



## Gas Safety and Smart Metering Solutions

# CUBIC INTRODUCTION

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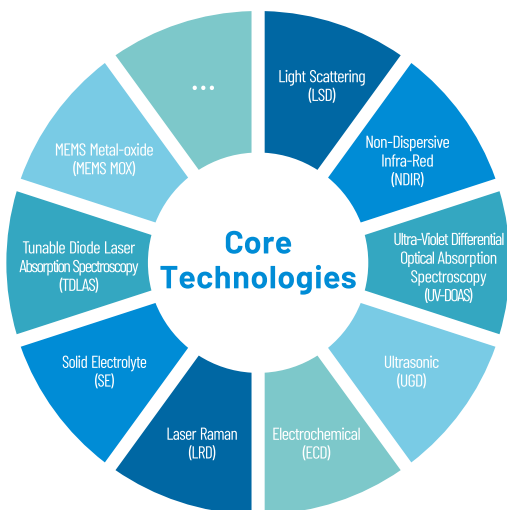
Cubic Sensor and Instrument Co., Ltd. (hereinafter referred to as "Cubic") is a publicly listed company in SSE STAR Market (stock code:688665), specializing in smart gas sensors and superior gas analyzers. Set up in 2003, situated at "Optics Valley" of Wuhan, China, Cubic has established gas sensing technology platforms including optical technologies (NDIR, Ultraviolet, Light Scattering, Laser Raman), ultrasonic technology, MEMS metal oxide semiconductor (MOX) technology, electrochemical technology, ceramic thick-film technology based high temperature solid electrolyte technology and so on. At present, Cubic has obtained more than 100 patents home and abroad, with abundant products widely used in various fields of air quality, environmental monitoring, industrial processes, industrial safety monitoring, healthcare, smart metering and so on.

Cubic has a provincial-level enterprise technology center and a gas analysis instrumentation engineering technology research center in Hubei Province of China. At the same time, Cubic energetically participates in the national technological innovation system and has successively obtained many national and provincial projects which support Cubic incessant innovations. Those projects contain the National Major Scientific Instrument and Equipment Development Project, the Ministry of Industry and Information Technology Internet of Things Development Special Project, the Ministry of Industry and Information Technology Strong Foundation Engineering Sensor "One-stop" Project, the Ministry of Science and Technology Science and Technology Boost the Economy 2020 Key Special Project, and the Hubei Province Technical Innovation Major Project, etc. Cubic has been regarded as a major gas sensor manufacturer and representative enterprise by industry authorities at home and abroad and won the "Most Influential IoT Sensor Enterprise Award" by the China Internet of Things Industry Alliance.

With decade-long dedications in technical innovations, strict quality control and global business strategies, Cubic, as a leading manufacturer of high-quality gas sensors and sensor solutions, has obtained the recognition of many well-known Fortune 500 companies as well as other domestic and overseas leading companies in different fields. Cubic products have been exported to more than 80 countries and regions, besides, Cubic is moving towards a higher target to be the international brand in the field of gas sensors.



