Honeywell |Connected Plant

M. Sonic® Medium-low Pressure Ultrasonic Gas Flowmeter

Designed for the trade measurement of urban fuel gas and industrial and commercial users

Company Profile

Elster, with a history of more than 150 years, has been dedicated to the research & development and production of high-grade and advanced gas metering and pressure regulating equipment. Now, Elster can provide energy metering systems, ultrasonic flowmeters, turbine flowmeters, Roots flowmeters, diaphragm gas meters and high, medium and low pressure gas pressure regulating products. The electronic products produced by it include flow computers, volume correctors, advanced data reading and analysis systems, and automatic remote data reading equipment. In addition, Elster also provides various specifications of gas pressure regulating and measuring stations, and calibration and testing devices for trade measurement instruments, with the products covering all areas of the gas industry. In 2015, Elster was acquired by Honeywell.

Product Description

M.Sonic® is the latest precision multi-channel ultrasonic gas flowmeter launched by Honeywell Elster, and is powered by batteries. It is specially designed for natural gas trade measurements that require high precision and high reliability. It integrates the PTZ/EVC function, and can convert the volume flow under operating conditions measured with a flowmeter into the volume flow under standard conditions.

M.Sonic® is mainly used in the field of natural gas measurement of urban fuel gas and industrial and commercial users. M.Sonic® can replace traditional mechanical flowmeters, reduce the maintenance cost of flowmeter products, improve the operation management efficiency of gas enterprises, and will guide the new development of the metrology industry in the field of fuel gas in cities.



Applications

Used for the trade measurement of natural gas, in the service of urban fuel gas and industrial and commercial users.

Working Principles

It adopts the propagation time difference mode with excellent repeatability, with multiple sets of ultrasonic sensors installed inside the measuring tube, and measures the arrival time of sound waves between them simultaneously. According to the principle of superposition of sound velocity and flow velocity, there will be a time difference between the up-going and down-going time of propagation of each set of ultrasonic sensors. The time difference can be calculated using the high-precision correlation algorithm. The flow rate of each channel can be calculated according to the following formula:

$$T_{up} = \frac{L_i}{C_i - V_i * \cos\theta_i}$$

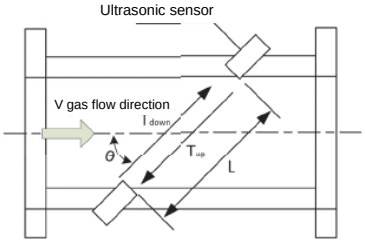
$$V_i = \frac{L_i}{2 * \cos\theta_i}\left(\frac{1}{T_{down}} - \frac{1}{T_{up}}\right) = \frac{L_i}{2 * \cos\theta_i}\left(\frac{\Delta T}{T_{down} * T_{up}}\right)$$

$$V_{line} = \sum_{I=1}^{I=N} W_i * V_i$$

（N=2）

It can be seen from the above measuring principle and formula that the calculation of flow rate is not affected by sound velocity. The flow Q can be worked out by multiplying the result with the cross-sectional area of the measuring tube and the coefficient of correction.

$$Q'_{line} = K * A * V_{line}\left[m^3/s\right]$$



L_i : *Spacing between ultrasonic sensors*

C_i : *Sound velocity*

V_i : *Uncorrected gas sound velocity*

V_{Line} : *Gas sound velocity in operation*

θ_i : *The angle between the ultrasonic propagation axis and the central axis of the measuring tube*

T_{down} : *Ultrasonic propagation time (clockwise)*

T_{up} : *Ultrasonic propagation time (counterclockwise)*

Q_{Line} : *Flow*

W_i : *Weighting factor*

A : *Cross-sectional area*

K: *Coefficient of correction*

Key Features

The latest product M.Sonic® of Honeywell Elster adopts the leading technology in natural gas metering. The product integrates the temperature and pressure sensors, and has the functions of a volume corrector. Its integrated compact design is convenient for onsite flexible installation. It is powered by batteries, and has low power consumption and a long service life. This can greatly reduce the product use and maintenance cost.

Technical Advantages

A wide range of flow measurement

The product adopts the unique energy converter design and computation module, with a wide range of flow measurement and a wide range ratio which can reach 1:160; it can help users to realize precise measurement within a wider range of flow.

Precise small flow measurement

The minimum accurate measurement flow can reach 1m3/h (DN50). It can help users with accurate measurement under the operating conditions with a small flow, and help to avoid the loss of charges. Besides, with this feature, it can also be used for the evaluation of gas leakage and the monitoring of gas pilferage.

