



VISTARIS 600 LAB
Universal vacuum sputtering system with vertical cathode arrangement



VISTARIS 600 PILOT
Inline vacuum sputtering system for R&D and pilot production

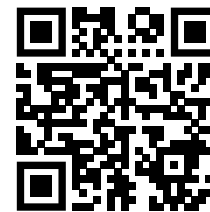


VISTARIS 900
Inline vacuum sputtering system for glass deposition



VISTARIS 1800
Large inline vacuum sputtering system with chamber for carrier rotation

Subsidiaries
Offices



Headquarters

SINGULUS TECHNOLOGIES AG
Hanauer Landstrasse 103
63796 Kahl, Germany
Tel. +49 6188 440-0
Fax +49 6188 440-1130
sales@singulus.de
Your direct contact:
www.singulus.com

Subsidiaries

China
SINGULUS TECHNOLOGIES (SHANGHAI) Co. Ltd.
Room B412-413
No. 1400 Jiangchang Road
Jingan District, Shanghai
Zip Code: 200072
Tel. +86 21 61073997
greens.pan@singulus.com.cn

SINGULUS TECHNOLOGIES Guangzhou Office
Room 539, 5F Block B
Nanlong Commercial Center
Dalong No.31 Shilian Road, Panyu
Guangzhou 511450
Tel. +86 13822138376
greens.pan@singulus.com.cn

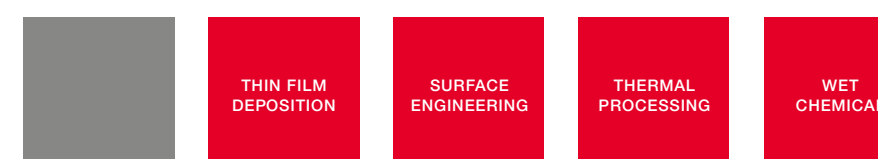
France
SINGULUS TECHNOLOGIES FRANCE S.A.R.L.
Tel. +33 3 8931 1129
laurent.ferrer@singulus.fr

South America
SINGULUS TECHNOLOGIES LATIN AMERICA LTDA.
Tel. +55 1121 6524-10
sales@singulus.com.br

Southeast Asia
SINGULUS TECHNOLOGIES ASIA PACIFIC PTE LTD.
Tel. +65 67411912
sales@singulus.com.sg

Taiwan, China
SINGULUS TECHNOLOGIES TAIWAN LTD.
Tel. +886 2 8692 6996
sales@singulus.com.tw

North America
SINGULUS TECHNOLOGIES INC.
Tel. +1 860 683 8000
sales@singulus.com



SINGULUS TECHNOLOGIES - Thin-Film Coating and Surface Treatment

SINGULUS TECHNOLOGIES develops and assembles innovative machines and systems for efficient thin-film coating and surface treatment processes, which are used worldwide in the Photovoltaics, Semiconductor, Medical Technology, Packaging, Glass & Automotive as well as Battery & Hydrogen markets.

The company's core competencies include various processes of coating technology, surface treatment as well as wet-chemical and thermal production processes. SINGULUS TECHNOLOGIES sees sustainability as an opportunity to position itself with innovative products. In the focus are:

- » Environmental awareness
- » Efficient use of resources
- » Avoidance of unnecessary CO₂ pollution

SINGULUS TECHNOLOGIES attaches great importance to responsible and sustainable corporate governance.



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VISTARIS

Modular Inline Vacuum Sputtering System with Vertical Substrate Transport



VISTARIS – Inline Sputtering System

Modular Sputtering System for CIGS & CdTe Thin-Film Solar Modules as well as Applications with Large Glass Surfaces

Sputtering Competence

SINGULUS TECHNOLOGIES has delivered far more than 8,500 vacuum sputtering machines since its foundation in 1995. The machines range from ultra-high vacuum deposition machines applying extremely thin layers of around 0.2 nm for the semiconductor industry down to high-throughput sputter machines for metallizing of e.g. a lipstick cover in 0.3 s.

PVD Systems from SINGULUS TECHNOLOGIES are mainly used in photovoltaics, data storage, sensor technology and decorative coatings but also in other applications such as hydrogen, battery, automotive, electrical shielding and advanced packing applications.

A close cooperation with scientific institutes like Fraunhofer ISE, Helmholtz-Zentrum Berlin (HZB), and SERIS as well as with research organizations and institutes in the USA and China allow SINGULUS TECHNOLOGIES to participate and make use of the latest solar research results worldwide.

VISTARIS Vacuum Sputtering System

The SINGULUS TECHNOLOGIES VISTARIS system was developed for the requirements in the photovoltaic industry. Inline sputtering systems are important in today's CIGS & CdTe thin-film solar cell production. The VISTARIS system was designed to enhance the efficiency of thin-film solar cells, while cutting production costs by using the state-of-the-art technologies. For photovoltaic technology, SINGULUS TECHNOLOGIES develops and manufactures coating systems which can apply special layers and layer systems on different substrates

Examples are transparent front or metallic back contact layers as well as multilayered precursors with a broad range of different materials. The main advantage of the system is that it can be used for vertical vacuum-based coating of glass substrates in solar and display industry. In the market for thin-film photovoltaic SINGULUS TECHNOLOGIES adds another production stage to its range of processing systems for the manufacture of CIGS/CIS cells.

