EQUIPMENT AND SOLUTIONS FOR THIN FILM TECHNOLOGY

SPUTTER SOURCES
PLASMA GENERATORS

PROCESS TECHNOLOGY
REACTIVE GAS CONTROLLERS

3D CAD DESIGN
CUSTOM COMPONENTS

SPUTTERING TARGETS
RETROFITs

SERVICES
CATHODE ENVIRONMENTS

MATERIALS
EVAPORATION MATERIALS

BACKING TUBES
BACKING PLATES
TARGET BONDING
Founded in Rhineland-Palatinate in 2002, robeko is a leading manufacturer of sputtering targets and bond services as well as a supplier of highest quality process hardware for thin film deposition, especially for sputtering. 

robeko provides state-of-the-art solutions for specific coating problems of ambitious customers. We focus on individual technical requirements and at the same time believe in the value of human relationships. The balance between these two elements enables us to develop cost-effective solutions tailored to the demands of each of our customers.

Achievements and Prospects
We supply state-of-the-art equipment, materials and solutions required for thin film deposition. In doing so, we aim high with respect to partnership, innovativeness and growth. This is our mission:

- Heading for the future, we closely cooperate with leading and highly skilled partners.
- In each and every case, we focus on the best technical solution for the benefit of our customer.
- We continuously explore new market areas and develop innovative technologies and products.
- We consider fair pricing to be the basis of long-term customer relationships and of sustaining growth.

Powered by Experience
More than 15 years of experience in manufacturing and bonding of sputtering targets
More than 20 years of experience in operating thin film coating machines and coating development
More than 20 years of experience in distributing process hardware and application engineering

All technical specification in this catalogue are subject to change without prior notice, to make sure your requirements are met request please.
Microwave Plasma Source
MIRO-200-CI
- Filament free and gridless Plasma Source
- Uniform directional beam profile
- Optional magnetic plasma localization module
- Very low ion energy (for epitaxic film growth)
- Compatible with adjacent processes e.g. sputtering

Features
- Microwave power coupling
- Standard mounting flange geometries
- Use multiple sources as array to cover larger substrates
- Complete scope of delivery including generator and power cable
- Applicable in batch and in line systems
- Localization mode option allows adjustable plasma position and concentration of the full power in a small volume close to the substrate
- Integrated gas bar option

Applications
- High rate Ar ion etching
- Addition of nitrogen, carbon or oxygen ions and radicals into a plasma process
- Plasma nitriding or oxidation
- High rate deposition of a-C:H and ta-C:H
- Development of PVD/PECVD hybrid processes
- High rate deposition of carbon based low friction nanocomposites
- PECVD processes for low stress optical coatings, e.g. SiO₂
- Plasma treatment of substrates

Process Data
- Very low adjustable plasma potential: between 2 eV and 10 eV
- Ion current densities of up to 1 mA/cm²
- Deposition rate a-CH: 36 µm/h
- Operational pressure: 5.4 x 10⁻³ mbar
- Fully compatible with noble and reactive gases Ar, O₂, N₂, C₂H₂, HMDSO
- Power range from 0.3 – 3 kW
- PECVD deposition rates up to 100 nm/min
- Very good pretreatment capability
- Adjustable plasma density in localized plasma near the substrate
Plasma & Sputtering Sources

Technical Data / Dimensions

<table>
<thead>
<tr>
<th>Source materials:</th>
<th>Stainless steel / Quartz / Aluminum / BN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame material:</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Housing material:</td>
<td>Painted steel</td>
</tr>
<tr>
<td>Mounting flange:</td>
<td>Compatible with DN ISO-200 ISO-F.</td>
</tr>
<tr>
<td>Cooling water:</td>
<td>3 bar inlet, open outlet.</td>
</tr>
<tr>
<td></td>
<td>Fitting: 8 mm push-to-pull 2 l/min</td>
</tr>
<tr>
<td></td>
<td>Fitting: 10 mm push-to-pull 3,8 l/min</td>
</tr>
<tr>
<td>Compressed air:</td>
<td>4 – 8 bar</td>
</tr>
<tr>
<td>Weight:</td>
<td>40 kg for single source</td>
</tr>
</tbody>
</table>

Available Power Supply Options

<table>
<thead>
<tr>
<th>Power</th>
<th>Cooling</th>
<th>Input</th>
<th>Control Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIRO-200-CI-VA-12</td>
<td>1,2 kW</td>
<td>Air 1 x 230 V 2 x 24 V</td>
<td>Analog 0-10 V I/O Digital 24 V I/O</td>
</tr>
<tr>
<td>MIRO-200-CI-VA-20</td>
<td>2 kW</td>
<td>Air 2 x 230 V 2 x 24 V</td>
<td>Analog 0-10 V I/O Digital 24 V I/O</td>
</tr>
<tr>
<td>MIRO-200-CI-VA-30</td>
<td>3 kW</td>
<td>Air 3 x 230 V 2 x 24 V</td>
<td>Analog 0-10 V I/O Digital 24 V I/O</td>
</tr>
<tr>
<td>MIRO-200-CI-VA-P20</td>
<td>2 kW</td>
<td>Water 3 x 400 V 1 x 230 V CAN Bus</td>
<td></td>
</tr>
<tr>
<td>MIRO-200-CI-VA-P30</td>
<td>3 kW</td>
<td>Water 3 x 400 V 1 x 230 V CAN Bus</td>
<td></td>
</tr>
</tbody>
</table>

PLC Interface (not for CAN Bus Power Supply)

DI: Error, Error Code, Error Heat
DO: Interlock, MW On, Heat On
AI: Actual current/power
AO: Setpoint current/power, Setpoint Heat

VA: All metal parts exposed to water or vacuum made of stainless steel
Rotatable Magnetrons by SCI

Sputtering Components, Inc. is the leading global provider of reliable and affordable rotatable cathodes, complete e-Cathode™ lid systems and magnetics featuring state-of-the-art technology. All SCI products are designed to enable the end user to perform quick and inexpensive maintenance work.

Robeko is the exclusive sales and service rep in Germany, the surrounding countries and Italy.

Internal Mount End Blocks

SCI internal mount end blocks have high reliability and a simple, easy-to-maintain design. They are available in three different models – varying in size and power. The single-ended design reduces the number of rotary and static seals, one of the most common failure modes in rotary cathodes.

Our unique water fill and drain feature allows improved target cooling and full draining of the target water on blow down. The design eliminates the possibility of galvanic corrosion inside the end block, which could lead to water leaks and short circuits. Sputtering Components’ internal mount end blocks can be installed on any new coater or can easily replace your old end blocks.

External Mount End Blocks

SCI external mount end blocks are small enough for modern thin film solar cell machines, yet powerful enough for the world’s largest architectural glass coaters. The external mount end blocks are using the same patented technology as the internal mount end blocks.

Internal (Drop In) vs. External (Side) mount end block System Geometry

NEW SYSTEM INSTALLATIONS

Available as individual end blocks, end block plus the TRM-Bar™, ORM-Bar™, mORM-Bar™ magnetics or complete e-Cathode™ systems ready to install

UPGRADE PLANARS TO ROTARIES

Increase the output and quality of your existing coater without adding chambers

Coater modification and integration support available
SC-Series Internal Mount End Block
The industry-standard size SC-Series, internal mount end block is the lowest cost, highest power, and most reliable end block available.

FEATURES
- Patented power-delivery technology
- Unique target attachment method
- Durable, long-life rotary seals
- Industry standard mounting to lid
- Non-proprietary target design
- Patented target water fill/drain feature

BENEFITS
- Highest reliability on the market
- Easy to install
- Retrofit from competitor endblocks
- Fastest target change available
- 1 hour annual maintenance
- 3 hour total end block rebuild
- Lowest maintenance costs
- Use targets from any vendor
- No inductive heating impact - no brush dust
- No galvanic corrosion

MC-Series Internal Mount End Block
The MC-Series, internal mount end block provides high performance and reliability in a compact design.