# CORE TECHNOLOGIES



## 20+ Years Focus

Emission Monitoring Solutions

Core Technologies

## Professional Technical Engineers

Quick Service Response

Technical Support

## Intellectual Property

Numerous National Invention Patents

International PCT Patents

## CUBIC CERTIFICATES



ISO 9001: 2015



ISO 14001: 2015



ISO 45001: 2018

## CUBIC GLANCE



Cubic Headquarter



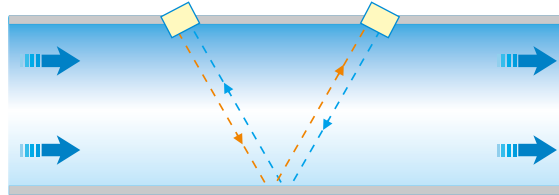
Cubic R&D Center



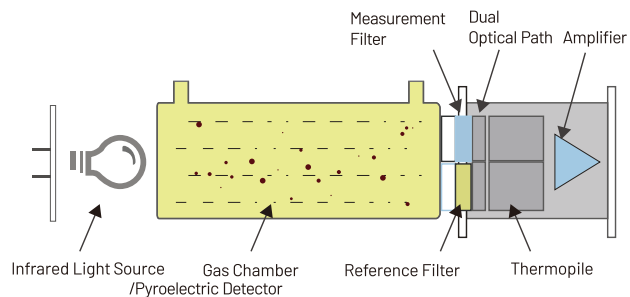
Cubic Jiashan Factory

# Core Technologies

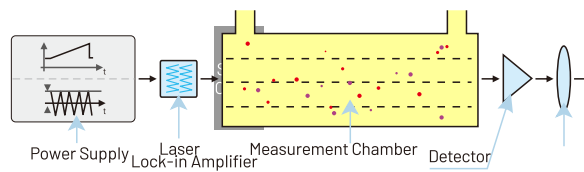
## Ultrasonic Gas Sensor Technology



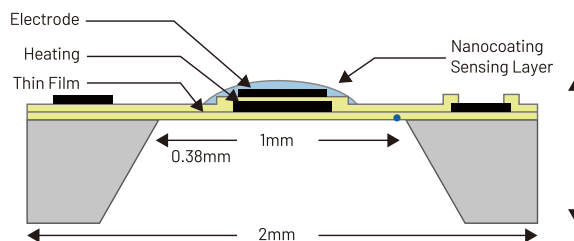
## NDIR Gas Sensor Technology



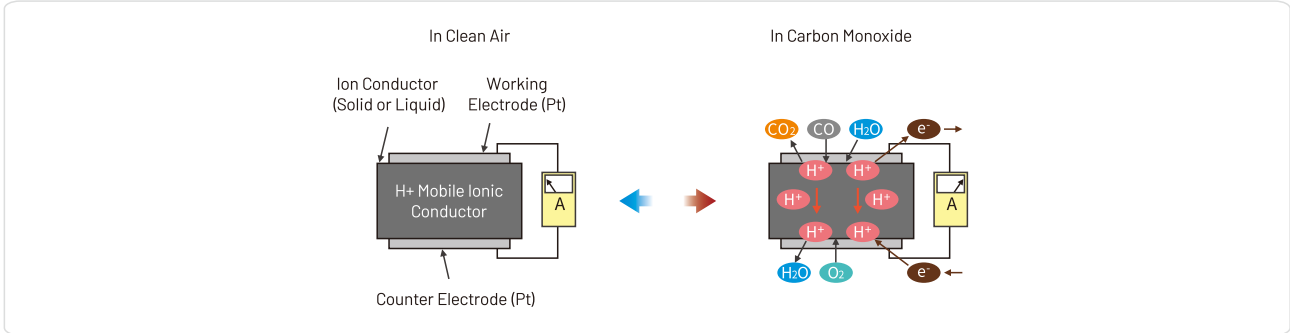
## TDLAS Gas Sensor Technology



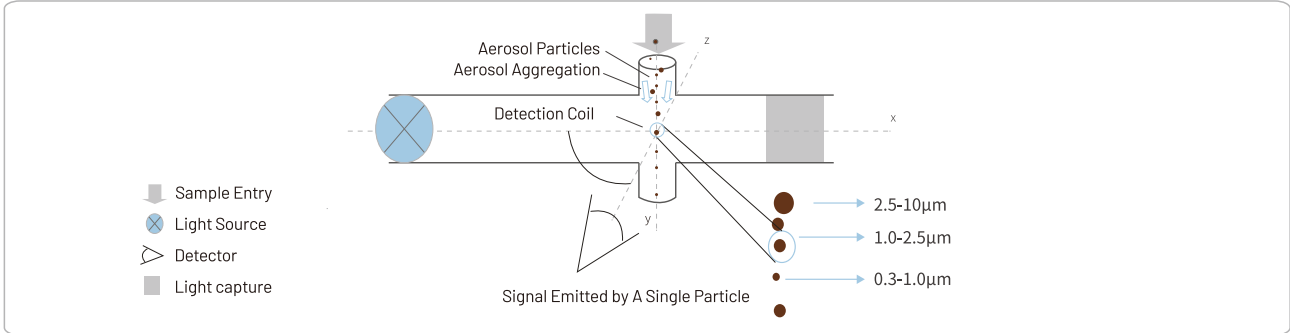
