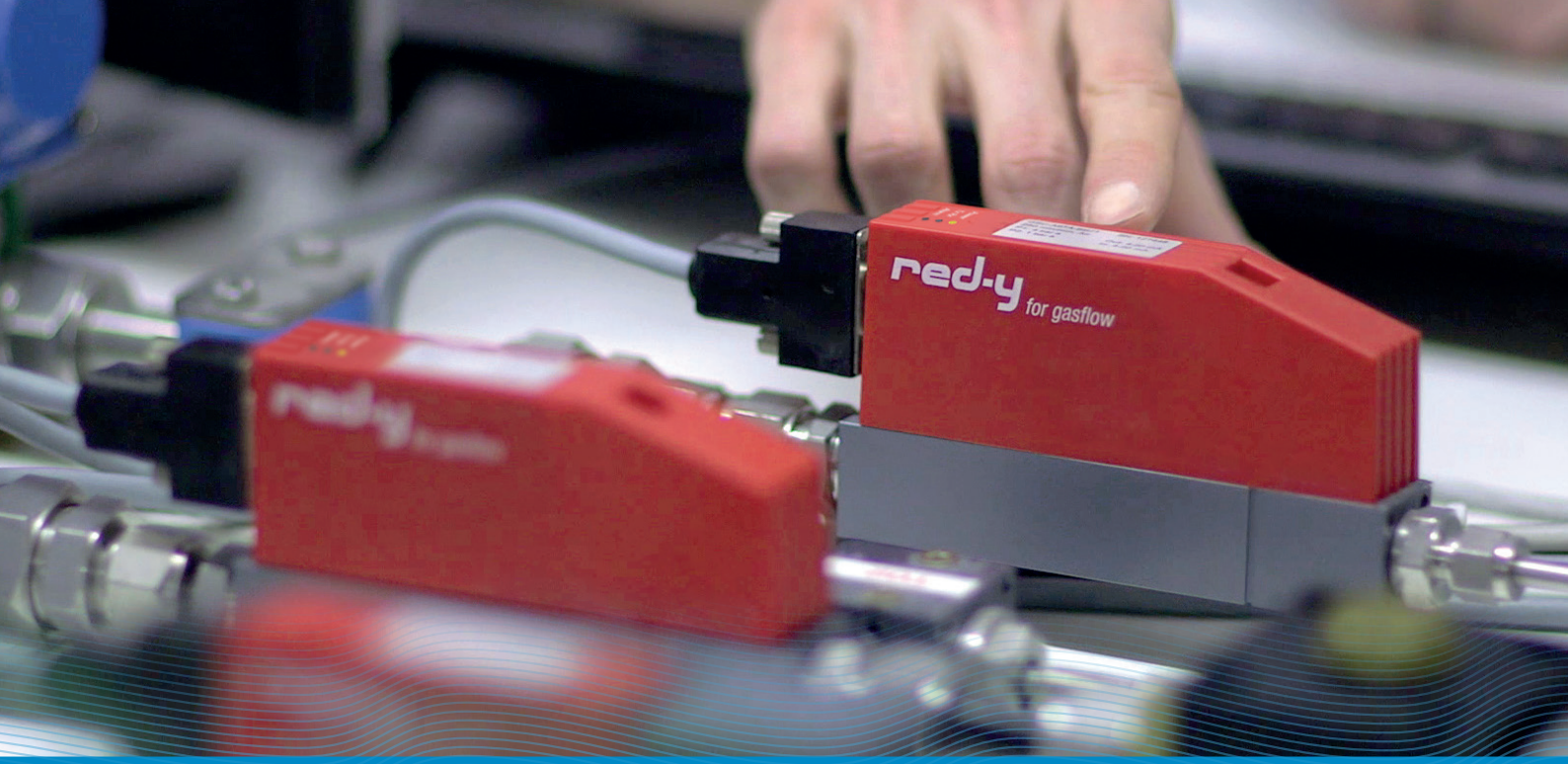
Reliable and Accurate Mass Flow Meters and Controllers for Gases

SWISS TECHNOLOGY

vögtlin instruments



High class. High quality. High accuracy.
Welcome to Vögtlin Instruments GmbH

Vögtlin is your Partner for intelligent and innovative gas flow measurement and control instrumentation.