FEATURES
- Patented power-delivery technology
- Unique target attachment method
- Durable, long-life rotary seals
- Compact design
- Non-proprietary target design
- Patented target water fill/drain feature

BENEFITS
- Highest reliability
- Easy to install
- Fastest target change available
- 1 hour annual maintenance
- 3 hour total end block rebuild
- Lowest maintenance cost
- Use targets from any vendor
- No inductive heating impact - no brush dust
- No galvanic corrosion

TECHNICAL DATA
Power  | Up to 200 kW DC or 80 kHz MFAC
V/A   | 1000 V/450 A
Target| Up to 4000 mm
Average weight | 40 kg

TECHNICAL DATA
Power  | Up to 100 kW DC or 80 kHz MFAC
V/A   | 1000 V/225 A
Target| Up to 2500 mm
Average weight | 20 kg
TC-Series Internal Mount End Block
The TC-Series, internal mount end block combines high-performance and reliability in our most compact design.

FEATURES
- Patented power-delivery technology
- Unique target attachment method
- Durable, long-life rotary seals
- Most compact design available
- Non-proprietary target design
- Patented target water fill/drain feature
- Fits standard target sizes

BENEFITS
- Excellent reliability
- Simple to install
- Fast target change
- 2 hour annual maintenance
- 3 hour total end block rebuild
- Very low maintenance cost
- Use targets from any vendor
- No inductive heating impact - no brush dust
- No galvanic corrosion
- No special target size needed

TECHNICAL DATA
- Power: Up to 40 kW DC or 80 kHz MFAC
- V/A: 1000 V/100 A
- Target: Up to 1500 mm
- Average weight: 10 kg

SM-Series External End Block
The SM-Series external mount end block uses the same patented technology as our SC-Series end block to deliver outstanding value, performance and reliability.

FEATURES
- Simple design - fewer parts and highly reliable
- Patented target water fill/drain feature
- Patented power-delivery technology

BENEFITS
- Wider substrate coverage than traditional internal end blocks
- Fits most chamber designs
- All utilities are external and remain attached during target changeover
- High packing density, dual cathodes in 400 mm space
- Drive motors mount up, down, inward or outward
- High-power with no inductive heating impact no brush dust
- Simple in-house maintenance
- Allows co-sputtering, tighter plasma coupling and limits shield coating

TECHNICAL DATA
- Power: Up to 200 kW DC or 80 kHz MFAC
- V/A: 1500 V/450 A
- Target: Up to 4000 mm
- Average weight: 60 kg
MM-Series External End Block

- The MM-Series external mount end block uses the same patented technology as our MC-Series end block to deliver outstanding value, performance and reliability in a compact design.
- **Features:**
  - Customizable drive shaft length
  - Compact and flexible form factor
  - Easy access water seal cartridge
  - Patented power-delivery technology
  - Simple design - fewer parts and highly reliable
  - Magnet bar externally adjusts to any angle
  - Patented target water fill/drain feature

CM-Series External End Block

- The CM-Series external end block combines high-performance and reliability in a very compact and lightweight design. Available also with smaller mounting flange for 80 mm ID target. Therefore the CM end block fits perfectly for systems with smaller space requirements.
- **Features:**
  - Customizable drive shaft length
  - Ultra compact and flexible form factor
  - Easy access water seal cartridge
  - Simple design - fewer parts and highly reliable
  - Magnet bar externally adjusts to any angle
  - Patented target water fill/drain feature
  - Fits industrial standard 125 mm ID target sizes or smaller, 80 mm size

**TECHNICAL DATA**

- **Power:** Up to 100 kW DC/80 kHz MFAC
- **V/A:** 1500 V/225 A
- **Target:** Up to 2500 mm
- **Average weight:** 30 kg

**BENEFITS**

- All utilities are external
- Utilities remain attached during target changeover
- Wider substrate coverage than traditional internal end blocks
- Fits most chamber designs
- High-power with no inductive heating impact - no brush dust
- High-packing density; dual cathodes in 350 mm space
- Drive motors mount up, down, inward or outward
- Simple, in-house maintenance
- Allows co-sputtering, tighter plasma coupling, and limits shield coating
Swing-Cathode Model
SMS (and MMS)

The Swing Cathode end block uses the same patented technology as our SM-Series and MM-Series end block to deliver outstanding value, performance and reliability. Also available with CM-Series and blocks.

**FEATURES**
- Designed to coat static substrates using a programmable magnet pack with swing motion
- Easy access water seal cartridge
- Patented power-delivery technology
- Simple design - fewer parts
- Patented target water fill/drain feature
- Adjustable drive shaft length
- Compact and flexible form factor
- No brush dust
- Simple, in-house maintenance
- Coater is kept dry during target changes

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Up to 200 (100) kW</td>
</tr>
<tr>
<td>V/A</td>
<td>1500 V/450 (225) A</td>
</tr>
<tr>
<td>Target</td>
<td>Up to 4000 mm (2500 mm)</td>
</tr>
<tr>
<td>Average weight</td>
<td>15 kg</td>
</tr>
</tbody>
</table>

**BENEFITS**
- Ideal for display or 3D part coating
- High-packing density, dual cathodes in a 400 mm space
- All utilities are external and remain attached during target changeover
- High power with no inductive heating impact
- No brush dust
- Simple, in-house maintenance
- Coater is kept dry during target changes

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**Swing-Duo™ Software**

Swing-Duo™ (Dynamic Uniformity Optimization) software is designed to simulate the combined cathode array uniformity for individually optimized motion profiles used to control the motion of the SCI magnet bars when used with our exclusive Swing Cathode™.

**FEATURES**
- Dwell-based simulation finds the key deposition angles and calculates the amount of time required at each angle.
- Outputs a CAM table for simplified servo programming - angle and time format
- Uniformity optimization for constant power or variable power
- Uniformity optimization refinement using actual measured uniformity results
- Allows customers to determine the amount of wasted material not deposited on the substrate as a function of the motion profiles
- Simple and easy to use web-based interface

**BENEFITS**
- Quickly design coater configurations for optimal uniformity of deposition
- Uniformity compensation for systemic issues in the form of motion profile changes
- Prevent uniformity drift over the life of the target by creating multiple CAM tables for different target diameters

For a link to the demonstration video, choose the Swing-Duo™ software from the online products page at sputteringcomponents.com. Members of the SCI website can run the software using the following web address:

http://swingduo.sputteringcomponents.com

Customers will experience improved coating efficiencies in the large area and high aspect ratio coating industries.
### BENEFITS

- Industry leading coating uniformity up to +/- 1%
- Superior target utilization and reduced cross corner effects
- High deposition rates
- Lengthen campaign - decrease downtime and increase productivity
- Adjustable sputter angle
- Most versatile rotary magnet systems available
- Custom length magnet bars to ensure the perfect match for your system
- Designed to adapt to other end block styles
- Reduce maintenance costs due to magnet, roller, and bushing replacement
- Increase process yields by reducing process drift
- Increase target utilization and save on target costs

### BENEFITS (continued)

#### Advanced Magnetics

Our Magnetics are designed to provide high quality, uniform coatings for your application.

#### FEATURES

- Multiple designs to fit your application requirements
- Advanced magnetics designed using 3D finite element analysis software
- High-strength magnets that are categorized in-house according to gauss level
- Fully encapsulated magnets and robust construction for many years of troublefree operation
- Long-life, multi-roller system for sputter up, sputter down, or off-angle sputtering
- Simple magnetic uniformity tuning
- Easily installed in any possible orientation

#### Magnetics

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Target Diameter (mm)</th>
<th>Sputter Angle</th>
<th>Target Material Utilization</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRM</td>
<td>160 mm ± 12°</td>
<td>&gt; 70% / &gt; 80%</td>
<td>Thin Targets, Acceptable for most material</td>
<td></td>
</tr>
<tr>
<td>mQRM</td>
<td>170 mm ± 15°</td>
<td>&gt; 85%</td>
<td>Thicker Targets, High Utilization</td>
<td></td>
</tr>
<tr>
<td>QRM</td>
<td>180 mm ± 21°</td>
<td>&gt; 85%</td>
<td>Thickest Targets, ITO, Electrical Grade Films</td>
<td></td>
</tr>
</tbody>
</table>

All specifications are for 152 mm OD targets. *SCI tapered target required for >80% utilization with the TRM.