## MEMS MOx Gas Sensor Technology



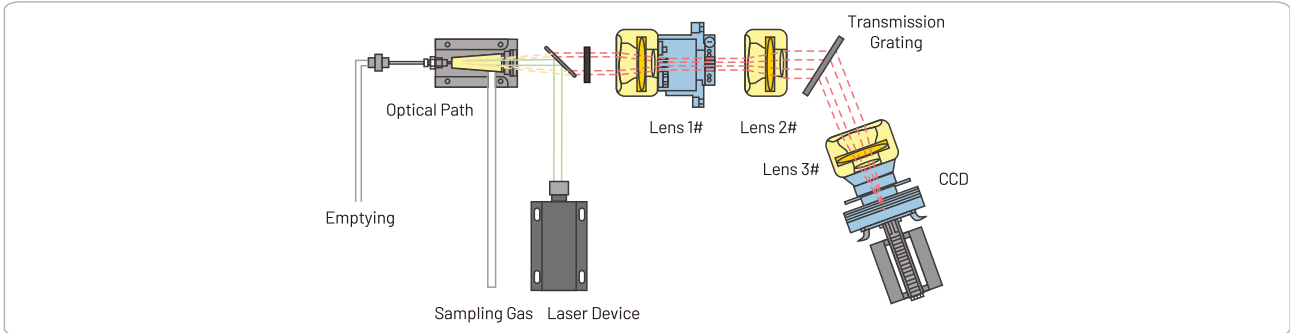
## Electrochemical Gas Sensor Technology



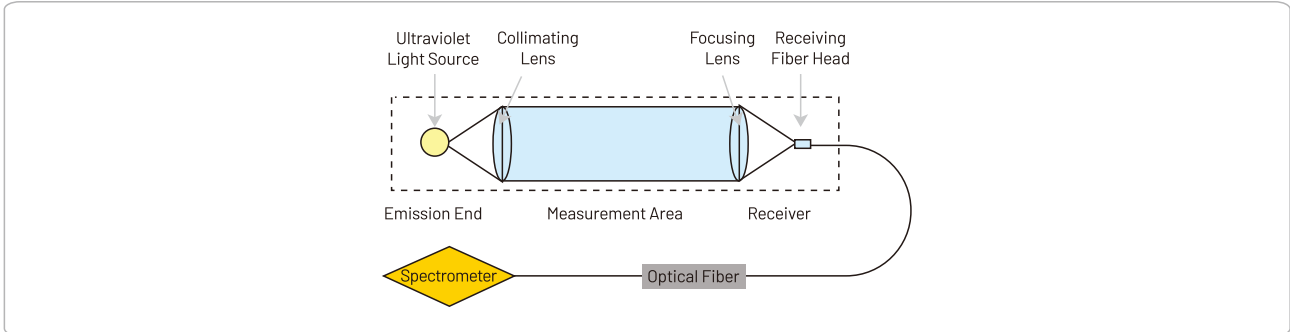
## Light Scattering Gas Sensor Technology



## Laser Raman Gas Sensor Technology



## UV-DOAS Gas Sensor Technology



## Ultrasonic Gas Flow Meter and Module

With innovative ultrasonic flow sensor technology, Cubic smart ultrasonic gas flow meters and modules realize high stability and high accuracy measurement for residential, commercial and industrial applications, especially for low flow range (Qmin) measurement. With built-in temperature and pressure compensation, along with intelligent software algorithm, Cubic gas flow meters and modules are accurate in air, 100% CH<sub>4</sub>, LPG and different natural gases for full temperature range.