Strong worldwide Sales, Service and Distribution Network

Vögtlin has been manufacturing gas flow meters since 1986. Since 2011 Vögtlin is a member of the TASI Flow Network which delivers flow meter, flow control and dispensing solutions. TASI Flow products are developed, customized and serviced through technical centers in the Switzerland, US, Germany and UK. Strategically located calibration centers in Europe, Asia and the US allow us to provide full service and application expertise close to our customers.

Innovative Products based on latest Technology

Our high-precision flow measurement and control devices are based on advanced semicon MEMS sensor technology. With more than 600k+ devices sold, Vögtlin is a respected global player in this market. Our dedication to needs part of our customers' success drives us to provide the best products and services possible.

Swiss Technology

swiss safety center ISO 9001 certified system

Vögtlin is a Swiss designer of precision flow instrumentation. For the last 35+ years our flow experts ensure high-value products and solutions for your flow measurement and control tasks. Our mass flow meters and mass flow controllers for gases with digital and analog output and IP67/NEMA6 and ATEX protection serve a wide range of applications: analytical, laboratory, pharmaceutical, scientific research, biotech/life science, OEM and other industrial applications.

The Vögtlin Team is looking forward to help you get the best flow solution!

For further information visit us at **www.voegtlin.com**

Application Overview

Our digital mass flow meters and controllers optimize numerous applications.

Applications \ Industry	Analytical Technology - Chromatography, Mass Spectrometers, Environmental	Energy - Fuel Cell, Natural Gas	Medicine / Biotechnology / Pharma / Life Science	Building Technology	Glass, Precision Glass Production	Semiconductor Industry	Laboratory - R & D / Technical University	Food Industry	Metallurgy	Surface Technology	Process Industry - Apparatus Engineering, Plant Engineering, Mechanical Engineering	Automotive / Aerospace / Aviation
Air Probe Sampler	✓		✓	✓		✓	✓	✓			✓	✓
Calibration Analyzer	✓		✓				✓	✓				✓
Calibration Equipment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Calibration of Test Equipment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coating Equipment (Vacuum and Plasma)					✓	✓	✓		✓	✓	✓	✓
3D Printer		✓	✓				✓		✓		✓	✓
Consumption Measurement				✓			✓				✓	✓
Food Production	✓						✓	✓			✓	✓
Fuel Cells	✓	✓		✓		✓	✓			✓	✓	✓
Furnace Building	✓	✓			✓	✓	✓		✓	✓	✓	✓
Gas Analyzers	✓	✓	✓				✓	✓			✓	✓
Gas Chromatography	✓	✓	✓				✓	✓	✓		✓	✓
Gas Generator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gas Metering	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gas Mixer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gassing Bioferments Reagents	✓		✓			✓	✓	✓	✓	✓	✓	✓
Gassing of Molten Metals	✓								✓		✓	✓
Ice Cream Manufacturing and Chocolate Aeriation								✓			✓	
Laser Welding & Cutting	✓						✓		✓		✓	✓
Leak Testing		✓	✓	✓			✓	✓			✓	✓
Part Inspection			✓		✓		✓		✓		✓	✓
Regulation of Gas Atmosphere	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Spray Drying			✓					✓				
Torch Control / Flame Control		✓	✓		✓		✓		✓		✓	✓
Support Air Control (Tube Production, Catheters)			✓				✓		✓		✓	✓

Intelligent. Innovative. Impressive.
Our Mass Flow Meters & Controllers for Gases

The Vögtlin product line-up covers thermal and differential pressure mass flow meters and mass flow controllers for gases. It includes versions with integrated battery for mobile applications with built-in touch display, others come equipped with digital and analog interface, IP67/NEMA6 protection and/or ATEX certification.

red-y smart series

Reliable and accurate:

Thermal Mass Flow Meters and Controllers

Technology and industry standard interfaces make the red-y smart series thermal mass flow meters (MFM) and mass flow controllers (MFC) particularly suitable for measurement and control in gas delivery systems and plant engineering applications.