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### BENEFITS

#### Plasma & Sputtering Sources

- **TRM-Bar™**
  - Small magnet, 3-row design
  - Narrowest deposition profile minimizes coating loss to shields
  - Multiple turn-around design options specific to your application
  - Easy change turn-arounds
  - Target diameters up to 160 mm OD

- **QRM-Bar™**
  - Large magnet, 4-row design
  - Patented staggered turn-around design
  - Improved performance and reduced impedance
  - Stable plasma impedance over the life of the target
  - Target diameters up to 180 mm OD

- **SRM-Bar™**
  - The SRM-Bar™ is designed specifically for the 80 mm target tube used with the CM-Series external mount end block.
  - 80 mm ID Targets
  - Acceptable for most material.
**Plasma & Sputtering Sources**

**BENEFITS**
- In-situ uniformity and position adjustments eliminates costly system shutdown.
- Constant impedance mode can reduce process drift and help stabilize the deposition rate throughout the lifetime of the target materials.
- The batteries are standard rechargeable Li-Ion packs that can quickly and easily be swapped out.
- Very fine tuning for the most demanding uniformity requirements.

**FEATURES**
- Self-contained system that utilizes fiber optics for control.
- Compatible with SCI's TRM-Bar™, mQRM-Bar™ and QRM-Bar™ magnet bars.
- Achieve film thickness uniformity of better than +/- 1%.
- Movement accuracy of +/- 50µm over the full 20mm range of motion.
- Allows for up to 4mm vertical difference between adjustment locations.
- Robust industrial communication via ethernet gateway.
- Control multiple magnet bars through a dedicated PC.
- Easy-to-use, operational software.

**TECHNICAL DATA**

| Min BT Length | 1 m |
| Max Target Diameter | 180 mm |
| Adjuster Pitch | 12" / 305 mm |
| Adjustable Uniformity | +/- 1% depending on application |
| Application | Optical Thin Films with Tight Uniformity Requirements |

**RAM-Bar™ Magnetics**

Sputtering Components’ Remotely Adjustable Magnet Bar or RAM-Bar™ allows customers to adjust the distance between the magnets and the target surface from outside the system during operation.

**E-Cathode Lids**

The e-Cathode™ is a complete cathode solution. SCI e-Cathode™ systems are available in digital and analog styles and are adaptable to meet your needs.

SCI provides OEM equipment builders complete turn-key solutions, ready to interface with their systems. SCI can customize these solutions to provide as much controls integration as desired onboard the e-Cathode™. End users seeking to add additional cathodes to their system look to SCI for plug-and-play solutions. Our e-Cathode clones match all your current external mechanical and electrical interfaces but use SCI end blocks, magnet bars, and cathode control systems.

**E-CATHODE LIDS**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Digital e-Cathode™</th>
<th>Analog e-Cathode™</th>
<th>Basic e-Cathode™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onboard Logic</td>
<td>PLC</td>
<td>Relay</td>
<td>None</td>
</tr>
<tr>
<td>Interlocks</td>
<td>Full</td>
<td>Full</td>
<td>HV only</td>
</tr>
<tr>
<td>Control</td>
<td>Local (touch screen), Remote (Ethernet, Profibus, etc.)</td>
<td>Local (lights, switches), Remote (discrete I/O)</td>
<td>All sensors wired to the connector</td>
</tr>
<tr>
<td>Water Flow</td>
<td>Flow rate (LPM) report</td>
<td>Flow switch</td>
<td>Customer supplied, external</td>
</tr>
<tr>
<td>Water Temperature</td>
<td>Water temp report</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Onboard MFC Option</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Differential Pumping Option</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Customizable</td>
<td>Yes (operating hours, kwH, etc.)</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Plasma & Sputtering Sources**
The envis-ION™ Dual Magnetron Pretreatment Source has a wide range of operation for improved adhesion and durability.

**FEATURES**

- Flexible mounting options
- 200+ hours per campaign
- Hidden electrodes produce minimal contamination
- Compact design
- Long electrode life
- Wide operating pressure (1-40 mTorr)
- Compatible with other PVD processes
- Effective source to substrate range of 50-200mm
- Fast target change

**BENEFITS**

- Fits into your existing equipment
- Fewer process disruptions; longer campaigns
- Low cost of ownership
- Promotes film adhesion
- Reduced chance of substrate damage due to lower ion energies
- Drives off water vapor and other volatile contaminants from the substrate
- Wide operating pressure
- Highly tunable

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Model</th>
<th>DMPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Power</td>
<td>5 kW/m</td>
</tr>
<tr>
<td>Typical Power</td>
<td>2-4 kW/m</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>1-40 m Torr</td>
</tr>
<tr>
<td>Pet Surface Energy at 6.7 m/min</td>
<td>&gt;65 Dynes</td>
</tr>
</tbody>
</table>

**SC Model Lid Dimensional Information**

400mm MIN. CHAMBER OPENING

**MC Model Lid Dimensional Information**

345mm MIN. CHAMBER OPENING

**NOTE:**

TTS = TARGET TO SUBSTRATE

MINIMUM LID HEIGHT WITH LOCAL ELECTRONICS PACKAGE = 450mm

MINIMUM LID HEIGHT WITH REMOTE ELECTRONICS PACKAGE = 210mm

**CENTER TO CENTER**
Planar Magnetrons by THFC

The unique IONIX® magnetron sputtering sources have a flexible architecture to cope with the partially contradicting performance requirements of modern vacuum coating technology. The IONIX® concept is based on maximum reliability, adaptable magnet array layout and versatile design to fit with customer’s specific applications.

Since January 2017 robeko is sales agent for Thin Film Consulting.

High Vacuum Round Magnetrons
For R + D and small scale production

IONIX® round magnetrons are available in target diameters of 1.25” to 10” and include standard KF/ISO interfaces for use with virtually any type of vacuum chamber installation.

UHV Round Magnetrons
For scientific research

IONIX® UHV magnetrons are available in target diameters of 1” to 8”. Rectangular UHV sources are available on request.

Flange Mount Magnetron Ass’y’s
IONIX® flange assemblies plug-in solutions:

- Target Ø 1” - Ø 6” HV and UHV
- Target Ø 1” - Ø 8” HV and UHV
- Pneumatic shutter
- Argon distribution
- Z-Adjustment
- metallic sealing vacuum-to-air
- Bakeable 200°C
- Flange mount and internal mount design

Rectangular Magnetrons

IONIX® rectangular magnetron sputtering sources with advanced water cooling circuits are designed for industrial production purposes, offering:

- High-rate metallic sputtering
- RF sputtering of dielectric targets
- Pulsed reactive mode sputtering for high rate
- Deposition of dielectric thin films

Advanced water cooling
Directed cooling water flow and multipolar magnet arrays accommodate the use of clamped targets at power levels of 20W/cm² (Cr, Al) and above.

<table>
<thead>
<tr>
<th>Target width “A”</th>
<th>Target length “B”</th>
<th>Cathode width “C”</th>
<th>Cathode length “D”</th>
<th>Height “H”</th>
</tr>
</thead>
<tbody>
<tr>
<td>63 mm / 2.5”</td>
<td>300 ... 1000 mm</td>
<td>102 mm</td>
<td>„B” + 40 mm</td>
<td>64 mm</td>
</tr>
<tr>
<td>89 mm / 3.5”</td>
<td>300 ... 1000 mm</td>
<td>135 mm</td>
<td>„B” + 47 mm</td>
<td>75 mm</td>
</tr>
<tr>
<td>100 mm / 4”</td>
<td>300 ... 1000 mm</td>
<td>147 mm</td>
<td>„B” + 47 mm</td>
<td>66 mm</td>
</tr>
<tr>
<td>127 mm / 5”</td>
<td>300 ... 2000 mm</td>
<td>172 mm</td>
<td>„B” + 47 mm</td>
<td>71 mm</td>
</tr>
<tr>
<td>152 mm / 6”</td>
<td>300 ... 2000 mm</td>
<td>205 mm</td>
<td>„B” + 57 mm</td>
<td>80 mm</td>
</tr>
<tr>
<td>200 mm / 8”</td>
<td>300 ... 3000 mm</td>
<td>265 mm</td>
<td>„B” + 75 mm</td>
<td>84 mm</td>
</tr>
</tbody>
</table>

Magnet Array Options

1. Standard magnet arrays
- Extended film homogeneity
- High rates
- Target utilization 30 - 35 %
- Stable operation in AC and RF mode
2. Multi-polar magnet arrays
- Target utilization 35 - 45 %
3. Coil assisted magnet arrays
- To unbalance
- Adjust target utilization
4. Low pressure magnet arrays
- p = 7 x 10-4 mbar and below
EMICON – Plasma Monitor and Process Control System

Broadband Spectrum Acquisition
Multi-Channel And High-Resolution Series
Real – Time Plasma Emission Monitoring
Turn Key System For Industrial Applications

Process control
Analog and digital outputs and inputs are available to install open and closed loop control functions. This feature is used for end-point detection or for monitoring deviations from standard plasma process conditions. The integrated PID control function gives direct access to applications where closed loop control is necessary such as gas flow control or power control in reactive sputtering applications.