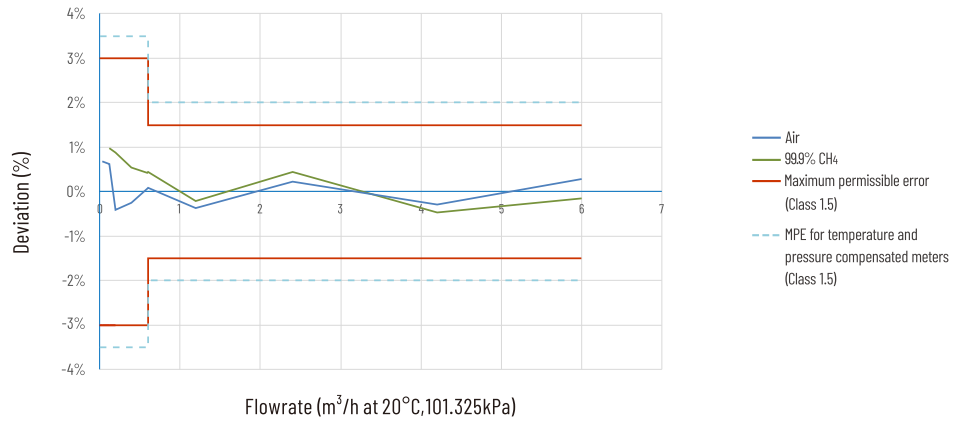
Thanks to full electronic design without moving parts, ultrasonic gas meter technology has no issue of mechanical wear which leads to degradation of accuracy and has the advantage of anti-contamination. Therefore, long-term stability and accuracy can be guaranteed for ultrasonic gas meter solutions and there is no need for periodical maintenance.

Besides, Cubic smart ultrasonic gas flow meters and modules are equipped with temperature sensor, pressure sensor and shut-off valve, which facilitates the accurate monitoring of gas flow, and the gas leakage check system realized by valve ensures user safety by automatically shutting down gas supply in case of inconspicuous leakage.

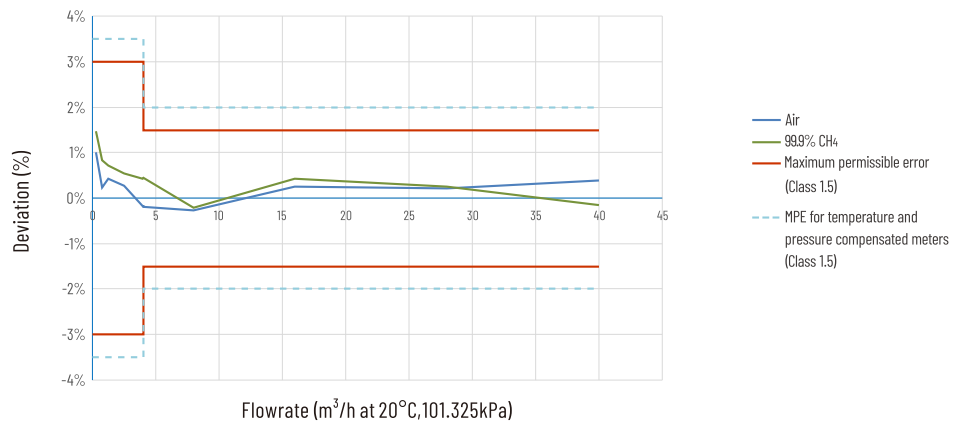
What's more, Cubic ultrasonic gas flow meters could also achieve low power consumption, which is a basis for smart gas metering market demand. To meet ever growing smart gas metering need, Cubic has developed gas flow meters combined with wireless communication GPRS and NB-IoT, which enables users to read data of remaining gas volume and arrange top-up remotely.