TYPICAL PERFORMANCE CHARACTERISTICS

- » Integrated power supply design
- » No carrier return system necessary
- » Fully vertical substrate transport
- » Special designed carrier transport system
- » Load and unload of substrate from the same side of the machine
- » Usage of rotatable cylindrical magnetrons for highest utilization of target material
- » Temperature processing before and during deposition available
- » Gas separation by dynamic slit valves and/or by individual lock chambers
- » Smallest machine footprint thru turn chamber technology
- » Easy maintenance, low CoO
- » Fast target exchange, use any vendor target
- » Easy expansion possible
- » Vacuum base pressure: $< 1 \times 10^{-6}$ mbar
- » Typical process pressure: $2-5 \times 10^{-3}$ mbar

VISTARIS Inline Sputtering System

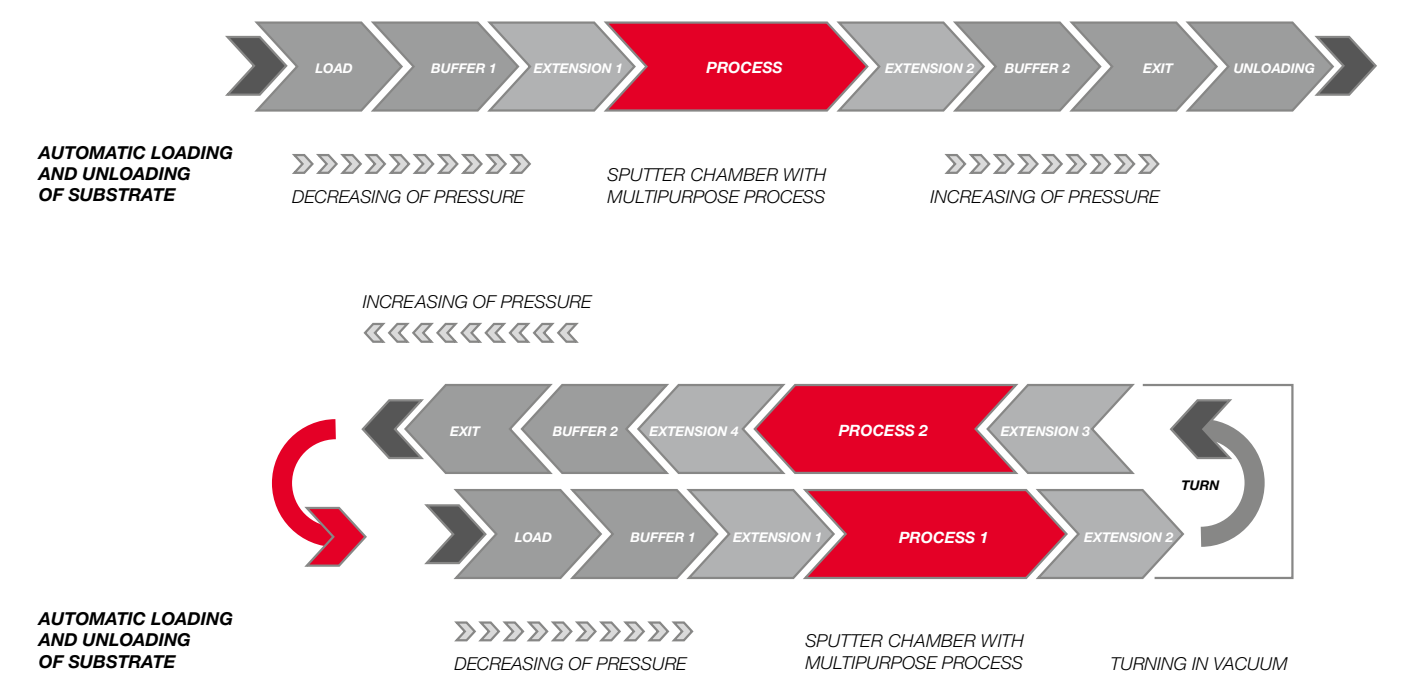
The SINGULUS TECHNOLOGIES VISTARIS system responds to demand in the photovoltaic industry especially for CIGS/CIS thin-film solar cells. The VISTARIS system for development and production tools is designed to enhance the efficiency of thin-film solar cells, while cutting production costs by using the state-of-the-art technologies. For photovoltaic technology, SINGULUS TECHNOLOGIES develops and manufactures coating systems which can apply special layers and layer systems on different materials. Inline sputter systems are important in today's thin-film solar cell production. Examples are transparent front or metallic back contact layers as well as multilayered precursors with a broad range of different materials.

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TYPICAL TARGET MATERIALS FOR PV APPLICATION

- » Sputtering materials like ITO, AZO, CuGa, Cu, In, AZO, i-ZnO etc

Example for System Configuration



VISTARIS
Modular Vacuum Sputtering System with Vertical Transport Orientation for Applications like CIGS and CdTe Solar, Glass Coating and Layers for Display Technology