Advanced system software
The system is fully software controlled and all functions are available by one click navigation. The split-screen shows maximum overview of all process relevant data. Special features: recipe manager, set-point alarm, PID control with automatic response curve scaling, DLL remote control, administrator/user mode, etc.

Optics
A variety of optical components are available for collecting the plasma radiation: optical fibers, collimator optics and optical feedthroughs for ex-vacuum and in-vacuum use. All in-vacuum optics comes with a protection device to avoid coating of the optical surfaces.

Spectral data analysis tool
For evaluating and analyzing the recorded spectral data the optional SpecLine software package is available: SpecLine comes with an extensive and unique database for atoms and molecules which is essential for the identification of plasma species and analysis of the recorded spectra.

Process analysis
A full analysis of the plasma process is carried out by reviewing recorded spectra and process data.

Process optimization
Real-time monitoring gives the capability to optimize the plasma process by taking advantage of the instant system response on parameter changes.
**MAGPULS Pulse Power Supplies**

Magpuls Pulse Power supplies provide highest flexibility and supreme performance for plasma nitriding processes, bias applications and magnetron sputtering including ambitious reactive and HIPIMS processes.

The MAGPULS Unipolar and Bipolar Pulse Power Supply series MP 1, MP 2 and MP 2 – HC are constructed in two separate units. One unit is the DC power supply which provides the DC power into the big capacitor bank of the pulse unit and the pulse unit with the integrated sophisticated ARC management.

The MP 2 – AS family follows the same design principle, but needs two separate DC power supplies to make the asymmetric pulse feature possible.

Depending on model and application the power supplies are available with peak currents of up to 1500 A (MP 2 – HC) and with up to 8 adjustable pulse wave forms (MP 2 – AS). The DC power is in the range of 6 – 75 kW. Higher power available upon request.

The duty cycle can be adjusted within the range from 0.002% up to 99.998% and for the bipolar MP 2 family is individually adjustable for each half wave. The new MAGPULS enhanced ARC management provides best coating results without process interruptions.

Optional the all MAGPULS power supplies are provided with an external optical input interface for external controlling of the pulse times as well as an optical output interface for triggering or synchronization of other unipolar or bipolar pulse power supplies of the MP 1 and MP 2 series.

### COMMON FEATURES

- Up to 8 different operating modes depending on model including DC mode.
- Adjustable pulse parameters and frequency
- Enhanced Arc Management

### COMMON BENEFITS

- Universal Application range with one power supply
- Optimum adjustment of process and high process stability.
- Best Arc suppression and lowest Arc energy for best performance

### Up to 8 adjustable pulse wave forms

- DC
- UP
- DC-
- UP-
- BP
- BP-AS
- PPT
- PPT-AS

---

<table>
<thead>
<tr>
<th>Mode*</th>
<th>DC+</th>
<th>UP+</th>
<th>DC-</th>
<th>UP-</th>
<th>BP</th>
<th>BP-AS</th>
<th>PPT</th>
<th>PPT-AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Power Supply Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MP 1 Unipolar</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MP 2 Bipolar</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>MP 2 – AS Bipolar Asymmetric</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>MP 2 – HC Bipolar HIPIMS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

*referred to diagram above, AS = asymmetric, PPT = programmable pulse train, ✓ = mode available

---

*overview*
### Power Supplies

#### MP 1 – Unipolar Pulse Power Supply

<table>
<thead>
<tr>
<th>Output</th>
<th>MP1-35</th>
<th>MP1-60</th>
<th>MP1-100</th>
<th>MP1-200</th>
<th>MP1-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>0 – 1000 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0 – 10 A DC 0 – 35 A Puls</td>
<td>0 – 20 A DC 0 – 60 A Puls</td>
<td>0 – 40 A DC 0 – 100 A Puls</td>
<td>0 – 80 A DC 0 – 200 A Puls</td>
<td>0 – 150 A DC 0 – 400 A Puls</td>
</tr>
<tr>
<td>Power</td>
<td>0 – 6 kW DC 0 – 10 kW DC</td>
<td>0 – 10 kW DC 0 – 20 kW DC</td>
<td>0 – 20 kW DC 0 – 40 kW DC</td>
<td>0 – 40 kW DC 0 – 75 kW DC</td>
<td></td>
</tr>
<tr>
<td>Pulse frequency</td>
<td>DC / 0.05 Hz – 100 kHz</td>
<td>DC / 0.05 Hz – 100 kHz</td>
<td>DC / 0.05 Hz – 75 kHz</td>
<td>DC / 0.05 Hz – 75 kHz</td>
<td></td>
</tr>
<tr>
<td>Max. frequency with</td>
<td>100 kHz @ 10 A 25 kHz @ 35 A</td>
<td>100 kHz @ 25 A 40 kHz @ 60 A</td>
<td>100 kHz @ 25 A 40 kHz @ 100 A</td>
<td>100 kHz @ 50 A 20 kHz @ 200 A</td>
<td>75 kHz @ 100 A 20 kHz @ 400 A</td>
</tr>
<tr>
<td>Pulse time settings</td>
<td>T on 2.0 µs up to 100 sec</td>
<td>T on+ T off+ T on- T off-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse waveform</td>
<td>DC / Unipolar pulsed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Input

| Max. Voltage | 0 – 1000 V |
| Max. Current | 0 – 10 A DC 0 – 20 A DC 0 – 40 A DC 0 – 80 A DC 0 – 150 A DC |
| Max. Power   | 0 – 6 kW DC 0 – 10 kW DC 0 – 20 kW DC 0 – 40 kW DC 0 – 75 kW DC |
| Mains supply | 1 AC 230 V, 50/60 Hz or 1 AC 115 V, 50/60 Hz |

#### MP 2 – Bipolar Pulse Power Supply

<table>
<thead>
<tr>
<th>Output</th>
<th>MP2-35</th>
<th>MP2-60</th>
<th>MP2-100</th>
<th>MP2-200</th>
<th>MP2-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>0 – 1000 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0 – 10 A DC 0 – 35 A Puls</td>
<td>0 – 20 A DC 0 – 60 A Puls</td>
<td>0 – 40 A DC 0 – 100 A Puls</td>
<td>0 – 80 A DC 0 – 200 A Puls</td>
<td>0 – 150 A DC 0 – 400 A Puls</td>
</tr>
<tr>
<td>Power</td>
<td>0 – 6 kW DC 0 – 10 kW DC</td>
<td>0 – 10 kW DC 0 – 20 kW DC</td>
<td>0 – 20 kW DC 0 – 40 kW DC</td>
<td>0 – 40 kW DC 0 – 75 kW DC</td>
<td></td>
</tr>
<tr>
<td>Pulse frequency</td>
<td>DC / 0.05 Hz – 100 kHz</td>
<td>DC / 0.05 Hz – 100 kHz</td>
<td>DC / 0.05 Hz – 75 kHz</td>
<td>DC / 0.05 Hz – 75 kHz</td>
<td></td>
</tr>
<tr>
<td>Max. frequency with</td>
<td>100 kHz @ 10 A 25 kHz @ 35 A</td>
<td>100 kHz @ 25 A 40 kHz @ 60 A</td>
<td>100 kHz @ 25 A 40 kHz @ 100 A</td>
<td>100 kHz @ 50 A 20 kHz @ 200 A</td>
<td>75 kHz @ 100 A 20 kHz @ 400 A</td>
</tr>
<tr>
<td>Pulse time settings</td>
<td>T on+ T on- T off+ T off-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse waveform</td>
<td>DC+ / DC- / Unipolar pulsed + / Unipolar pulsed - / Bipolar pulsed / programmable pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Input

| Max. Voltage | 0 – 1000 V |
| Max. Current | 0 – 10 A DC 0 – 20 A DC 0 – 40 A DC 0 – 80 A DC 0 – 150 A DC |
| Max. Power   | 0 – 6 kW DC 0 – 10 kW DC 0 – 20 kW DC 0 – 40 kW DC 0 – 75 kW DC |
| Mains supply | 1 AC 230 V, 50/60 Hz or 1 AC 115 V, 50/60 Hz |
### MP 2 – AS Asymmetric
**Bipolar Pulse Power Supply**