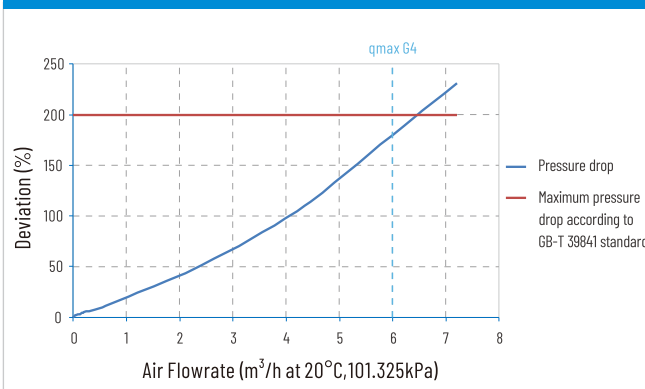
## G4 Accuracy in Air and Gas-99.9%CH<sub>4</sub> Accuracy



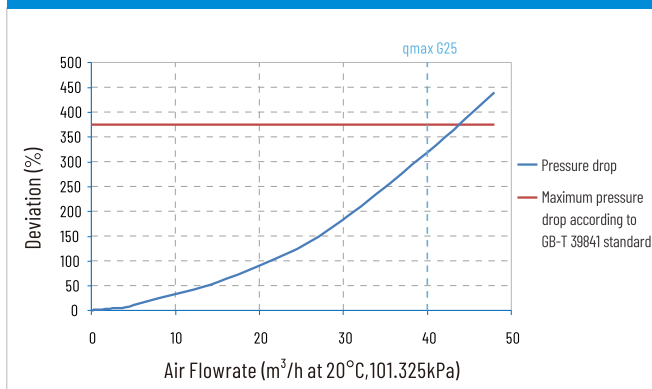
## G25 Accuracy in Air and Gas-99.9%CH<sub>4</sub> Accuracy



## G4 Meter-Pressure Drop



## G25 Meter-Pressure Drop



## Gas Meter Parts and Functions

### Infrared Communication & LED Indicator Lights

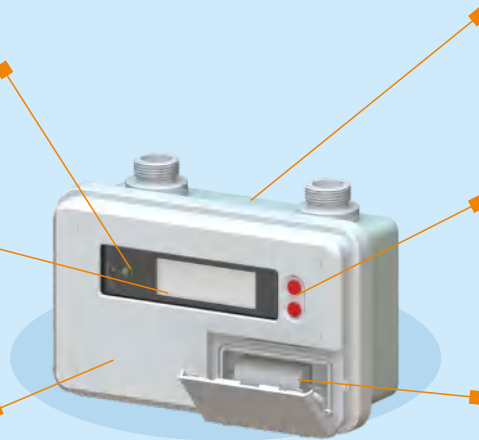
Infrared communication is used for data exchange; LEDs are used for flow calibration and wireless communication indication.

### LED Display

Mode change, flow direction, temperature/pressure alternate display, instant flow rate display, accumulated volume display, battery capacity, motor valve status, low battery alarm sign and so on.

### Battery 2

Built-in Lithium battery ER26500/3.6V powers the test module.



**Residential Steel Ultrasonic Gas Meter**

### Shut-off Value

Integrated shut-off value, which can be remotely controlled.

### Upper Button

Support the scrolling of display screens and specific functions for mode switching and valve on/off;

### Lower Button

Wireless communication, long press to upload communication.

### Battery 1

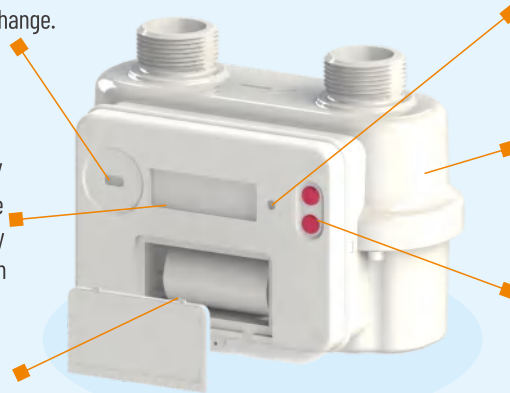
4 sections AA alkaline battery or a Lithium battery ER26500/3.6V, power the mainboard and wireless transmission module, with transmission of low battery and battery-removal alarms.