- High-precision measurement
- Analog and digital interface
- Safe and fast control
- Long-term stability with 3 years warranty

red-y compact series

Independent digital convenience:

Battery Powered Digital Mass Flow Meters and Controllers

The devices offer a new level of ease of use: compact design with battery power, backlit touch display and extended alarm function.

- AA battery and USB power
- MEMS sensor technology
- High accuracy & dynamics
- Wide choice of flow units
- Options: 24 Vdc power supply, alarm module and 4/20 mA + pulse out

red-y industrial series

High accuracy for heavy duties:

Mass Flow Meters and Controllers with IP67 Protection and ATEX zone 2 certification

Reliable technology and industry standard interfaces for rough environments: Our tried and tested thermal mass flow meters and controllers for gases of the red-y smart series available as IP67/NEMA 6 version.

- Accurate & fast measurement/control
- Analog (mA & Vdc)
- Digital interfaces (Modbus, optional Profinet, EtherCAT, Ethernet/IP, Profibus)
- Options: Multigas (up to 10 gases)

red-y smart pressure controller

Pressure and flow in a single device:

Pressure Controller with integrated Flow Measurement

The electronic red-y smart pressure controller combine the reliable technology of our digital mass flow controllers with electronic pressure control. On-the-fly switching between pressure control and flow control offers maximum flexibility.

- Pressure controller with flow measurement/limitation
- Flow controller with pressure measurement
- Pressure and back pressure devices
- Analog and digital interface

Free software

Easy device access:

Efficient Management for our Mass Flow Instruments

With the free software, users now have PC access to all connected Vögtlin measuring and control devices.

- Display all key device information
- Extensive diagnostics
- Switch measurement units & gas type
- Plug & play with USB cable
- Logging and visualizing selected process data

OEM applications

Customized Solutions:

Optimize and Simplify your Processes with our Customized and Modular Flow Solutions

For a wide range of applications the thermal mass flow meters and mass flow controllers offer you a significant optimization and simplification of your processes.

Ask your Sales Partner for more information and read our applications stories on **www.voegtlin.com**

d·flux multi series

High flows and amazing flexibility:

Multi-Parameter Mass Flow Meters and Controllers for Gases

The d·flux multi series is a fast and reliable multi-parameter mass flow device for gases with measurement outputs for mass, normalized and volumetric flow, pressure and temperature.

The instrument is based on differential pressure measurement over an internal advanced laminar flow element. One of the many advantages of this laminar flow device is the ability to easily switch to a different gas without a loss in accuracy.

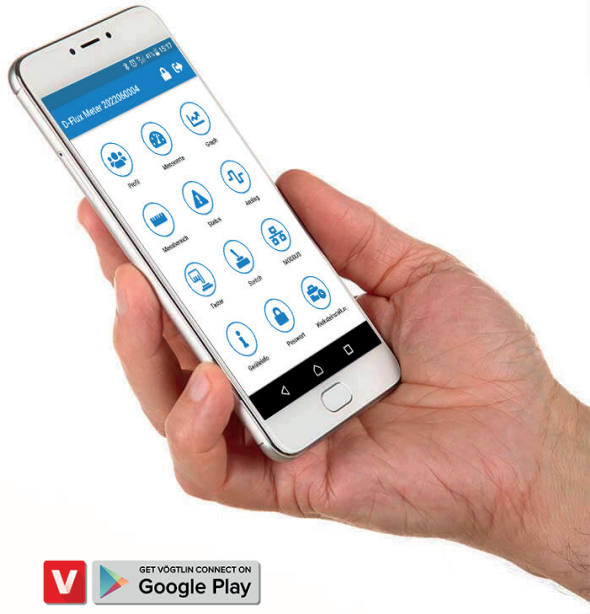
- Flow rates up to 1400 ln/min (gas depended, H2 2900 ln/min)
- State-of-the-art communication
- Multiple pre-programmed gases
- All stainless wetted and special H2 units available

Why do we see more and more Bluetooth® configuration tools in flow meters and do they work?

