

Mass Flow Meters and Controllers





Corporate Headquarters of the Leister Group, Switzerland

About Axetris AG

Axetris AG, a company of the Leister group, is serving OEM customers with micro technology based (MEMS) infrared light sources, laser gas sensors, mass flow sensors and controllers and micro-optical components used in industrial, process control, environmental, medical automotive and telecom applications.

Axetris supports its customers in many industries with in-depth application know-how. Our engineering and manufacturing teams combine broad experience in simulation, design, manufacturing and metrology from microchip level to advanced electronic and electro-

optic modules. Customers benefit from excellent product value, consistent high product quality and outstanding customer support. OEMs rely on Axetris as a competent and sub-system partner for a wide range of high-quality off-the shelf products as well as customer specific solutions from concept to volume production.

Axetris is ISO 9001 certified and ISO TS 16949 compliant and operates its own 6" to 8" wafer MEMS foundry in Central Switzerland for its own products and external customers.

High Performance Ultra Compact Mass Flow Meters and Controllers for OEM Applications

Complete range

From ultra compact mass flow meters and controllers for single gases up to highly integrated customized manifold units for measuring and controlling multiple gases, the new Axetris MFM / MFC 2000 product range is suited for a wide range of applications.

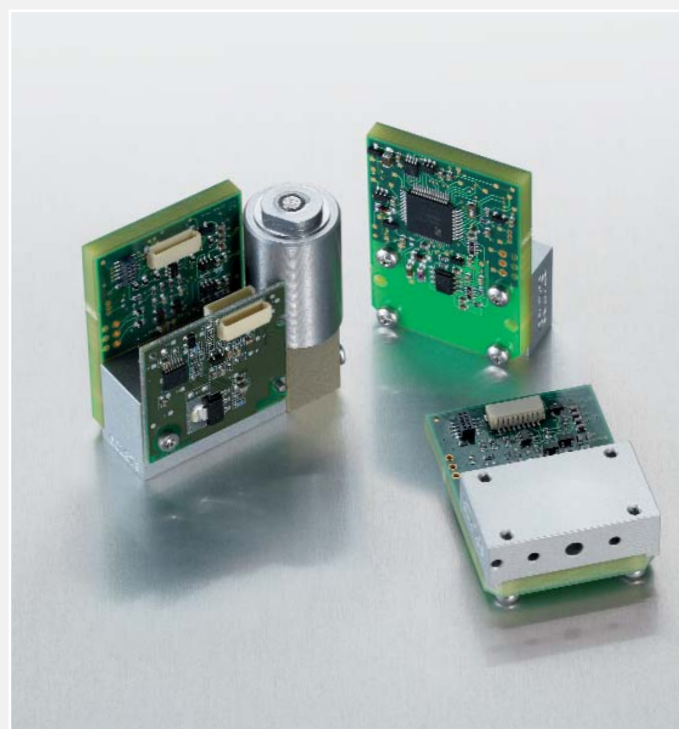
The modular design and broad range enables seamless integration of the newest flow sensing and control technology into your products.

High accuracy and short reaction time

The high accuracy and short reaction time open new possibilities for the controlling of gases with a speed and precision not possible before. This capability enables: tighter control of process parameters, increased system throughput, and reduced carrier gas consumption.

Compact size

The compact size of the Axetris mass flow sensors and controllers lets you add new functionality while reducing the size and weight.



Mass flow meter and controller modules

Low Flow

The new flow channel design allows measurement and control extremely low flows with unmatched repeatability and stability.

High turndown ratio

The unsurpassed high turndown ratio of more than 1000:1 enables broad range measurement and control of flow within one single unit.

Multi-gas / multi-range capability

Each module can be configured for different flow ranges and/or different gases thus reducing the part complexity.

Full calibration and compensation

Each Axetris MFM / MFC 2000 unit is delivered fully calibrated and temperature compensated. The calibration is NIST traceable.

Broad gas and flow range

The MFM / MFC 2000 products are available for a broad range of non-aggressive gases with flow ranges from below 20 sccm to 3000 sccm (standard cubic centimeters per minute). Even higher flow ranges can be reached with an external bypass.

