

SYS-SMF Coriolis

Flow and density measurement of liquids or gases

- Traceable precision
- Intuitive operation
- Economical process reliability

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www.tempeco.be

SYS-SMF Coriolis

Coriolis mass flow meter



systemec
CONTROLS

Perfect flow and density measurement

Where precision counts

systemc SYS-SMF is a high-precision Coriolis mass flow meter for liquids and gases. In addition to the flow, SYS-SMF also directly measures the fluid density. The SMF Coriolis flow meter was developed for applications where maximum accuracy, a huge measuring range and highest process reliability are required.

The systemc SMF flow meters are very accurate. The mass flow of liquids is measured in a huge span with the class 0.2%, 0.1% or 0.05%. The density is determined with an uncertainty of 0.1 - 0.5 g/l.

systemc SYS-SMF has a variety of analog and digital interfaces and can therefore be easily integrated into existing PLC. SYS-SMF is very easy to use. Thanks to the large graphical colour display, the flow meter can be easily set up using the front buttons or with the included IR remote control through the closed glass cap. Thanks to a selection of different corrosion-resistant steels, SYS-SMF is suitable for a variety of fluids.

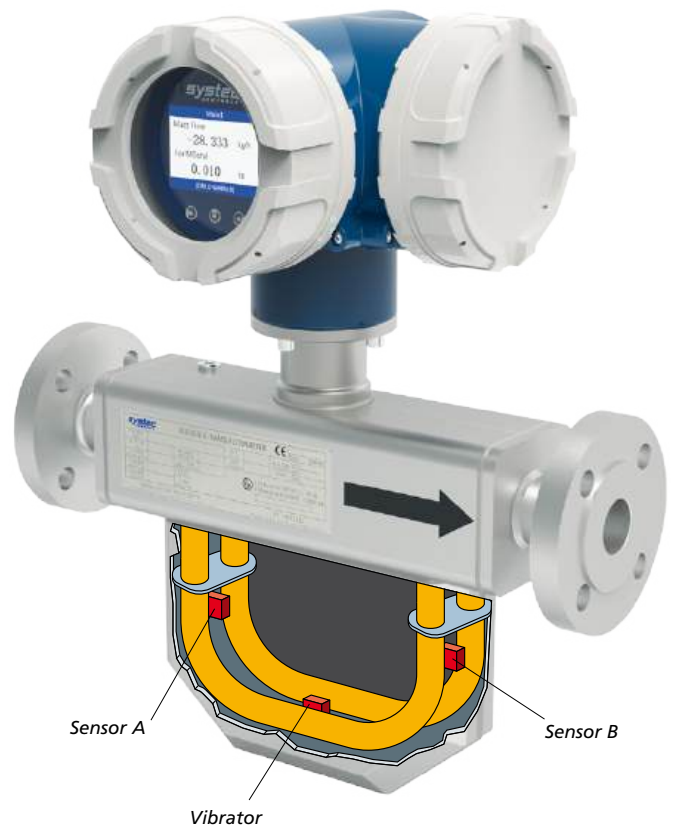
The Coriolis flow meter is one of the most accurate flow meter. During an extensive series calibration at the Physikalisch-Technische Bundesanstalt in Braunschweig (highest German national lab of metrology), the SYS-SMF has already proven its precision: the uncertainties were down to 0.05% of the flow measurement value. The uncertainty of the density measurement is with 0.1 - 0.5 g/l also highly precise and can be used as a valuable process parameter, too.

The measuring principle

In the SYS-SMF there are two parallel U-shaped tubes, which are stimulated to vibration in the lower part of the bend. Sensors on the flanks of the U-tubes measure the resonance frequency and phase shift of the oscillation between the flanks. (see image on the right).

The resonance frequency depends on the weight of the two tubes and thus on the density of the liquid in the tubes. The resonance frequency is therefore a direct measure of the density of the liquid.

If there is no flow, the two oscillation signals that sensor A and sensor B measure are in phase. If a fluid flows, the Coriolis force creates a phase shift between sensors A and B. This phase shift is linear with the mass flow through the pipes and is therefore a direct measure of mass flow.



SYS-SM

Highly accurate, easy to use, easy to integrate into PCS

Traceable accuracy

The systec SYS-SMF Coriolis flow meters are extremely accurate. The mass flow of liquids is measured in the large measuring range with the class 0.2%, 0.1% or even 0.05% of the measured value. The density is determined with an uncertainty of 0.1 - 0.5 g/l .

As standard, the measuring devices are equipped with a factory calibration certificate delivered with a weighing test bench of class 0.02% or on a loop test bench of class 0.05%. Alternatively, DAkS calibration certificates with a test bench accuracy of 0.04% are possible.

To ensure the maximum accuracy in signal transmission, the systec SMF flow meters have not only analog but also digital interfaces to transmit the measured values digitally to the PLC. The uncertainties of analog transmission can be avoided by using the digital interfaces.

systec SMF flow meters are very easy to use. The large digital display allows the flow meter to be parameterized quickly and easily. Through a selection of different corrosion-resistant steels, SYS-SMF can be used for a variety of fluids.