### Infrared Communication

Infrared communication is used for data exchange.

### LED Display

Mode change, flow direction, temperature/pressure alternate display, instant flow rate display, accumulated volume display, battery capacity, motor valve status, low battery alarm sign and so on.



**Residential Aluminum Ultrasonic Gas Meter**

### LEDs Indicator

LEDs are used for flow calibration and wireless communication indication.

### Shut-off Value

Integrated shut-off value, which can be remotely controlled.

### Upper Button

Support the scrolling of display screens and specific functions for mode switching and valve on/off;

### Lower Button

Wireless communication, long press to upload communication.

- Internal or External Antennas Optional

- Data Archive

Hourly consumption storage for 720 records  
Daily consumption storage for 120 records  
Monthly consumption storage for 120 records

- Small Size

Compact size, light weight, easy installation

- Compliant to OIML R137 and EN14236 class 1.5

- Battery Cap

Battery cap removable with screw and seal

- Software Upgrade

The application software can be remotely updated, optionally also the legally relevant-one

- Alarms

Alarms to illegal meter tampering, low battery and battery removal. Logger to record alarms and events.

- Replaceable SIM

Replace the SIM card from the battery slot.  
It's accessible from the battery compartment.

- Encryption/Authentication

AES 128-bit encrypted communication

- Built-in Temperature Compensation

- GPRS and NB-IoT Solutions are Optional.



### Infrared Communication & LED Indicator Lights

Infrared communication is used for data exchange; LEDs are used for flow calibration and wireless communication indication.

### LED Display

Mode change, Flow direction, Temperature/Pressure alternate display, Instant flow rate display, Accumulated volume display, Battery capacity, Motor valve status, Low battery alarm sign and so on.

### Shut-off Value

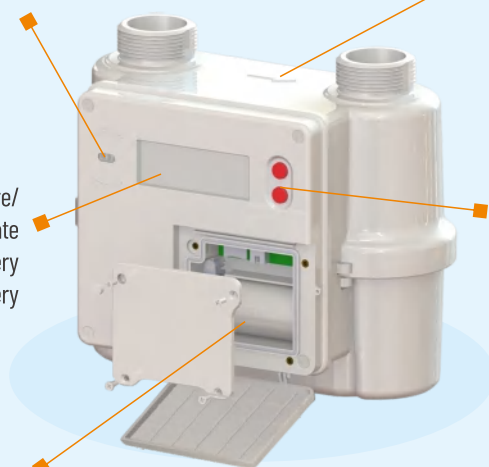
Integrated shut-off value, which can be remotely controlled.

### Upper Button

Support the scrolling of display screens and specific functions for mode switching and valve on/off;

### Lower Button

Wireless communication, long press to upload communication.



### Built-in Lithium battery ER34615/3.6V

## Commercial Ultrasonic Gas Meter

- **Internal or External Antennas Optional and GPRS**

- **Data Archive**

Hourly consumption storage for 720 records

Daily consumption storage for 120 records

Monthly consumption storage for 120 records

- **Small Size**

Compact size, light weight, easy installation

- **Compliant to OIML R137 and EN14236 class 1.5**

- **Battery Cap**

Battery cap removable with screw and seal

- **Software Upgrade**

The application software can be remotely updated, optionally also the legally relevant-one

- **Alarms**

Alarms to illegal meter tampering, low battery and battery removal. Logger to record alarms and events.

- **Replaceable SIM**

Replace the SIM card from the battery slot.

It's accessible from the battery compartment.

- **Encryption/Authentication**

AES 128-bit encrypted communication

- **Built-in temperature and pressure compensation**

- **GPRS and NB-IoT Solutions are Optional.**

# Residential Ultrasonic Gas Meter and Module

USM Series Ultrasonic Gas Flow Meter is a type of electronic meter that adopts ultrasonic transit time difference method and a unique patented structure to measure the medium flow rate, which is suitable for natural gas flow measurement.