Wide beam technology

It can ensure the efficiency of signal transmission while guaranteeing the wide coverage of flow measurement.

Applicability in various harsh operating conditions

In response to different working conditions with turbulent flow and noise disturbance, we have designed the special rectifier and noise reduction device, and can provide various installation accessories for users to use under different working conditions.

Signal processing unit

•The instrument head can realize +180°/-165° rotation.

•Protection grade IP65

•Ambient temperature scope: -25 ~ +60°C

•LCD display	-Temperature
-Cumulative flow	-Pressure
-Flow in working condition	-Electric quantity of battery
-Flow in standard condition	-Pulse output indication
-Sound velocity	-RS485 communication indication
-Flow rate	-System status

Technical parameters

Performance items		Performance indicators and scope of application				
Main technical parameters of the product						
Installation mode and standard		DN50/DN80/DN100/DN150				
Type of gases measured		Natural gas, coal gas, air, nitrogen and other non-corrosive gases				
Gas temperature and humidity for measurement		-20 ~ +60℃, below 95% RH				
Temperature and humidity in the operating environment		-25 ~ +60℃, below 95% RH				
Storage temperature		-40 ~ +70℃				
Pressure rating		PN16				
Body material		Aluminum alloy				
Explosion-proof grade		Ex ia IIB T4 Ga				
Protection grade		IP65				
Power supply mode		Built-in lithium battery, with a useful life of 3 years (Remark)				
		Voltage 7.2V				
		Labeled capacity 19 x 4 Ah				
		Number of battery packs: at least 4				
Number of sound tracks		DN50, DN80, DN100 two sound tracks; DN150 three sound tracks				
Installation mode		Horizontally or vertically				
Display of the instrument head	**Display mode of positive cumulative flow**	000000000.000 Nm^3 or 0000000000.00 Nm^3 (12 bits)				
	Instantaneous flow rate	Maximum display of 0000 and support of 3 decimal points of the flow under standard conditions and flow under working conditions				
	Temperature and pressure	Temperature: 00.0 ℃ (3 bits) Pressure (absolute pressure): 000.00KPa or 0000.0KPa (5 bits)				
Corresponding table of flow range (working condition)	**Grade 1.0 accuracy** Qmin≤Q<Qt: ±2% Qt≤Q≤Qmax: ±1%	Bore diameter (mm)	50	80	100	150
		Qmax [m^3/h]	160	400	650	1000
		Qmin [m^3/h]	1.0	2.5	4	4
		Qt [m^3/h]	16	40	65	100
		Startup flow rate [m^3/h]	0.2	0.5	0.8	2

Performance items	Performance indicators and scope of application
Technical parameters of temperature sensors	
Temperature sensor	Pt1000 A measuring range
Measuring range	-25 ~ 65℃
Measuring accuracy	Grade A
Technical parameters of pressure sensors	
Measuring range	0~4 bar g 2~8 bar g 5~16 bar g
Pressure transmitter	Absolute pressure
Measuring accuracy	0~2.5 bar a, ±0.10% FS. 2.5~5 bar a, ±0.20% 0~5 bar a, ±0.1% FS. 5~10 bara, ±0.2% 0~10 bar a, ±0.1% FS.10~20 bara, ±0.20%
Parameters of RS485 communication interface	
Communication protocol	RS485 Modbus/RTU
Communication rate	9600 bps/19200 bps
Communication address	1~247
Power supply	Outside power supply 24 VDC ±15%
High-frequency impulse output parameter (for metrological verification)	
Type of impulse	Open drain
Maximum withstand voltage	27.6 VDC
Supply voltage	3.3~26.4 VDC
Maximum current	50 mA
Voltage at low pulse level	Below 1V
Current at high pulse level	Below 50 μA
Impulse factor (P/M^3) (fmax*3600)/Flw(max)	90000
Maximum output frequency	4 KHz
Low-frequency impulse output parameter (for prepaid intelligent valves)	
Type of impulse	Open drain
Maximum withstand voltage	27.6 VDC
Supply voltage	3.3~26.4 VDC
Maximum current	50 mA
Voltage at low pulse level	Below 1V
Current at high pulse level	Below 50 μA
Unit of impulse output (L/P)	1~10000
Maximum output frequency	100 Hz

Remarks:

1. The battery life will be calculated from the time when the flowmeter is powered on for the first time after release to the time when the battery power remains 5%.
2. Twelve months of production, logistics, and inventory time will be reserved before the battery life is calculated.
3. The battery life will be calculated according to the distribution curve of the annual outdoor temperature (in hours) in typical cities such as Harbin, Beijing, Wuhan, and Guangzhou.