<table>
<thead>
<tr>
<th>Output</th>
<th>MP2-AS-35</th>
<th>MP2-AS-60</th>
<th>MP2-AS-100</th>
<th>MP2-AS-200</th>
<th>MP2-AS-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>0 – 1000 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0 – 10 A DC</td>
<td>0 – 20 A DC</td>
<td>0 – 40 A DC</td>
<td>0 – 80 A DC</td>
<td>0 – 150 A DC</td>
</tr>
<tr>
<td>Power</td>
<td>0 – 6 kW DC</td>
<td>0 – 10 kW DC</td>
<td>0 – 20 kW DC</td>
<td>0 – 40 kW DC</td>
<td>0 – 75 kW DC</td>
</tr>
<tr>
<td>Pulse frequency</td>
<td>DC / 0.05 Hz – 100 kHz</td>
<td>DC / 0.05 Hz – 75 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. frequency with Max. pulse current</td>
<td>100 kHz @ 10 A</td>
<td>100 kHz @ 25 A</td>
<td>20 kHz @ 100 A</td>
<td>20 kHz @ 200 A</td>
<td>75 kHz @ 100 A</td>
</tr>
<tr>
<td>Pulse time settings</td>
<td>T on+</td>
<td>T on-</td>
<td>T off+</td>
<td>T off-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.0 µs up to 100 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse wave form</td>
<td>DC+ / DC- / Unipolar pulsed + / Unipolar pulsed - / Bipolar pulsed / programmable pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Voltage 1</td>
<td>0 – 1000V</td>
</tr>
<tr>
<td>Max. Voltage 2</td>
<td>0 – 1000 V</td>
</tr>
<tr>
<td>Max. Current 1</td>
<td>0 – 10 A DC</td>
</tr>
<tr>
<td>Max. Current 2</td>
<td>0 – 10 A DC</td>
</tr>
<tr>
<td>Mains supply</td>
<td>1 AC 230 V, 50/60 Hz or 1 AC 115 V, 50/60 Hz</td>
</tr>
</tbody>
</table>

### MP 2 – HC Bipolar HIPIMS
**Pulse Power Supply**

<table>
<thead>
<tr>
<th>Output</th>
<th>MP2-HC 200</th>
<th>MP2-HC 400</th>
<th>MP2-HC 600</th>
<th>MP2-HC 1000</th>
<th>MP2-HC 1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>0 – 1000 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0 – 20 A DC</td>
<td>0 – 40 A DC</td>
<td>0 – 60 A DC</td>
<td>0 – 100 A DC</td>
<td>0 – 150 A DC</td>
</tr>
<tr>
<td>Power</td>
<td>0 – 10 kW DC</td>
<td>0 – 20 kW DC</td>
<td>0 – 30 kW DC</td>
<td>0 – 60 kW DC</td>
<td>0 – 90 kW DC</td>
</tr>
<tr>
<td>Pulse frequency</td>
<td>DC / 0.05 Hz – 100 kHz</td>
<td>DC / 0.05 Hz – 50 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. frequency with Max. pulse current</td>
<td>100 kHz @ 40 A</td>
<td>50 kHz @ 80 A</td>
<td>50 kHz @ 105 A</td>
<td>50 kHz @ 120 A</td>
<td>50 kHz @ 120 A</td>
</tr>
<tr>
<td>Pulse time settings</td>
<td>T on+</td>
<td>T on-</td>
<td>T off+</td>
<td>T off-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0 µs up to 100 sec</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse wave form</td>
<td>DC+ / DC- / Unipolar pulsed + / Unipolar pulsed - / Bipolar pulsed / programmable pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Voltage</td>
<td>0 – 1000V</td>
</tr>
<tr>
<td>Max. Current</td>
<td>0 – 20 A DC</td>
</tr>
<tr>
<td>Max. Power</td>
<td>0 – 10 kW DC</td>
</tr>
<tr>
<td>Mains supply</td>
<td>1 AC 230 V, 50/60 Hz or 1 AC 115 V, 50/60 Hz</td>
</tr>
</tbody>
</table>
**Arc Management**

Function 4-S-C (available for all MP2-Models)

Permanent checking the current and voltage situation of the plasma, in the case of ARC starts a controlled ARC-reduction process. Operates in all modes Bi-, Uni-Polar + HC Bipolar.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image of balanced plasma process" /></td>
<td><img src="image" alt="Image of out of balance plasma process" /></td>
</tr>
</tbody>
</table>

**Plasma Process - 4-S-C operation**

<table>
<thead>
<tr>
<th>Plasma Process - balanced</th>
<th>Plasma Process - 4-S-C operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image of 4-S-C operation" /></td>
<td><img src="image" alt="Image of balanced plasma process" /></td>
</tr>
</tbody>
</table>

**Arc Management**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>I max - Detection</td>
<td>0 A up to max. pulse current</td>
</tr>
<tr>
<td>Voltage</td>
<td>&gt;200 ns</td>
</tr>
<tr>
<td>OFF time after ARC</td>
<td>500 µs up to 1000 ms</td>
</tr>
<tr>
<td>di/dt dynamic change</td>
<td>Var. di/dt threshold: 0 A/µs up to 2000 A/µs</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>Var. U threshold: 0% up to 100% U DC (option)</td>
</tr>
</tbody>
</table>

**Application & Service Support**

**Easy to maintain**

- **Goal = Design Rule**
  - smart + simple
- **Repair on site**
  - The construction allows an repair on site
  - Experienced user or technician can exchange the common industrial parts

**Repair Service**

- Remote Diagnostic
- Customer sends failure codes or picture to us
- Remote Service Support by smart communication
- We answer direct via phone, mail, smart phone or video downloads

**Application Support**

- Support by experienced team
- Remote or on site
- Own Thin Film Development Center
Power Supplies

SEREN Power Supplies

robeko provides products of Seren IPS Inc., a leading manufacturer of RF power delivery components.

At Seren IPS, Inc., innovative technology, applications and design expertise are combined with world class support to deliver critical RF power solutions including RF Generators, Matching Networks and accessories. Continuous product development and dedicated Application/Design Engineering services ensure success for our customers.

Distribution of Seren’s products in Europe is performed jointly with RF industries, UK.

Product overview

RF power supplies

- R & L Series Generators: (Industrial Applications, Sputter/ Etch/Deposition): 100W – 30kW, 100 kHz – 40.68 MHz
- “HR” Series Generators: (Semiconductor, Sputter/Etch/Deposition, ALD): 600w – 30kW, 100 kHz – 40.68 MHz
- M Series Generator: (Table Top, Bias Applications): 125 & 300 Watts @ 13.56 MHz

Matching networks

- AT Series (Industrial Applications/Sputter/Etch/Deposition): 100W through 20,000 Watts @ 350 kHz through 40.68 MHz
- ATS Series (Semiconductor/Sputter/Etch/Deposition/ALD): 100W through 20,000 Watts @ 350 kHz through 40.68 MHz
- Matching Transformers Step up / Step Down (50 kHz – 500 kHz): 1000W through 5,000 Watts

COMMON FEATURES

- LDMOS FET’s
- CE marked
- Up to 5kW Half rack
- Internal DC Switcher
- High speed pulsing
- Agile frequency tuning
- CEX w/ digital phase shifter

SEREN RF-Generators, HR-Series

The Seren HR-2001 is a third-generation, 2000 Watt RF Generator. It may be purchased at 13.56 MHz, 27.12 or 40.68 MHz. This lightweight, water-cooled ½ rack unit is designed to exceed the most stringent vacuum processing demands. The HR-2001 can be used as the sole source for plasma generation, as a Bias generator, or as one of several generators in a multiple generator configuration. Front panel indicators include AC ON, RF On, Alarm and Interlock. An optional Remote controller (front panel controls and indicators) may be purchased.