Ideal for many applications

Coriolis meters are used where high accuracy and reliability are required. These include, for example, dosing tasks in the food industry, chemical and pharmaceutical processes or additive dosing in the hydrocarbon industries. Coriolis flow meters are also used for processes with custody transfer requirements. Fuels, detergents and solvents, cosmetics and chemicals are measured, as are oils, fats, alcohol, fruit concentrates and juices, beer, gases and liquefied gases.



Physikalisch-Technische Bundesanstalt
 Seite 3 zum Kalibrierschein vom 2023-03-01, Kalibrierzeichen: PTB - 15001 - 23
 Page 3 of the Calibration Certificate dated 2023-03-01, calibration mark: PTB - 15001 - 23

Calibration results:

Table - Mean values:

Date	No.	Gravimetric standard		Test fluid conditions		Meter under test			Measurement uncertainty (k = 2)		
		Flow	Mass	Pressure	Temperature	Factor	Measurement	Measurement			
		mean	mean	mean	mean	mean	mean	standard deviation	combined uncertainty		
		[kg]	[kg]	[bar]	[°C]	[dimensionless]	[kg]	[%]	[%]		
09.01.23	1	0.309	1206.109	103.02968	3.01	19.86	205.997	1959.48	-0.09	0.006	0.02
09.01.23	2	0.752	480.112	101.61942	2.98	20.03	203.293	2000.51	0.03	0.013	0.02
10.01.23	3	1.484	546.107	258.99134	2.99	19.90	538.108	2000.47	0.02	0.009	0.02
10.01.23	4	2.506	388.896	270.66850	2.99	19.90	543.563	2000.42	0.02	0.012	0.02
10.01.23	5	3.752	259.302	270.23855	3.00	19.97	540.458	1999.93	0.00	0.000	0.02
10.01.23	6	4.006	243.105	270.49810	3.01	19.96	540.333	1999.40	-0.03	0.014	0.02

The calibration results (Table) represent average values. Each of these values was calculated from five individual measurements (diagram), only set point No. 4 was averaged based on four measurements. The combined uncertainty of the measurements represents the expanded measurement uncertainty which is based on a standard uncertainty multiplied by a coverage factor k = 2. This provides a level of confidence of 95 %. The estimate of the standard uncertainty has been carried out with the methods recommended in the „Guide to the Expression of Uncertainty in Measurement“ of ISO.

The represented value of U_{rel} was estimated in accordance to ILAC-P14 12/2010; U_{rel} additionally includes short-term contributions during calibration.

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FCoriolis

SYS-SMF – European top technology at an affordable price

system Controls, founded in 1994 in Puchheim near Munich, is a globally operating SME company. With our own production sites in Germany and Tianjin and development resources in Germany, the UK and Shenzhen, we are able to develop and produce cutting-edge technology competitively.



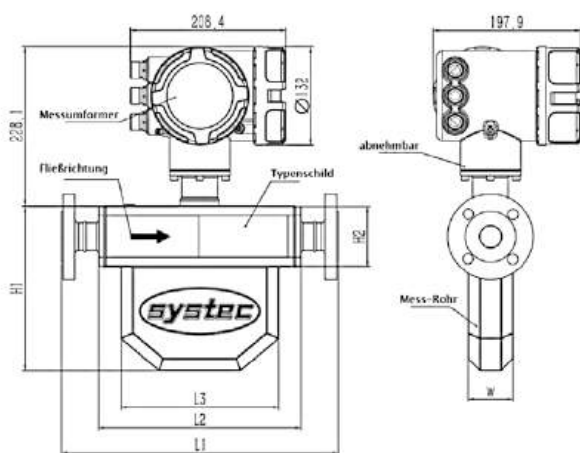
SYS-SMF was developed in cooperation with the University of Oxford, TÜV and PtB. The manufacturing, production and assembly of the SYS-SMF take place at our subsidiary Tianjin System Technology. There is also one of the largest and most accurate flow test benches in the country, where we precisely calibrate your Coriolis. Quality controls, repairs and recalibrations are carried out in Bavaria; our service is available to you throughout Germany and Europe .

Your advantage: Top European technology at an absolutely competitive price.

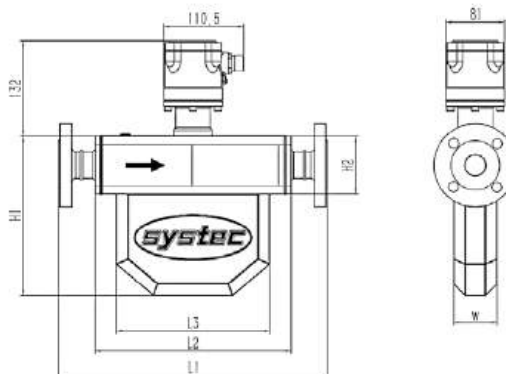
The Advantages of Coriolis flow measurement