Benefits

- MEMS based technology
- Compact size
- High accuracy
- Low flow capability
- High turn down ratio
- Short reaction time
- Multi-gas / Multi-range
- Excellent long term stability

Applications

- Analytical instruments
- Gas chromatography
- Mass Spectrometry
- Leakage detection
- Single and multiple gas metering and control
- Calibration and quality control
- Thin film process control

Mass Flow Meter and Controllers

Meters



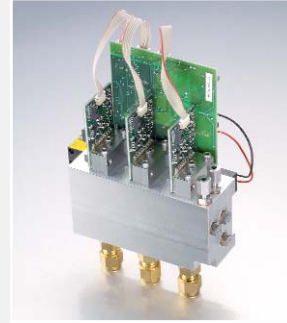
MFM 2020
MFM 2021

Controllers



MFC 2022

Custom Systems



MFY 20000
Series



MFM 2100
Series

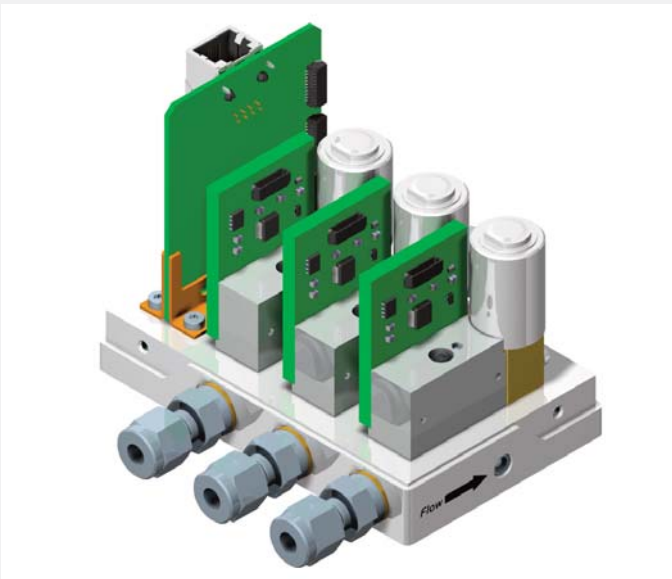


MFC 2100
Series



MFY 21000
Series

Note: Typical pictures are shown only. For the actual design variant and availability contact Axetris.



Customized gas mixing and blending systems

By integrating several mass flow meter, pressure sensor and controller modules into one common manifold, Axetris can build highly compact, customer specific systems exactly meeting your needs. In contrast to conventional manifolds using standard mass flow controllers an integrated manifold can be build more compact and cost effective.

Standard Product Range

	Type	Output						Input					Functionality				Supply Voltage	Main application / Remarks
		Flow			Temp.	PID Control Signal		Set point			Valve override		Valve	Compact Module	Stand- Alone	Multi Gas/ Multi Range		
		0...5 V	4...20 mA	Digital	Digital	Valve driver	0...5 V	0...5 V	4...20 mA	Digital	Analog	Digital						
Meter	MFM 2020	•		•	•								•		•	12 V	Compact digital meter module - For system integration - RS232 TTL, 0...5V	
	MFM 2120	•		•	•									•	•	24 V	Stand - alone digital meter - RS232, 0...5V	
	MFM 2130		•	•	•									•	•	24 V	Stand - alone digital meter - RS232, 4...20mA	
	MFM 2140			•	•									•	•	24 V	Stand - alone digital meter - RS485	
Meter with PID Output	MFM 2021	•		•	•	•	•	•	•	•		•		•	12 V	Compact digital meter module with additional - PID control output - Set point input - Valve override		
Controller	MFC 2022	•		•	•	•	•	•	•	•	•	•	•	•	•	24 V	Compact digital controller module - For system integration - RS232 TTL, 0...5V	
	MFC 2122	•		•	•	•		•	•	•	•	•		•	•	24 V	Stand alone digital controller - RS232, 0...5V	
	MFC 2132		•	•	•	•		•	•	•	•	•		•	•	24 V	Stand alone digital controller - RS232, 4...20mA	
	MFC 2142			•	•	•			•	•	•	•		•	•	24 V	Stand alone digital controller - RS485	

Modules for system integration

MFM 2020: A compact mass flow meter with a digital interface and 0...5 V analog output. Its small size makes it the ideal choice when space is a limitation. In addition it is the ideal product to build customized multi-channel gas metering units. The MFM 2020 also provides temperature along with meter status, and identity information. The digital interface supports configuration of gas, range and meter output response time.