Modern flow meters get smarter and have more options, that need to be configured, selected and optimized. To build all “configurating” in the PLC is not effective, in general we use separate software for that, often under MS Windows®.

Bluetooth® and an Android app are convenient and do not need any cables. Most people have their phone with them most of the time.

The Vögtlin d·flux multi gas flow meter and controller is configurable over Bluetooth® with an intuitive app. No need to study manuals for hours and it is free of charge. Have a look at our flow meters and controllers from 1 mln/min to 1400 ln/min. We have convenient solutions that are affordable! The Vögtlin Connect App is free of charge and can be downloaded from the **Google Play store**.



SmartTrak® series

High Performance Capillary:

Premium Capillary Mass Flow Meters and Controllers for Gases

The SmartTrak® thermal mass flow meters and mass flow controllers are true multi-gas digital MFC designed to deliver smooth, stable, accurate, and repeatable gas mass flow control you can rely on, every time.

- Measure and control gas mass flow rates up to 500 ln/min
- True linear performance provides high accuracy and great flexibility in multiple gases
- Pressure up to 35 barg
- Ideal for OEM, industry or research applications

Durable. Modular. Classical.
Our Variable Area Flowmeters and Needle Valves

Our variable area flowmeter and manual needle valve product line provides great functionality and design:

Q-Flow

Attractive design and quality materials:

Variable Area Flowmeters

Our proven Q-Flow is a modern VA-flowmeter for gases built on the variable area principle. Designed in close collaboration with users, it combines our long experience and practical shop-floor + OEM requirements.

- Compact and slender design
- Glass measuring tubes in 3 sizes
- Body in aluminium or stainless steel
- Panel mounting design (plug-in)
- Optional 15-turn control valve for smooth and accurate adjustment

M-Flow

Precise setting and tightly closing:

High Precision Control Valves

Vögtlin's M-Flow micro needle valves were developed for fine dosages of gases and liquids and are the ideal solutions for precise OEM applications.

- High-precision flow rate setting
- Leak-proof when closed
- 15 turn spindle, no hysteresis
- Optional digital display for reproducible settings

Product Overview

Instrument types			
	red-y smart series Meter GSM / Controller GSC	**red-y industrial series** Meter GIM / Controller GIC	**red-y compact series** Meter GCM / Regulator GCR
Flow ranges (Air)	0–25 mln/min to 0–450 ln/min		
Sensor	MEMS / CMOS		
Accuracy and dynamics	Standard: ± 1% of full scale, dynamic range 1:50 Optional: ± 0.3% of full scale + ± 0.5% of reading, dynamic range 1 : 100, extended dynamic range up to 1 : 1000 on request		Standard: ± 2% of full scale Dynamic range 1:50 Optional: ± 1% of full scale Dynamic range 1 : 100
Gases	Air, N2, O2, Ar, CO2, H2, He, CH4, C3H8 other gases and gas mixtures on request		
Response time	Meters ~80 ms Controllers ~500 ms		Max. 300 ms
Repeatability	± 0.2% of full scale		± 0.5% of full scale
Long term stability	< 0.2% of measured value / year		
Operation pressure	Max. 10 barg		
Operation temperature	0–50°C		
Body materials	Aluminium Optional: Stainless Steel	Stainless Steel	Aluminium Optional: Stainless Steel
Sealing materials	FKM, EPDM (FDA) or FFKM	FKM, EPDM (FDA) or FFKM	FKM or EPDM (FDA)
Warm-up time	< 1 seconds for full accuracy		
Display	Optional	None	Standard
Communication (analog / digital)	Standard Modbus RTU and Analog Option: ProfiBus / Profinet RT / EtherCAT / Ethernet IP™		Optional: 4–20 mA/Pulse or Alarm outputs
Process connections	Up to 60 ln/min air: 1/4″ female (BSPP) Above 60 ln/min air: 1/2″ female (BSPP) Optional: Fittings		
Inlet path	None required		
Ingress Protection Class	IP50	IP67	IP50
Certifications		ATEX Certification: II 3G nA IIC T4 Gc II 3D Ex tc IIIC T100°C Dc	
	CE, RoHs, REACH and WEEE compliant. For some models ISO10204 2.1 or 3.1 certifications on request. All units with EPDM are FDA/USP Class VI compliant and ADI free		
Warranty	3 years		

