



## Vacuum Equipment - Coatings - Optics

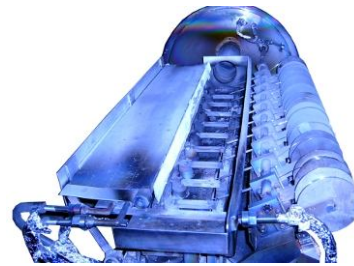
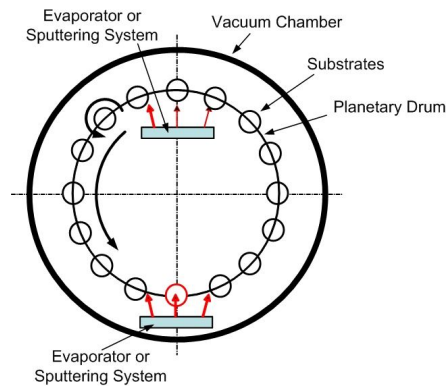
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### VU1600 Series Coating Machines



**VU1600MA, -ME, and -MS** coating machines are intended for industrial Al and other metals metallizing. Linear resistive evaporators, arc evaporators, or DC magnetron sputtering systems may be installed for Al deposition onto substrates loaded on horizontal drum (single or planetary rotation). Linear anodic layer ion source is used for substrate pre-cleaning. Other materials and their compounds also may be deposited.

Resistive or arc evaporators, or sputtering magnetrons are installed inside and outside the drum providing fast and uniform coating of parts with complicated surface.



Linear resistive evaporator

Each linear resistive evaporator consists of 10-13 separately powered evaporation cells with the common shutter. Each cell has its own feeder – Al wire coil.

**VU1600MA, -ME, and -MS** are fully automated computer controlled machine.

Compare different Al metallization methods below:

	<b>Resistive evaporation</b>	<b>Arc evaporation</b>	<b>Magnetron sputtering</b>
<b>Al deposition rate</b>	Maximal, tens $\mu\text{m}/\text{hour}$	Average, a few $\mu\text{m}/\text{hour}$	Below 1 $\mu\text{m}/\text{hour}$
<b>Reflectance</b>	Maximal	Maximal at small film thicknesses	Low

<b>Film structure</b>	High porosity	Column structure, presence of drop phase	Low porosity
<b>Relative machine price</b>	High. Each evaporator needs its own power supply and Al feeder with controller	Average. Two arc evaporators and two power supplies with electronic ignition	Low. Two DC magnetrons with two power supplies.
<b>Relative maintenance cost</b>	High. Each evaporation cell TiB2 boat and Al wire coil must be replaced weekly.	Low. Only Al cathode must be replaced in a few weeks or months depending on production intensity.	Low. Only Al target must be replaced in a few weeks or months depending on production intensity. Pure argon is needed for sputtering.

### General specifications

<b>Vacuum chamber dimensions, mm</b>	Dia.1600x2000
<b>Diffusion pumps, pcs</b>	4
<b>Diffusion pumps total pumping speed, l/s</b>	28 000
<b>Ultimate pressure, Pa</b>	$10^{-3}$
<b>Pumping time to ultimate pressure, min</b>	20
<b>Ion source dimensions, mm</b>	1700x90x20
<b>Ion source power supply power, kW</b>	3
<b>Exchangeable drums, pcs</b>	2
<b>Drum rotating speed, rpm</b>	2-20
<b>Occupied area, m<sup>2</sup></b>	50
<b>Weight, kg*</b>	3500
<b>Cooling water consumption, l/s*</b>	1.6
<b>Power, kW*</b>	90

\*- depends on installed deposition system

**VU1600MMS** coating machine is intended for industrial multilayer BBAR and ITO coatings deposition onto computer 17" monitor screens and similar components. Linear anodic layer ion source and 6 linear DC magnetrons are used for substrate pre-cleaning and coating deposition by reactive magnetron sputtering with ion beam assistance (usually two magnetrons are used for TiO<sub>2</sub> deposition, two magnetrons – for SiO<sub>2</sub> deposition, and the rest two magnetrons – for ITO, Ag, or other materials deposition). In general, six magnetrons allow deposit six different materials.



Computerized spectral optical monitor allows monitor each layer deposition run *in situ* over the whole range of 380 nm – 780 nm (or other on request).

The ITO or other metal layer resistance is also monitored *in situ*.

Argon pressure is kept automatically. Reactive gas pressure is monitored and controlled with the help of plasma spectra monitor. Optical monitoring software compatible with IBM PC; RS232/485 interface allows connect to any other controller.

## Specifications

<b>Vacuum chamber dimensions, mm</b>	Dia.1600x2000
<b>17" screens load per run, pcs</b>	24-32
<b>Diffusion pumps, pcs</b>	4
<b>Diffusion pumps total pumping speed, l/s</b>	28 000
<b>Ultimate pressure without heating, Pa</b>	$10^{-3}$
<b>Pumping time to ultimate pressure, min</b>	20
<b>Substrates heater power, kW</b>	10
<b>Ion source dimensions, mm</b>	1700x90x20
<b>Ion source power supply power, kW</b>	3
<b>Number of DC magnetrons, pcs</b>	6
<b>Ti target dimensions, mm</b>	1640 x 55 x 5
<b>Si target dimensions, mm</b>	1640 x 49 x 4
<b>In/Sn target dimensions, mm</b>	1640 x 50 x 2
<b>DC magnetron magnetic system</b>	SmCo magnets
<b>Magnetron target cooling</b>	Ti – direct Si- non-direct
<b>Number of magnetron power supplies, pcs</b>	2
<b>Magnetron power supply power, kW</b>	10
<b>Exchangeable tooling, pcs</b>	2
<b>Tooling rotating speed, rpm</b>	2-20
<b>Typical run time (without loading/unloading), min</b>	90
<b>Coating integral reflection @380 nm – 780 nm, %</b>	<0.5
<b>Coating transmission, %</b>	>85
<b>Electro-conductive coating resistance, Ohm/square</b>	<250
<b>Occupied area, m<sup>2</sup></b>	50
<b>Weight, kg</b>	3500
<b>Cooling water consumption, l/s</b>	1.6
<b>Power, kW</b>	90

*The coating machines and their components design and specifications are shown for reference; the real design and specifications may vary to meet customer requirements.*