- Multivariable, simultaneous measurement of mass flow, density and temperature
- Universal measuring principle for liquids and gases
- Very high measurement accuracy: typical: 0.05 - 0.2% for liquids, 0.2 - 0.5% for gases
- Suitable for extreme temperature and pressure
- No inlet or outlet required
- Bi-directional measurement option
- One of the most accurate flow meter technologies

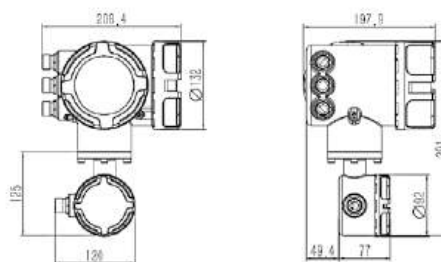
Dimensions



Compact installation



Separate installation



Transmitter for remote installation
To connect you need a 9-pin, shielded cable.

Technical data

Description	Specification
Measuring principle	Coriolis flow meter in U- tube architecture
Metrics	mass flow, density, volume flow
Media	liquids and gases

Designs / variants	
Connection flanges	DIN, ANSI, GB/T, HG/T, up to PN160 / ANSI 900
Wetted parts	316L, Inconel. (i.V. Titan, Tantal, Duplex S.S.)
Pressure ranges fluid	PN16-PN160 (-PN420 i.V.)

Accuracies */**	Standard type 1200	Highly precise type 1100
Mass flow rate liquids	0,2% v.M. plus 8,5e-6*NFS	0,1% v.M. plus 8,5e-6*NFS 0,05% v.M. plus 8,5e-6*NFS (opt)
Mass flow rate gases	0,5% v.M. plus 8,5e-6*NFS	0,35% v.M. plus 8,5e-6*NFS
Density	0,5 g/kg (0.1g/kg after field calibration)	0,2 g/kg (0.1g/kg after field calibration)

Size	Measuring range NFS (kg/h)
DN1-DN10 coming soon	
DN15	625
DN20	1300
DN25	2700
DN40	5100
DN50	9000
DN80	32000
DN100	85000
DN150..DN400 coming soon	

Further data	Specification
Power supply	18-265 V AC/DC, 15 watts
Exits (default)	1 x 4..20mA, pulses active, pulses passive
Exits (optional)	HART RS485 2 x 4..20MA
IP protection class	IP66
Pressure levels	PN16-160 (PN250/PN400 coming soon) ABSI Class 150-900 (Class 1500-2500 coming soon)
Fluid temperature	LT -200-50°C NT: -50..150°C HT 0..350°C

Materials	Specification
Material measuring tube	316 L (1.4404) Std., Hastelloy C4 i.V., Titan i.V., Tantal i.V., Duplex S.S. (1.4462) i.V.
Material flanges	304 (1.4301), 316 (1.4401), 316L (1.4404), Hastelloy C4 i.V., Titan i.V.

Size	L1 [mm] PN40	L1 [mm] PN100	L2 [mm]	L3 [mm]	H1 [mm]	H2 [mm]	W [mm]
DN1-DN10	i.V.						
DN15	370	380	272	212	220	80	60
DN20	370	480	272	212	220	80	60
DN25	370	380	272	212	220	80	60
DN40	500	560	400	280	275	80	76
DN50	500	590	400	280	275	80	76
DN80	610	730	490	320	325	100	90
DN100	1000	1050	850	450	445	135	130
DN125	1000	1100	850	450	445	135	130
DN150	1100	1180	850	450	445	135	130
DN200-DN400	i.V.						

* Valid in the ambient temperature range 0 – 40 °C.

** NFS=Nominal measuring range (1 bar pressure loss)

Flow measurement technology „by systec“



deltaflow with SYS-MMF multi-variable transmitter

The deltaflow dynamic pressure probe has proven itself thousands of times over for measuring the flow and quantity of gases, steam and liquids in pipelines. Pitot tubes have the lowest pressure loss of all differential pressure elements, meaning that many thousands of euros per year in energy savings can be achieved in many applications. With its PtB-tested accuracy of up to 0.4% of the measured value, the deltaflow probe can be used reliably even under the most adverse conditions.

The deltaflow is TÜV-tested for use in condensing, aggressive and dirty flue gases, is available for pipe diameters from 1 mm – 15 m and a pressure rating of 690 bar and therefore covers the vast majority of flow applications.



deltaflowC

The deltaflowC measures the mass flow of gases in pipes and channels. The integrated differential pressure, pressure and temperature sensors, including patented microprocessor technology, achieve measurement accuracies of better than 2%.

The deltaflowC is particularly characterized by high dynamics, zero point stability and easy operation. Virtually maintenance-free and at an attractive price, with deltaflowC you have your process costs under control.



The head office of systec Controls is located in Puchheim, near Munich. Here, we develop and manufacture our products according to DIN EN ISO 9001. But innovation and product quality alone are not enough for us. We have also had our systems tested by independent institutes – with clear,

proven success. And of course, we are there for you even after the installation of your system. Our service-crew will assist you at your plant.

systec Controls – the specialist in flow measurement technology.

systec
CONTROLS

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