Seren “HR Series” products incorporate a separate surface mount technology printed circuit board for controls and RF amplifier. The RF amplifier is powered by a switch-mode power supply.

Seren “HR Series” products utilize LDMOS Field-Effect Transistors in the power amplifier stages. The unit operates in a class AB mode providing power accuracy and stability across the entire power range.

Basic Specifications

<table>
<thead>
<tr>
<th>Models</th>
<th>HR-601/1001/2001/3001/4000/5001/10001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Power Output</td>
<td>600/1000/2000/3000/4000/5000/10000 Watts</td>
</tr>
<tr>
<td>20 &amp; 30 kW models in master slave mode</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>1.7-2.1, 13.56, 27.12, 40.68 MHz</td>
</tr>
<tr>
<td>Forward Power Accuracy</td>
<td>+/-2%</td>
</tr>
<tr>
<td>Harmonics</td>
<td>-50 dBc</td>
</tr>
<tr>
<td>Input Power</td>
<td>190-264, 380-415, 480 VAC, 47-63 Hz, 1 or 3 Phase, depending on model</td>
</tr>
<tr>
<td>Output Connector Type</td>
<td>“N”, “HN”, “LC” or “Din” Female, depending on generator model</td>
</tr>
<tr>
<td>Interface Connectors</td>
<td>Serial: DB-9 Female; Analog: DB-25 Female</td>
</tr>
<tr>
<td>Pulsing</td>
<td>10 micro sec. / min. pulse</td>
</tr>
<tr>
<td>Cooling</td>
<td>Air cooled (HR601/1001), Water cooled (HR2001 to HR30.001)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>HR601 – HR5001: ½ 19” rack, HR10001: 19” rack</td>
</tr>
<tr>
<td>Weight</td>
<td>Depending on model</td>
</tr>
</tbody>
</table>
### R Series - High Frequency RF Generators (1.7 – 40.68 MHz)

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
<th>Frequency</th>
<th>Cooling</th>
<th>Mounting</th>
<th>H x W x D</th>
</tr>
</thead>
<tbody>
<tr>
<td>R301</td>
<td>300 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>5.25” x 8” x 19”</td>
</tr>
<tr>
<td>R601</td>
<td>600 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 8” x 19.5”</td>
</tr>
<tr>
<td>R1001</td>
<td>1000 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 8” x 18.5”</td>
</tr>
<tr>
<td>R2001</td>
<td>2000 W</td>
<td>1.7 – 2.1 MHz</td>
<td>Water</td>
<td>10’ Rack</td>
<td>7” x 17” x 23”</td>
</tr>
</tbody>
</table>

### L Series - Low Frequency RF Generators (additional frequencies available, consult factory)

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
<th>Frequency</th>
<th>Cooling</th>
<th>Mounting</th>
<th>H x W x D</th>
</tr>
</thead>
<tbody>
<tr>
<td>R301</td>
<td>300 W</td>
<td>350 – 460 KHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>5.25” x 8” x 19”</td>
</tr>
<tr>
<td>R601</td>
<td>600 W</td>
<td>350 – 460 KHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 8” x 19.5”</td>
</tr>
<tr>
<td>R1001</td>
<td>1000 W</td>
<td>350 – 460 KHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 8” x 18.5”</td>
</tr>
<tr>
<td>R2001</td>
<td>2000 W</td>
<td>350 – 460 KHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 17” x 23”</td>
</tr>
<tr>
<td>R3001</td>
<td>3000 W</td>
<td>350 – 460 KHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 17” x 23”</td>
</tr>
</tbody>
</table>

### HR Series – High Frequency RF Generators (1.7 – 40.68 MHz)

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
<th>Frequency</th>
<th>Cooling</th>
<th>Mounting</th>
<th>H x W x D</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-125</td>
<td>125 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>Rack</td>
<td>3.25” x 8” x 10”</td>
</tr>
<tr>
<td>HR601</td>
<td>600 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>5.25” x 8” x 19”</td>
</tr>
<tr>
<td>HR1001</td>
<td>1000 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 8” x 19”</td>
</tr>
<tr>
<td>HR1201</td>
<td>1,200 W</td>
<td>13.56 MHz</td>
<td>Air</td>
<td>½ Rack</td>
<td>7” x 8” x 19”</td>
</tr>
<tr>
<td>HR2001</td>
<td>2,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>7” x 8” x 22”</td>
</tr>
<tr>
<td>HR3001</td>
<td>3,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>7” x 8” x 22”</td>
</tr>
<tr>
<td>HR4001</td>
<td>4,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>7” x 8” x 22”</td>
</tr>
<tr>
<td>HR5001</td>
<td>5,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>7” x 8” x 22”</td>
</tr>
<tr>
<td>HR6001</td>
<td>6,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>7” x 8” x 22”</td>
</tr>
<tr>
<td>HR10,001</td>
<td>10,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>7” x 17” x 29”</td>
</tr>
<tr>
<td>HR20,001</td>
<td>20,000 W</td>
<td>13.56 MHz</td>
<td>Water</td>
<td>½ Rack</td>
<td>8.25” x 17.2” x 29”</td>
</tr>
</tbody>
</table>

### ATS Series - Automatic matching Networks (1.7 – 40.68 MHz)

**Input Power: (24VDC @ 3 Amps)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Power</th>
<th>Rating</th>
<th>Cooling</th>
<th>Var. Caps.</th>
<th>H x W x D</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS-3</td>
<td>300 W</td>
<td>20 Amps @ 2.5 KV</td>
<td>Air</td>
<td>Air/Air</td>
<td>5” x 9” x 15”</td>
</tr>
<tr>
<td>ATS-6</td>
<td>600 W</td>
<td>30 Amps @ 4.5 KV</td>
<td>Air</td>
<td>Air/Vac.</td>
<td>5” x 9” x 15”</td>
</tr>
<tr>
<td>ATS-10</td>
<td>1000 W</td>
<td>50 Amps @ 9 KV</td>
<td>Air</td>
<td>Vac./Vac.</td>
<td>6” x 13.2” x 13.4”</td>
</tr>
<tr>
<td>ATS-20</td>
<td>2000 W</td>
<td>65 Amps @ 9 KV</td>
<td>Air</td>
<td>Vac./Vac.</td>
<td>6” x 13.13” x 13.38”</td>
</tr>
<tr>
<td>ATS-30</td>
<td>3000 W</td>
<td>75 Amps @ 9 KV</td>
<td>Water</td>
<td>Vac./Vac.</td>
<td>6” x 13.13” x 13.38”</td>
</tr>
<tr>
<td>ATS-50/125</td>
<td>5000 W</td>
<td>120 Amps @ 6 KV</td>
<td>Water</td>
<td>Vac./Vac.</td>
<td>7.5” x 14.7” x 14.4”</td>
</tr>
<tr>
<td>ATS-50/140</td>
<td>5 – 10 KW</td>
<td>140 Amps @ 6 KV</td>
<td>Water</td>
<td>Vac./Vac.</td>
<td>9.5” x 16.12” x 17”</td>
</tr>
<tr>
<td>ATS-100/160</td>
<td>10 – 15 KW</td>
<td>160 Amps @ 6 KV</td>
<td>Water</td>
<td>Vac./Vac.</td>
<td>Custom</td>
</tr>
<tr>
<td>ATS-150/180</td>
<td>15 – 20 KW</td>
<td>180 Amps @ 6 KV</td>
<td>Water</td>
<td>Vac./Vac.</td>
<td>Custom</td>
</tr>
<tr>
<td>ATS-250/250</td>
<td>15 – 30 KW</td>
<td>250 Amps @ 6 KV</td>
<td>Water</td>
<td>Vac./Vac.</td>
<td>Custom</td>
</tr>
</tbody>
</table>
Introduction
robeko provides a wide range of high performance thin film coating materials for magnetrons of all manufacturers and a large variety of applications, for example large area coating, precision optics, touch panels, tribological and decorative coatings.