		**Instrument types**
SmartTrak series Meter / Controller	**d·flux** Meter DFM / Controller DFC	
0–10 mln/min to 0–500 ln/min	0–350 ln/min to 0–1400 ln/min	**Flow ranges (Air)**
Capillary	Differential pressure	**Sensor**
Accuracy: ± 1.0% of full scale Dynamic range 1 : 50 (Controller), 1 : 100 (Meter) Accuracy: ± 0.5% of full scale	Accuracy: ± 0.3% of user full scale ± 0.7% of measured value Optional: ± 0.5% of user full scale ± 1 % of measured value Dynamic range 1:100 (optional 1:1000)	**Accuracy and dynamics**
All gases and gas mixtures that are compatible with the selected material	Most gases and gas mixtures that are compatible with the selected materials	**Gases**
2 seconds faster or slower available	~90 ms / ~2000 ms Update time values: 10 ms / Sensor sample rate: 1 ms	**Response time**
± 0.2% of full scale	± 0.2% of factory full scale	**Repeatability**
Typical < 2% of measured value / year	< 1% of measured value / year	**Long term stability**
Max. 35 barg	Max. 13 barg	**Operation pressure**
0–50°C	–20 to +60 °C	**Operation temperature**
Stainless Steel	Stainless Steel Optional: Aluminium	**Body materials**
FKM (Viton®), Neoprene, Valve seat also FFKM (Kalrez®) optional	FKM, EPDM or FFKM	**Sealing materials**
< 15 min for full accuracy	< 2 sec. for full accuracy	**Warm-up time**
Optional	None	**Display**
Standard version with analog signals and digital RS232 interface	Analog, Modbus and Bluetooth default Optional: EtherCAT and Profinet One MOSFET I/0 default	**Communication (analog / digital)**
Fittings included. Options: Swagelok® (Compression), VCR, VCO, NPT	G1″ female (BSPP) Optional: Fittings: ½”, Compression and Tri-clamp	**Process connections**
None required		**Inlet path**
IP20	IP54 (IP40 for units with Ethernet)	**Ingress Protection Class**
CE, RoHs, REACH and WEEE compliant. For some models ISO10204 2.1 or 3.1 certifications on request. All units with EPDM are FDA/USP Class VI compliant and ADI free. RoHs/REACH: All components comply with Directive 2002/95/EC (RoHS) and REACH directives		**Certifications**
1 year	3 years	**Warranty**

Three Gas Flow Measurement Technologies

Below we describe three basic sensor principles for gas mass flow meters from about 1 mln/min up to around 2900 ln/min (gas dependend).

