upgrade kit **16771513** has to be ordered. **Note:** For an **e-beam coater <u>in addition</u>** the adapter set **16771516** has to be ordered. **Hint:** Once the Cryo outfit is installed it can be exchanged with a standard or motorized table. The fracturing tool 16771540 can also be used by exchanging the door.

	16771513 (for coaters delivered before November 2018)	**Field upgrade kit** For a field upgrade with an EM ACE600 load lock or cryo configuration the field upgrade kit is needed. Please order 16771513 together with 16771596, 16771597, 16771598, 16771599, 16771515 or 16771517.
	16771516 (for coaters delivered before November 2018)	**E-beam adapter set** For the e-beam coater field upgrade a connector is needed for all load lock or cryo configurations. Please order 16771516 together with 16771596, 16771597, 16771598, 16771599, 16771515 and 16771517.
	16771540	**Basic Fracturing Tool** Exchangeable door with fracturing mechanism - Fracturing/ poking scalpel on door - Cooling bands - Cooled resting position for fracturing/poking tool - Magnifying glass A basic cryo-set or freeze fracture cryo-set is required to use this tool.
	16771643	**Adapter plate for VCT100 shuttle** - Allows to use the VCT100 shuttle to connect to the ACE600 **Note**: Pre-requirement is an installed VCT500 set.
		For the **EM VCT500 transfer shuttle**, please refer to and order from the EM VCT500 order list. **Note**: Shuttle is included in SEM-Set adaptations.

Accessories – EM ACE600

	16771518	**Spare e-beam source for EM ACE600** **Note:** The instrument has to be already configured with at least one e-beam source.
	16771541	**Planetary drive stage for EM ACE600** For uniform coatings of highly fissured specimen surfaces. - 6 planets with pin holes (ø 3,2mm) capable of holding a variety of SEM Stubs (4 standard stubs each) - Simple exchange, no mounting required - Fully integrated For this stage the coater has to be equipped with a motorized or manual stage.
	16771548	**Stage for SEM stubs for EM ACE600** Exchangeable stage holding 25 SEM stubs. Easy exchange, no mounting necessary. **Hint:** this is the standard table and included with any room temperature stage For this stage the coater has to be equipped with a motorized or manual stage.
	16771547	**Stage for glass slides for EM ACE600** Exchangeable stage with recess to hold 2 glass slides (76x 26 mm). Easy exchange, no mounting necessary. For this stage the coater has to be equipped with a motorized or manual stage.
	16771514	**Stage for 4 VCT holders** Exchangeable stage to receive up to 4 VCT holder. Easy exchange, no mounting necessary. This stage is included in the outfits 16771517, 16771515 and 16771598. For this stage the coater has to be equipped with a motorized or manual stage.

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	16771553	**Grid stage** Exchangeable stage to clamp up to 15 Ø 3mm grids. - 60mm diameter - eccentric QSG holder For this stage the coater has to be equipped with a motorized or manual stage. **Note**: Quarz holder is only suitable for e-beam evaporation, for other processes please use 16771546.
	16771552	**LARS stage (low angle rotary shadowing)** Exchangeable stage ideal for low angle rotary shadowing with electron beam evaporation. - 60mm diameter - eccentric QSG holder For this stage the coater has to be equipped with a motorized or manual stage. **Note**: Quarz holder is only suitable for e-beam evaporation, for other processes please use 16771546.
	16771546	**EM ACE600 QSG holder on the side** QSG holder for eccentric position of the QSG for larger samples Not suitable for e-beam evaporation, for e-beam please refer to 16771553 or 16771552.
	16771511120	**Blind flange for source** This flange gives the option to close the coating chamber with a flange instead of a coating source. Systems with only one coating head includes a blind flange on the other port.
	16771551	**Holding clips** Two clips fitting into the wholes of the table for SEM stubs (16771548 or 16771552) to fix a sample to the stage while coating under high angles.

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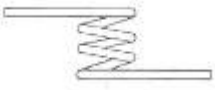
Wear Parts – EM ACE600
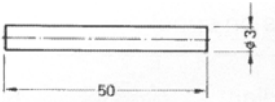
	16771544	**Chamber shield for EM ACE 600** Spare internal chamber shielding.
	16771545	**Chamber shield for EM ACE 600 cryo** Spare internal chamber shielding for a configuration with a cryo table (wholes on the side).
	16771511361	**Shutter** Spare shutter group (including shutter, spring connection, screw).
	16771531256	**Glass for chamber door** Spare glass for door to quickly exchange.
	16771543	**Glass shielding for light** Round glass slides ø 20 mm to protect the LED vacuum chamber light in vacuum chamber. Pack of 100.
	16771554	**Ceramic plate for carbon thread source** Two isolating ceramic plates for the carbon thread source. Loosely mounted to prevent short circuits. Spare part for cleaning or replacing.
	16771531670	**Hard metal knife** For cutting frozen specimens. Angle of the blade 45°, sharp cutting edge! Dimensions: 18mm x 10mm, 2mm thick. Wear part for replacing the original knife.

