

Ultrafast response, flow stability of MFCs deliver key advantages for thin film processes

Uniform film properties using the right mass flow controller

Thin film deposition processes rely on a stable, reproducible and quick gas flow control for sputtering and process gases. The right mass flow product can deliver critical advantages toward achieving high deposition performance.

Thin film deposition: Experiencing unprecedented growth

Deposition of thin films—coatings from a few nanometers to about 100 micrometers—is a key process step in a number of industries today. Thin film processes such as Chemical Vapor Deposition (CVD) or Physical Vapor Deposition (PVD) are used in industries ranging from semiconductor fabrication, solar panel production, and the coating of architectural glass.

Gas flow control: A key success criterion

Gas flow control for sputtering gases (typically Ar), process gases (O₂, N₂, etc.), as well as for precursors, is absolutely essential in achieving uniform film properties during thin film deposition. Of utmost importance are:

- **Reproducibility:** A highly reproducible gas flow control ensures reproducible thin film properties, thereby minimizing quality and inspection costs
- **Long-term stability:** Long-term stable performance is essential in avoiding deviations in film properties over time.
- **Quick reaction time:** In the coating chamber (usually held at near vacuum conditions), a number of parameters besides gas matrix must be controlled simultaneously and accurately, e.g. temperature and pressure. Since all of these parameters are interdependent, a quick mass flow controller response time lays the foundation for high coating efficiency.
- **Dynamic range:** Gas flow control over a wide flow range (down to a few sccm) is required for various process and precursor gases.



Thin film deposition processes rely on reproducible and quick gas flow control for maintaining coating process parameters..

Axetris MFC Advantages:

- ✓ Extremely high repeatability of < 0.15% Of Reading (O.R.)
- ✓ Excellent long-term stability (max. +/- 0.25% F.S. / year)
- ✓ Quick response time of < 150 ms
- ✓ Excellent dynamic range > 1000:1 provides flexibility in flow range selection with a single device

Technology Advantages with the Axetris mass flow technology

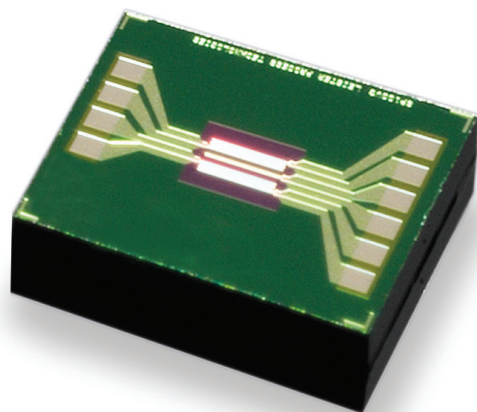
Axetris mass flow solutions are based on the in-house MEMS chip technology. This combined with smart electronic and software design, delivers key advantages for thin film applications. With Axetris, thin film deposition machine manufacturers have the ideal partner to support throughout the design process.

**Axetris mass flow meters and controllers
– Technology advantages for thin film applications**

Performance benefits at a glance:

- ✓ Repeatability < 0.15% O.R.
- ✓ Turndown Ratio > 1000:1
- ✓ High Accuracy < 0.2% F.S. 0-10% F.S.
< 1% F.S. for 10-100% F.S.
- ✓ Multigas He, H₂, N₂, Air, Ar, CO₂, O₂, etc.
- ✓ Reaction Time < 4 ms (mass flow sensor)
< 150 ms (mass flow controller)
- ✓ Pressure Coefficient +/- 0.2% O.R.
- ✓ Long-Term Stability +/- 0.25% F.S. per/year

O.R.: Of Reading; F.S.: Full Scale



Mass flow solutions from Axetris are based on the in-house MEMS technology, which delivers key advantages for thin film deposition applications.

About Axetris Mass Flow Meters and Controllers

Axetris offers OEM mass flow meters (MFM) and controllers (MFC) which offer outstanding value to the customer. The proprietary, platinum-based MEMS chip technology guarantees excellent accuracy and repeatability in combination with high speed and an extended dynamic range.

The Axetris mass flow technology is used by many leading companies in the fields of gas chromatography, leak testing, thermal analytics, mass spectroscopy, thin film deposition, plasma engineering and more.



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