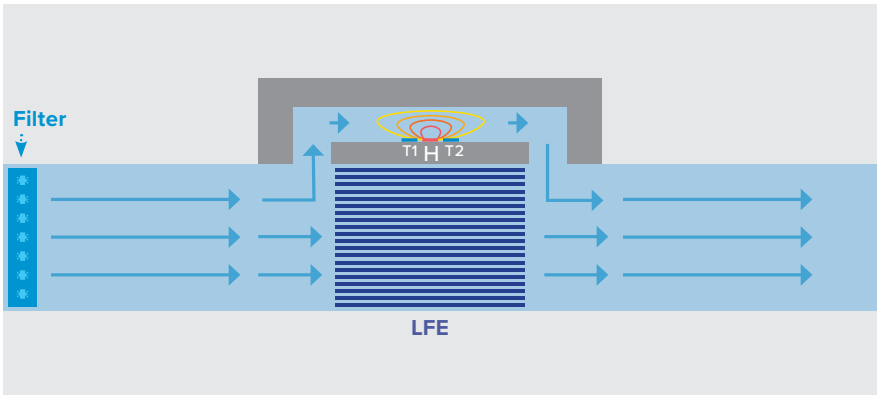
MEMS Sensor

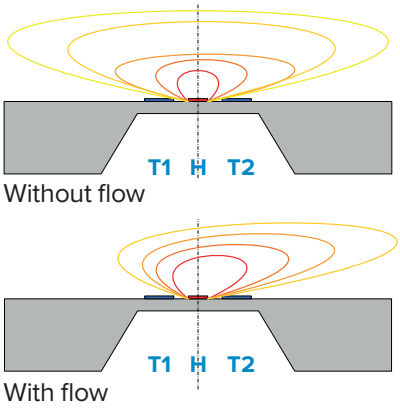
The MEMS gas flow sensor is based on the thermal measurement principle, basically you heat something up in the sensor and the gas that goes past that minute heater cools it off. The cooling effect is related to the gas mass flow. The MEMS (microelectromechanical systems) is basically a CMOS chip, in principle build up like any modern chip like f.i. a microprocessors.

The thermal flow measurement principle is available as different types of sensor like the capillary, immersible or MEMS and all offers a number of specific advantages. Most important, they all measure the gas mass flow. Important because gas is compressible, meaning that the volumetric measurement does not tell you a lot. The mass flow tells you how many gas molecules are in your flow and that is what counts when you have chemical or bio processes, flames reactions, respiration, etc. They have no moving parts and are, partly due to that, very reliable.

Specific advantages of the MEMS are the longterm stability, zero drift, small size and low energy requirement (we have MEMS flow units that work on a single AA standard battery). Measurement takes place directly in the medium, with a microheating element operated between two temperature sensors. If there is no gas flow, the temperature sensors T1 (upstream) and T2 (downstream) heat up equally. If gas flows passes the sensor, it cools T1 and, due to the additional heat dissipated by the heater, heats T2 simultaneously. The difference in temperture between T1 and T2 is an indication for the flow.

To achieve different ranges there is often a bypass avoid splitting system build in the flow meter, so that only a defined part of the flow goes past the sensor, the ration is fixed so if you know the sensor flow, you know the total flow.