MFM 2021: The advanced mass flow meter MFM 2021 includes an additional high precision PID controller with analog output, enabling direct, fast and accurate control of gas flows. The additional valve override functionality allows an immediate setting of the valve to the fully open or close position or any value in between.

MFC 2022: A compact mass flow controller created by integrating a fast acting valve and the driver electronics with the MFM 2021. It is the ideal choice to build up highly compact gas control systems.

Products for stand alone applications

MFM 21x0: A stand-alone mass flow meter with a complete housing that provides environmental and electrical protection to the MFM 2020. It is particularly suited to replace conventional mass flow or volume flow meters. Just like the MFM 2020, the full scale mass flow and the gas type can be changed via the digital interface. The following digital/analog interfaces are supported.
MFM 2120: RS232/ 0...5 Volt, MFM 2130: RS232/ 4...20 mA, MFM 2140: RS485.

MFC 21x2: A stand alone mass flow controller MFC 21x2 contains an integrated fast acting solenoid valve. Compared to conventional mass flow controllers it offers a smaller size, higher accuracy, a shorter settling time, along with multi-range and multi-gas capability.

The following digital/analog interfaces are supported.
MFC 2122: RS232/ 0...5 Volt, MFC 2132: RS 232/ 4...20 mA, MFC 2142: RS485.

The MFM 2100 and MFC 2100 series is available with D-SUB 9 or M12 electrical connector and with down port or side port gas connector.

Specifications

	Specifications		Standard ¹⁾
Gas	Flow range	Number of ranges	20, 50, 250, 3000 sccm (N ₂ equivalent) up to 8
	Gas	Non corrosive Number of gases	e.g. N ₂ , O ₂ , Air, CO ₂ , Ar, He, H ₂ up to 8
Calibration conditions	Standard cubic centimeter per minute	sccm	Reference conditions: t = 0°C, P = 1013 mbar absolute As an option user defined standard conditions (uccm) are available on request
Performance	Accuracy ²⁾	N ₂ , 25°C, 1 bar:	≤ 0.2 % F.S. for 0...10% F.S. ≤ 1 % O.R. for 10...100% F.S.
		N ₂ , 0...50°C, 1 bar:	≤ 0.5 % F.S. for 0...10% F.S. ≤ 2 % O.R. for 10...100% F.S.
	Pressure coefficient		± 0.2 % O.R. / bar N ₂
	Long term stability		± 0.25 % F.S. / year
	Response time	Sensor	4 ms
	Settling time	Controller	150 ms
Operating Conditions	Temperature	Operating	0...50°C
	Humidity	Non condensing	5...95 % R.H.
	Pressure range	Operating	0...10 bar ³⁾
		Burst Pressure	30 bar
Gas compatibility		Non aggressive gases	
Electronic interface	Digital interface	Protocol Input Output Connectors	RS232 (TTL level), RS232, RS485 Set point, gas and range selection, valve override Flow, PID control, temperatur D-SUB9, M12
	Analog input	Set Point Valve Override	0...5 V or 4...20 mA Force valve to open/close/normal position
	Analog output	Flow PID	0...5 V or 4...20 mA 0...5 V
Fluid	Interface	Material Connectors	Aluminium or stainless steel Down port / Side port
	Leak tightness	Meter	1x10 ⁻⁹ mbar l/s He
Power	Voltage	MFM 202x, MFC 2022, MFM 21x0, MFC 21x2	12 V ± 10 % 24 V ± 10 % 24 V ± 10 %
Size	L x H x B	MFM 2020, MFM 2021	34 x 48.5 x 16.4 mm
		MFC 2022	50.5 x 48.5 x 25 mm
		MFM 21x0, MFC 21x2	59.5 x 96.6 x 28.8 mm, Side port without fittings and electr. connection 79.5 x 84.6 x 28.8 mm, Down port without electrical connection
Weight		MFM 2020, MFM 2021	34 g
		MFC 2022	106 g
		MFM 21x0	274 g
		MFC 21x2	336 g, Side port without fittings, 3000 sccm F.S.

