SURAGUS
Sensors & Instruments

EddyCus® TF inline A – Inline Anisotropy Monitoring System

P_T_inlineA_20

Highlights

- Contact-free and realtime
- Accurate measurement
- High degree of variability and flexibility
  - In- and ex-vacuo solutions
  - Fixed sensor and traverse solutions
  - Single-lane and multi-lane solutions
- High sample rate up to 1,000 measurements per second

Sensor Series

- Metal thickness (nm, µm)
- Sheet resistance (Ohm/sq)
- Emissivity
- Conductivity / resistivity (mOhm·cm)
- Electrical anisotropy (%)
- Weight (g/m²) and drying status (%)
- Permeabilty (H/m) *Beta*

Applications

- Touch panel sensors (TPS)
- Printed electronics
- Wearable electronics
- Smart textiles
- Photovoltaics
- Smart / switchable films
- Medical surfaces and devices
- Biological sensors
- Aerospace, automotive, transportation
- Semiconductor and memory
- Energy storage

Materials

- Nanowire films
  - Conductive NW (Ag, Ni, Pt, Au)
  - Semiconductor NW (Si, SiC)
  - Magnetic NW (Fe_3O_4–AgNWs)
  - Multilayer NW (ZnO/AgNW/ZnO)
- Carbon Nano Tubes and Buds
- Fiber reinforced composites
- Metal meshes, smart meshes
- Anisotropic grain / domain materials
- Anisotropic effect / defect directions (cracks, line defects)

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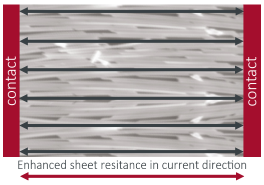
Made and Engineered in Germany

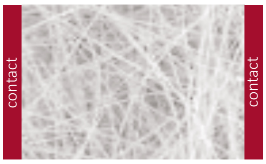
Anisotropy Term and Concept

- Electrical anisotropy refers to a difference in electrical resistance depending on the direction of current flow
- Wire and mesh structures can have anisotropic resistances
- Bulk materials with dominant directional characteristics / effects / defects can also have electrical anisotropy
- Anisotropy can be optimized to the layout of the contacts
- Anisotropy can save material and improve optical transparency to sheet resistance ratio
- Described by anisotropy direction and strength
- Both characteristics must be obtained at the same position
- The anisotropy strength is calculated using the lowest and highest resistance that align in perpendicular directions
- Inline deposition, e.g. slot die coating on moving web, tends to create lower resistances in machine direction "MD" and higher resistance in traversing direction "TD"
- Calculation as ratio of lowest and highest resistance

Anisotropic Wire Film

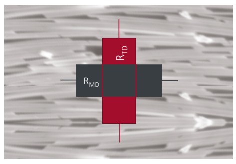


Isotropic Wire Film



Anisotropy Ratio $= \frac{R_{HIGHEST}}{R_{LOWEST}}$

Anisotropy Ratio $= \frac{R_{TD}}{R_{MD}}$



Device Characteristics

Sheet resistance measurement technology	Non-contact eddy current sensors with directed current induction
Substrates	Foils, glass, wafer, etc.
Measurement gap size	5 / 10 / 15 / 25 / 50 / 75 mm
Number of sensor pairs / monitoring lanes	1 – 99
Sensor sizes (W x L x H) in mm	Sensor M: 80 x 100 x 66 Sensor S: 34 x 48 x 117
Sheet resistance range	0.01 – 1,000 Ohm / sq; 1 to 5 % accuracy
Anisotropy range	0.33 – 3 (larger upon request)
Environment	Ex-vacuo/ in-vacuo @ T < 60°C / 140°F (higher upon request)
Sample rate	1 / 10 / 50 / 100 / 1,000 measurements per second
Hardware trigger	5 / 12 / 24 V
Interfaces	UDP, .Net libraries, TCP, Modbus, analog/digital
Further available features	Metal thickness, optical transmittance & reflectance (OEM)

Device Control and Software

- Several views and user levels
- Live view with upper and lower limits and alarm functions
- Analysis view providing statistics
- Can handle data of several thousands measurements per second
- Data storage into SQL database
- Customizable automated data export (csv, txt, xls,...)
- Several smart functions (automated DB cleaning, self-reference etc.)
- Parameterizable I/O modules (triggering of actions or alarms)