Our supply chain consists of own manufacturing capabilities combined with long-term partnerships to assure maximum quality, minimal lead times and highly competitive prices.

Sputtering Targets
We supply a comprehensive range of sputtering targets used both in R&D and industry.
Beside our core products chromium, titanium, silicon and aluminium we also provide refractory metals like tantalum or niobium. The spectrum is topped off with ceramic materials like SiO₂, Nb₂O₅ and HfO₂. For the complete range, please turn to the end of the "materials" section.

Targets can be delivered in cylindrical shape for rotatable magnetrons as well as in all common plane geometric shapes such as, for example, circles, triangles, rings and racetrack style.

Purity starts with commercial industry standards as low as 99.2 % but can also reach an ultra high grade of 99.9999 %.

Evaporation Materials
robeko evaporation materials are used in many different applications like e-beam and thermal evaporation. Our comprehensive range covers materials for ophthalmic products, precision optics, contact coatings, microelectronics, etc.
Forms of supply include tablets, pellets and granules in various optimized mesh sizes.

Manufacturing
Targets are manufactured by combining in-house capabilities such as continuous casting, milling and cleaning with external resources for HP, HIP, water jet cutting, high volume machining, etc.

Commodities like titanium, chromium, aluminium and copper are stocked in adequate production quantities and machined to order, thus assuring short lead times.

An optimized supply chain, standardized production processes and testing procedures ensure that the premium quality standards can be maintained and the goods can be tracked.

Quality
Our commitment to quality is manifested in industry standards such as fully described production charts, incoming inspections, material certifications, batch and serial numbers. In addition, we characterize and develop materials in our sputtering machines. These processes range from simple power tests to the definition of layer properties. Material can be analyzed in-house by aid of the Fischerscope XDAL.

Recycling
Due to the ongoing shortage of raw materials and to increasing costs, recycling of waste sputtering targets becomes more and more interesting. robeko reclaims used targets which are either refined for the production of new targets or delivered to other metal processing companies.

Recycling is most efficient for refractory materials like, for example, Cr, Mo, Ta, Nb as well as for ITO, Sb₂Te₃, Cu and Co.
**Targets & Evaporation Materials**

### Pure metals

<table>
<thead>
<tr>
<th>Material</th>
<th>Purity</th>
<th>Planar target</th>
<th>Cylindrical target</th>
<th>Evaporation material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>2N – 6N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>B</td>
<td>3N</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C</td>
<td>3N – 6N</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Cr</td>
<td>2N – 3N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Co</td>
<td>3N</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Cu</td>
<td>4N – 5N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fe</td>
<td>3N</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gd</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>In</td>
<td>3N – 6N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ni</td>
<td>2N – 4N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Si</td>
<td>5N – 6N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sn</td>
<td>3N – 4N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ti</td>
<td>Gr 1, Gr 2, 4N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zn</td>
<td>2N – 5N</td>
<td>X</td>
<td></td>
<td>X</td>
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### Refractory metals

<table>
<thead>
<tr>
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<th>Cylindrical target</th>
<th>Evaporation material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mo</td>
<td>3N – 3N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Nb</td>
<td>3N5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ta</td>
<td>3N5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>W</td>
<td>3N – 5N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zr</td>
<td>2N – 5N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
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</table>

### Precious metals

<table>
<thead>
<tr>
<th>Material</th>
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<th>Cylindrical target</th>
<th>Evaporation material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag</td>
<td>3N – 5N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Au</td>
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<td>X</td>
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<tr>
<td>Ir</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pd</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pt</td>
<td>3N – 6N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Ru</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
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</table>

### Alloys

<table>
<thead>
<tr>
<th>Material</th>
<th>Purity</th>
<th>Planar target</th>
<th>Cylindrical target</th>
<th>Evaporation material</th>
</tr>
</thead>
<tbody>
<tr>
<td>CuGa</td>
<td>4N – 5N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>CuSn</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>IrSn</td>
<td>3N5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NiCr</td>
<td>2N – 3N5</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>NiV</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sn2Te3</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SnAl</td>
<td>3N</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TiAl</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WTi</td>
<td>3N – 4N</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZnAl</td>
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</tr>
<tr>
<td>ZnSn</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
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</table>

### Ceramics

<table>
<thead>
<tr>
<th>Material</th>
<th>Purity</th>
<th>Planar target</th>
<th>Cylindrical target</th>
<th>Evaporation material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al2O3</td>
<td>3N – 4N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>B2C</td>
<td>2N5</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HfO2</td>
<td>3N5</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>ITO</td>
<td>4N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MoS2</td>
<td>2N5</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Nb2O5</td>
<td>2N – 4N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SiN4</td>
<td>2N5</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SiO</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SiO2</td>
<td>4N5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ta2O5</td>
<td>4N5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>TiB2</td>
<td>4N5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>TiOx</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ZnO:Al2O3</td>
<td>4N</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>ZrO2</td>
<td>3N</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Copper

robeko manufactures planar and cylindrical sputtering targets for application in electronics and display production. We provide cylindrical monolithic targets of industrial standard size. Thus we guarantee maximum material density, small grain size and maximum power density combined with good recyclability. The raw material is always on stock.

**Target size – PLANAR**
- Thickness up to 25 mm
- Diameter (max) = 400 mm
- Target length (max) = 3000 mm

**Target size – ROTATABLE**
- Inner diameter = 125 mm
- Outer diameter (max) = 163 mm
- Target length (max) = 2800 mm

**Applications**
- Touch panels
- TFT LCD
- EMV metallization

### Specifications

<table>
<thead>
<tr>
<th>Density (%)</th>
<th>Purity (%)</th>
<th>Electrical resistance (µΩ·cm)</th>
<th>Thermal conductivity (W/mK)</th>
<th>Grain size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 99.9 (8.96 g/cm³)</td>
<td>&gt; 99.99 (4N)</td>
<td>1.69</td>
<td>408</td>
<td>180 µm acc. ASTM</td>
</tr>
</tbody>
</table>

### Typical analysis

<table>
<thead>
<tr>
<th>Composition Cr &gt; xx.xx %</th>
<th>Impurities, ppm, less than</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Al</td>
</tr>
<tr>
<td>99.5</td>
<td>20</td>
</tr>
<tr>
<td>99.9</td>
<td>15</td>
</tr>
<tr>
<td>99.95</td>
<td>20</td>
</tr>
</tbody>
</table>

Chromium

robeko supplies high quality materials such as hipped chromium targets with purity grades ranging from 99.5 to 99.99 %.

- 100 % density = 7.19 g/cm³
- Dimensional stability
- Enhanced mechanical properties
- Uniform grain size distribution
- Small grain sizes

**Target size – PLANAR**
- Single piece up to 2000 mm
- Multi-assemblies/bonded to copper backing plate
- Manufactured to customer specifications

**Target size – ROTATABLE**
- Backing tube diameter = 133 x 4 mm, Cr thickness 10–15 mm
- Manufactured to customer specifications
- Hipped or sprayed

**Applications**
- Decorative coatings
- Mirrors
- TFT LCD
Aluminium

robeko supplies high quality aluminium targets with purity grades ranging from 99.2 to 99.9999%.