In order to eliminate the impact of different turbulent flows and noises on the accuracy of measuring, and meet the different requirements of pressure loss under different working conditions, M.Sonic is specially designed and can provide various forms of rectifier and noise silencers for selection.

Rectifier (selectable)

Hive rectifier (see Figure 1): Small-size rectifier, with ultra-low pressure loss, mainly used for installation in front of furnaces and cooking utensils

1D rectifier (see Figure 2): The rectifier with a length of 1D; it can be used in onsite narrow spaces, and can effectively eliminate the impact of turbulent flow and improve the measuring accuracy.

3D rectifier (see Figure 3): The rectifier with a length of 3D; it can effectively eliminate the impact of turbulent flow and improve the measuring accuracy.

Please see the user manual for the specific installation requirements and applicable working conditions of the rectifiers.

Hive rectifier



Figure 1

1D rectifier

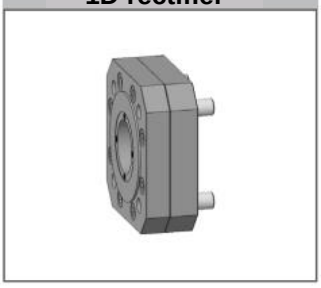


Figure 2

3D rectifier

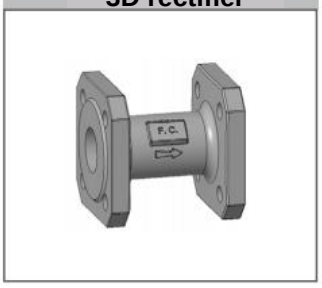


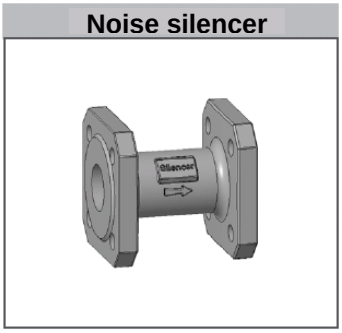
Figure 3

Noise silencer (selectable)

The noise silencer is mainly used when M.Sonic® is mounted to the back end of the pressure and flow regulating device in an integrated pressure regulating and measuring cabinet. It can effectively eliminate the disturbance of the noise produced by the pressure and flow regulating device at the front end of the flowmeter and the impact on the measuring accuracy.

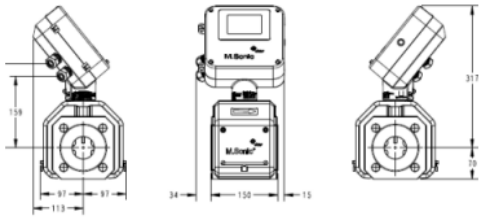
Please see the product user manual for the specific installation of the noise silencer.

Noise silencer

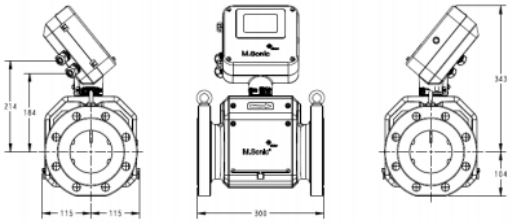


The installation dimension (mm) is provided as follows:

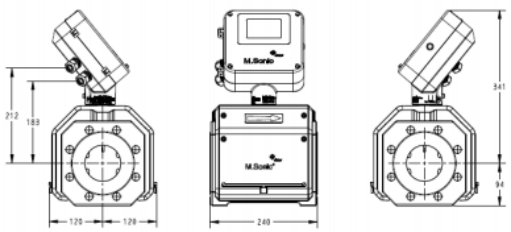
M.Sonic®, nominal dimension DN50, weight 11.2 KG



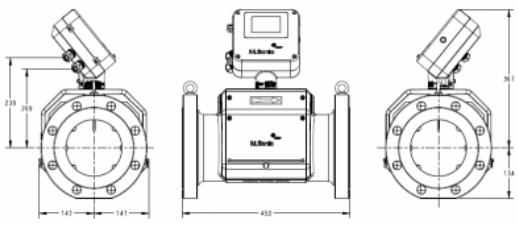
M.Sonic®, nominal dimension DN100, weight 17.83 KG



M.Sonic®, nominal dimension DN80, weight 15.83 KG



M.Sonic®, nominal dimension DN150, weight 28.26 KG



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