Technical data and specifications contained herein are subject to change without prior notice.

1) For other options and variants contact Axetris

2) Valid for 250 sccm and 3000 sccm full scale flow range. For other version contact Axetris

3) For MFC's the maximum operating pressure depends from the valve type. Contact Axetris for more details.

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

Benefits

- **MEMS technology**

The entire MFM / MFC product range is based on the proprietary Axetris mass flow sensor chip designed and manufactured in our own class 100 clean rooms in Switzerland.

- **High accuracy and long-term stability by platinum technology**

The micro machined chips from Axetris contain highly stable platinum resistors combined with a platinum heater. This guarantees an industry leading accuracy and long-term stability. Acknowledged by many of our customers these qualities improve overall system performance.

- **Compact size**

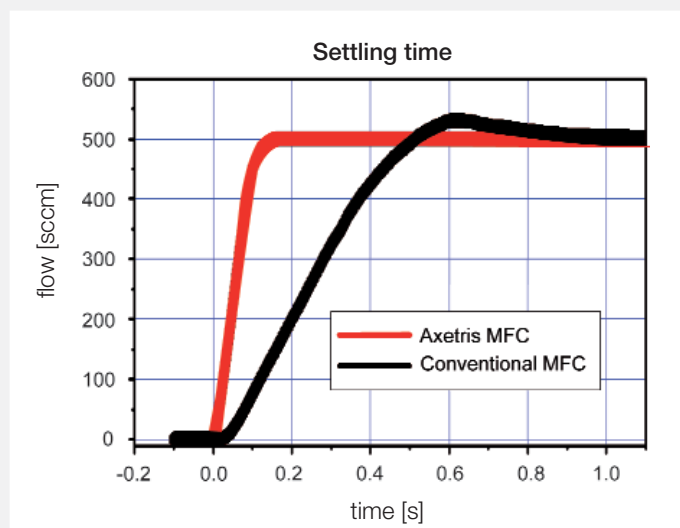
The Axetris mass flow meters and controllers are based on MEMS technology. This allows the built of very compact sensors and controllers. It enables OEM customers to reduce the size and weight of their systems and to integrate additional functionality.

- **Fast reaction speed**

Today's applications often require an exact gas flow or mixture even under changing pressure and temperature conditions. The high response speed of the Axetris mass-flow chip with a t_{90} of below 4 ms makes it possible to measure and control fast changing process parameters while maintaining high accuracy.

- **Flow range**

A broad flow range from 20 up to 3000 sccm is supported. With an external bypass even higher flows are possible. The multi-range capability allows configuration of the MFM / MFC 2000 for different flow ranges.



Compared to conventional products the Axetris mass flow controller has a much faster settling time and a superior control accuracy.

- **Multi-gas / multi-range capability**

The built-in multi-gas / multi-range capability allow to switch between different gases and measuring ranges.

- **Modularity**

Whether you need a single mass flow meter to integrate into your system, a stand alone mass flow controller or a complex gas handling system combining multiple mass flow controllers, with the MFC / MFM 2000 range we can customize a product exactly meeting your needs by relying on proven and tested building blocks.

- **Electronic interface**

The MFM / MFC supports various digital and analog interfaces you can choose from.

As the digital standard interface RS232-TTL level, RS232 or RS485 is provided.

- **Quality Control**

Axetris MFM / MFC products are entirely manufactured in Switzerland to the highest quality standards. Each MFM / MFC has a unique identity code. Factory and calibration data are stored in our factory guaranteeing full traceability.

- **Axetris competence**

With a team of experienced fluid dynamics engineers, state-of-the-art simulation tools and an advanced test and measurement laboratory, Axetris can assist you in integrating the MFM / MFC modules into your system in the best possible way.



Axetris mass flow sensor chip

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