- 100% density = 2.70 g/cm³
- Uniform grain size distribution
- Enhanced mechanical properties
- Small grain sizes

Target size – PLANAR
- Monolithic target/single piece up to 2.250 mm
- Alternatively multi-assemblies/bonded to backing plate; max dimensions up to 3.800 mm
- Manufactured to customer specifications

Target size – ROTATABLE
- Tube length up to 2.250 mm
- Sprayed targets for length over 2.250 mm
- Al thickness 6–15 mm
- Monolithic target tube with machined customized target end flanges

Applications
- Mirrors, Solar reflectors
- Decorative coatings

Aluminium Alloys

- AlMgSi
- AlSi
- ASiCu
- AICu

Specifications

<table>
<thead>
<tr>
<th>Shape</th>
<th>Manufacturing</th>
<th>Purities</th>
<th>Max size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planar</td>
<td>Cast</td>
<td>99.5-99.99%</td>
<td>Bonded Up to 3.800 mm</td>
</tr>
<tr>
<td>Cylindrical</td>
<td>Sprayed</td>
<td>99.5-99.95%</td>
<td>Up to 3.800 mm</td>
</tr>
<tr>
<td>Cylindrical</td>
<td>Monolithic</td>
<td>99.5-99.99%</td>
<td>Up to 2.250 mm</td>
</tr>
</tbody>
</table>

Titanium and Titanium Alloys

robeko supplies high quality Ti targets with purity grades ranging from 99.2 (grade 1–2) to 99.99% and Ti alloys like TiAl6/TiAl50.

- 100% density = 4.51 g/cm³
- Enhanced mechanical properties
- Uniform grain size distribution
- Small grain sizes

Target size – PLANAR
- Single piece up to 3.800 mm
- Monolithic target
- Alternatively Ti tiles bonded onto backing plate
- Manufactured to customer specifications

Target size – ROTATABLE
- Tube length up to 3.800 mm
- Ti thickness 10–15 mm
- Monolithic target tube with customized target end flanges

Applications
- Tribological layers
- Anti reflective layers

Nickel Chromium

- Purity 99.5–99.95%
- Uniform grain size distribution
- Small grain sizes

PLANAR
- Single piece up to 3.800 mm
- Monolithic target or bonded onto backing plate

ROTATABLE
- Single piece up to 3.800 mm

Applications
- Tribological layers
- Buffer layers
Introduction
Many sputtering targets need to be bonded to a backing plate or a magnetron body. When it comes to high power sputtering with low target cracking and good mechanical stability, the bonding procedure is crucial.

Our engineers and bonding staff can look back on many years of experience in providing joining techniques to correlate with different material combinations and applications. The right choice of adherence coating, diffusion barriers and the adequate bonding method is a prerequisite for obtaining perfect results.

Bonding Technologies
robeko bonding processes ensure the thermal integrity of the interface between the system’s cooling assembly and the target surface which suffers most of heat exposure. In cooperation with our customer we select the best joining technique for assembling the target/backing plate from one of the following bonding methods:
- Indium bonding
- Nanobond
- Elastomer bonding
- Epoxy bonding (conductive)

The two main methods are described in the following.

Indium Bonding
Sputtered intermediate layers and Indium or Indium-based solders are used in the prevailing technology. Backing plates and targets are wetted with Indium, placed onto each other and aligned at about 160 °C. After fixation the assembly is allowed to cool down to room temperature.

Nanobond
Nanobond can be performed at room temperature. Using a reactive foil as a heat source between target and backing plate, this method causes low thermal stress, creates high bonding coverage and allows higher sputtering power densities effected by solders with higher melting points. Nanobond is a superior method of bonding materials with dissimilar expansion coefficients.

Backing Plates and Tubes
Planar backing plates and cathode bodies are manufactured mainly from high purity copper which boasts the best thermal properties. The backing plates can also be composed of different materials such as titanium, molybdenum and stainless steel if required.

For rotatable magnetrons we supply backing tubes made of stainless steel and titanium. We can provide any length up to 4000 mm. Our backing tubes, 133 x 4 mm in thickness, are manufactured from cold drawn seamless pipes according to the industry standard OD. Other dimensions like 160 mm OD are available at request.

Workshop Equipment
- Sputter system for backside metallization
- Ultrasonic wetting system
- Four bonding tables, maximum length 3800 mm
- Remelting furnace for solder
- Hydraulic press for Nanobond
Introduction

Our coating department focuses on the development of coatings for new applications and on the evaluation of components and materials.

robeko is your partner for any development from basic performance tests to the creation of new products including pilot and low volume production.

These are the principle steps of development:

- Definition of coating properties/customer request
- Quotation
- Feasibility study
- Demonstration coating development
- Coating of customer substrate and optimization
- Pilot production
- Technology transfer to customer

Collaboration with the University of Kaiserslautern and the Fraunhofer Society enables us to quickly analyze deposited films and to push in new directions to find individual solutions for the problems of our customers.

robeko sets a high value on long-term development. We were invited to participate in publicly funded programs as an industry partner for the following activities:

- Material development
- Component development
- Process development
- Creation of machine concepts for process industrialization

Past Projects

- Scratch resistant coatings (EU – FP7)
- Reactive multilayers for microelectronics (BMBF) (see image on the left)
- Polymer evaporation source (ZIM)
- Metal-polymer multilayer films (ZIM)

Erika - Batch Coater

- DC glow discharge plasma treatment
- 3x 6” Magnetrons
- DC, bipolar pulsed and unipolar pulsed power supplies
- Metallic and reactive oxide and nitride coatings

Substrates

- Max. Ø200 mm
- 125 mm ± 5% homogeneity

Existing Coatings

- Metalizing of plastics, ceramics and glasses
  - Solderable coatings
  - Electrical contact
  - Decoration
- Optical coating on glass
  - Anti-reflex coating on sapphire
  - Scratch resistant coating on quartz
- Reactive multilayers
  - Direct soldering of microelectronics

Benefits

- No uncoated area due to substrate mounting
- Lowest cost on small substrates and low volume batches
Doro — In-Line Coater

- Radiant heater -350° C
- DC glow discharge plasma treatment
- AC glow discharge plasma treatment
- SCI Dual Magnetron Plasma Treatment
- 3x PK 750 Magnetrons
- 2x SCI internal mount TC end blocks for 550 mm length dual rotatable targets
- DC, MF, bipolar pulsed and unipolar pulsed power supplies
- Metallic and reactive oxide and nitride coatings
- In-Situ reflectometry measurement

Substrates

- Max. 640 x 800 x 35 mm
- 300 x 700 mm ± 5% homogeneity

Existing Coatings

- Metallizing of plastics, ceramics and glasses
  - Solderable coatings
  - Electrical contact
  - Decoration

- Optical coatings
  - High rate Al₂O₃
  - High rate SiO₂

- Decorative Coatings
  - Dichromatic Coatings
  - Black Chrome
  - Reactive multilayers
  - Direct soldering of microelectronics

 BENEFITS

- Precise optical coatings due to online measurement
- Simultaneous coating of both sides possible
- Big substrates
- Production process simulation for coaters with SCI rotary magnetrons
Stella - Batch & Bulk Ware Coater
- AC glow discharge plasma treatment
- 2x PK 500 Magnetrons
- DC and unipolar pulsed power supplies
- Metallic and reactive oxide and nitride coatings
- Bulk ware coating in tumble drum

Substrates
- Bulk ware: 2 to 30 mm (spherical equivalent)
- Batch coating: 300 x 300 x 10 mm

Existing Coatings
- Metallizing of plastics, ceramics and glasses
  - Catalyst
  - Electrical contact
  - Decoration

Benefits
- Coating of small 3D substrates in bulk ware process
- Lowest cost on medium sized substrates and low volume batches
- Lowest cost on small substrates with high volume batches
- Simultaneous coating of both sides possible

Laboratory Equipment

Fisherscope XDAL XRF
- Measurement of characteristic x-ray emission
- Calculation of material composition and film thickness
  - Multilayer possible

Sentech FTPadv Reflectometer
- Measurement of spectral reflectance/transmittance
- Calculation of film thickness and refractive index
  - Multilayer possible

Jandel RM3-AR 4 Point Probe
- Measurement of sheet resistance
- Qualitative information on film thickness, density or composition

Nabertherm 1100°C Furnace
- Tempering of thin films
- Stress testing

Sauter FH 500 Newton Meter
- Thin film adhesion testing

Projekt Elektronik
FM210 Teslameter
- Measurement of magnetic field strength

Bruker Dektak II A
- Measurement of roughness and step height
- Measurement of film thickness with masked substrates

Sentech SE 801 - Ellipsometer
- Measurement of amplitude change and phase difference of polarized light
- Calculation of film thickness and refractive index