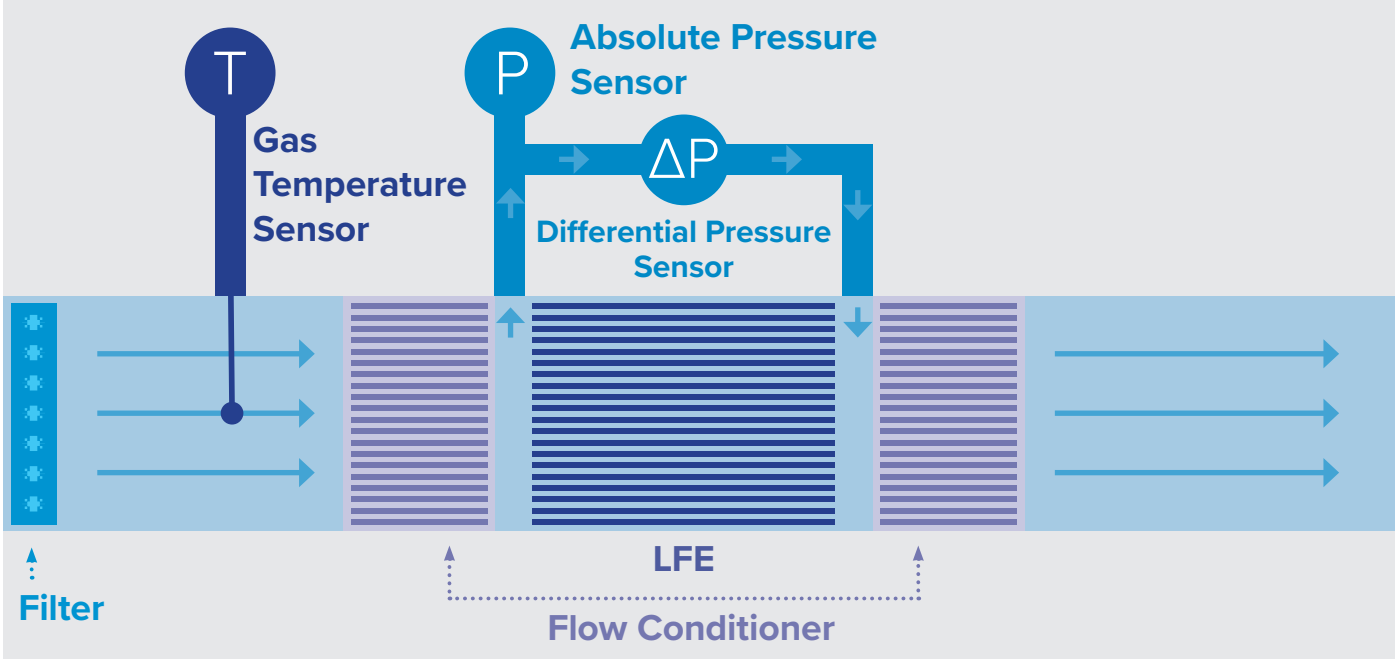


Differential Pressure

If you put a restriction in a pipe with gas flow, there will be a pressure drop over that restriction. In a differential flow meter, you measure the pressure drop over a restriction. If the mechanics are fixed you will get a bigger pressure drop at high flow and no pressure drop when there is no flow. If you make that restriction a bit special (laminar flow element) the relation between that flow and the pressure drop is linear. With that you can very accurately measure the volumetric flow. As mentioned with gas we are more interested in mass flow. The relation between volumetric flow and mass flow is for a specific gas defined by the pressure and the temperature of that gas. So, in a differential mass flow meter you find a differential pressure sensor, an absolute pressure and a temperature sensor. This all goes into a micro-processor that calculates, based on these three variables, the total mass flow going through that flow meter.

Because you have all these sensors, you have what you call a “Multi parameter flow meter”. So called because you can read the mass flow, volumetric flow, the pressure, temperature and you can calculate the density of the gas flowing through this flow meter.

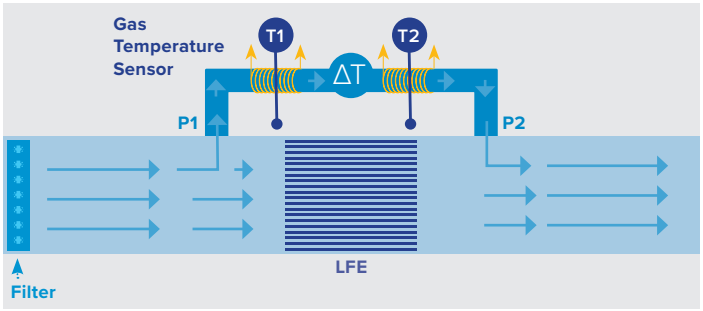
Most differential flow devices can measure all gases based on one calibration by air. Other advantages are that they can measure very low and high flows and are very accurate and flexible.



Capillary Sensor

The capillary thermal mass flow sensor is closely related to the MEMS, it also works on same cooling effect. The gas goes through a very small metal tube (0.1 to 0.9 mm). The heater and temperature sensors are very thin platinum wires wrapped around the small tube. They heat the tube up and just like with the MEMS there is an upstream and downstream sensor. When there is a flow going through the tube, the difference in temperature between these two coils, is measured by measuring the resistance of the platinum wires (So called PT elements). The electronics translate this difference in resistance in a flow indication.

The specific advantage of capillary sensor is that some can handle huge pressure (up to 700 bar), that they have nothing but metal wetted parts (for instance suitable for corrosive gases) and that there are fixed relations between different gasses, meaning you can calibrate them with air and with a factor make them suitable for any gas. Just like with the MEMS they use a bypass (Laminar flow element or LFE) to make one size sensor suitable for different ranges flow meters.



Controllers

Most of these meters can also be delivered with an integrated control valve. Instead of measuring the flow you can tell these units how much flow you want and they will automatically adjust the valve so you get the flow you want. These units are called “mass flow controllers”. The nice thing is that if anything changes in you process, these units will automatically adjust that valve so the gas mass flow stays accurately fixed.

The application of these units is endless, per year more than 7 million of these units are applied in all kind of processes and all kind of industries. If you need any support with the selection of the right flow meter for your application, do not hesitate to call us!

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