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	16771593	**Pins for glow discharge** A set of four PPK pins and screws. To be exchanged when highly coated with metal and so creating a short circuit while glow discharge.
	16771579	**Spacers for e-beam source** A set of spacers for the e-beam source. Two made of ceramic, three made of metal. 5 pieces

Consumables – EM ACE600

	16771511205	**Cleaning product for vacuum coaters** Includes one package of Multipolish (60ml) and 2 bottles of Cleaning fluid (500ml each) Regular cleaning maintains good vacuum fast.
	16771531889	**Quartz crystals, 6 MHz** Quartz crystals for the QSG film thickness measurement, Pack of 10

Foil Targets for sputtering devices, ø 54 mm

	16771565	Foil Target Au DN 54 mm x 0.17 mm, 99.99%, 19.32 g/cm3
	16771569	Foil Target Au/Pd (80/20) DN 54 x 0.17 mm, 99.99%, 17.9 g/cm3
	16771560	Foil Target Ir DN 54 x 0.3 mm, 99.99%, 22.56 g/cm3
	16771567	Foil Target Pt DN 54 x 0.17 mm, 99.99%, 21.45 g/cm3
	16771558	Foil Target Cu DN 54 x 0.2 mm, 99.90%, 8.92 g/cm3
	16771566	Foil Target Cr, DN 54 x 1 mm, 99.96%, 7.2 g/cm3
	16771568	Foil Target Ni DN 54 x 0.3 mm, 99.98%, 78.9 g/cm3

	16771561	Foil Target Ti DN 54 x 0.5 mm, 99.98%, 4.5 g/cm3
	16771562	Foil Target W DN 54 x 0.1 mm, 99.8%, 19.3 g/cm3
	16771564	Foil Target Ag, DN 54 0.2 mm, 99.99%, 10.5 g/cm3
	16771559	Foil Target Al DN 54 x 0.8 mm, 2.7 g/cm3
	16771555	Foil Target Pt/Pd (80/20), DN 54 mm x 0.17 mm, 19.6 g/cm3
	16771511115	**Carbon thread** Spool of carbon thread to produce carbon coatings with pulse or flash evaporation. Length: 3.5 m
	16771511116	**Carbon thread** Spool of carbon thread to produce carbon coatings with pulse or flash evaporation. Length: 25.0 m
	16771791	**Consumables for carbon evaporation** For approx. 1-year operation Consisting of: - 5 pack à 6 pieces of carbon rods Ø 3 x 50 mm - 10 pack à 5 pieces of tungsten-cathodes
	16771793	**Consumables for platinum / carbon evaporation** For approx. 1-year operation Consisting of: - 3 pack à 10 pieces of carbon rod Ø 2 x 20 mm both sides drilled for platinum insert - 6 pack à 10 pieces of platinum insert Ø 1.5 x 2 mm - 10 pack à 5 pieces of tungsten cathodes
	16771796	**Spectrographically pure carbon rod** To produce Carbon/Platinum mix coatings. Both sides drilled for platinum inserts. Dimensions: Ø 2 x 20 mm. Pack of 10
	16771798	**Platinum insert** For Carbon/Platinum mix coatings. Dimensions: Ø 1.5 x 2 mm. Pack of 10
	16771799	**Tungsten cathode** Suitable for evaporation sources. Pack of 5

	16771797	**Spectrographically pure carbon rod** To produce carbon backing films. Dimensions: Ø 3 x 50 mm. Pack of 6

Service upgrade packages

		Adds to the ACE600 Single Carbon Thread Coater (16771530) sputter coating. The package includes all necessary material, the work of a service technician on site and a basic introduction to the new application. Please get into contact with the BU for the Service upgrade number.
		Adds to the ACE600 Single Sputter Coater (16771525) carbon thread evaporation. The package includes all necessary material, the work of a service technician on site and a basic introduction to the new application. Please get into contact with the BU for the Service upgrade number.