## Performance Characteristics

USM-G1.6/G2.5/G4 Class 1.5



### Small Size, Stable Measuring Performance

Simple structure, small volume, no moving parts, no mechanical wear, and no magnetic field effects.



### Long Life and Maintenance-free

No moving parts, long lifetime. No need for factory repairs, convenient maintenance.



### Strong Expandability

Fully electronic structure, easily expandable for additional functions, such as remote charging, valve control, alarms, etc.



### High Sensitivity

Instantaneous flow monitoring to deal with various technical gas theft methods; Real-time temperature and pressure corrections, effectively improving supply-demand imbalance.

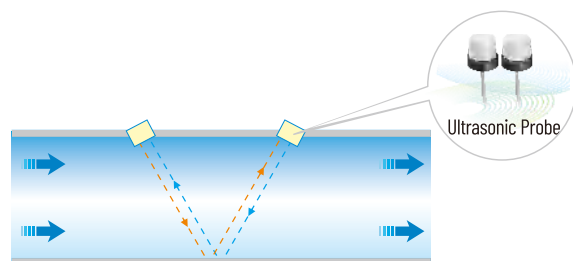


### High Security

Prevent minor leaks, and perform valve closing protection based on preset plan features including reverse installation alarm valve shutdown, abnormal large flow management, and illegal removal behavior monitoring function.

## Working Principle

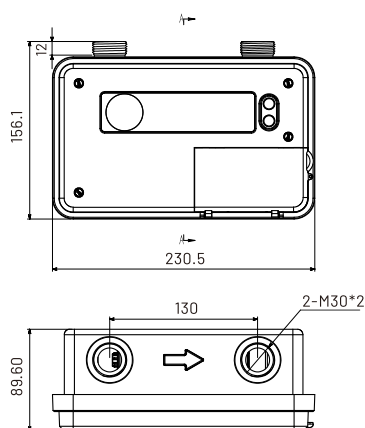
USM Series Ultrasonic Gas Flow Meter is a type of electronic meter that adopts TOF (Time of Speed) principle to measure flow velocity of gas medium. With class 1.5 accuracy and high stability, USM-G2.5/G4 is widely applied for residential natural gas metering application.



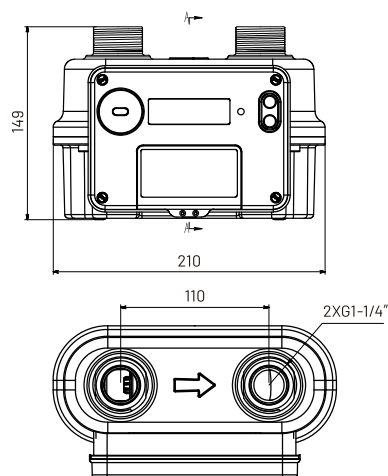
## Specifications

Product Name	Residential Aluminum Ultrasonic Gas Meter			Residential Steel Ultrasonic Gas Meter			Residential Ultrasonic Gas Meter Module		
Model	USM-G1.6A	USM-G2.5A	USM-G4A	USM-G1.6S	USM-G2.5S	USM-G4S	USM-G1.6M	USM-G2.5M	USM-G4M
Measurement Range (m <sup>3</sup> /h)	0.016~2.5	0.025~4	0.04~6	0.016~2.5	0.025~4	0.04~6	0.016~2.5	0.025~4	0.04~6
Pressure Loss	≤200Pa (Factory verification with control valve)			≤200Pa (Factory verification with control valve)			≤200Pa (Factory verification with control valve)		
Working Pressure	0~20kPa			0~20kPa			0~20kPa		
Dimensions (mm)	210*113.5*149			230.5*156.1*89.6			128.7*42.8*55.2		
Weight (kg)	1.1			1.6			/		
Center Distance of Connectors (mm)	110			130			/		
Connector Type	Screw thread, G1-1/4			Screw thread, M30*2			URAT-TTL		
Protection Class	IP65			IP65 (Lithium battery); IP54 (4 AA Alkaline battery)			/		
Flow Compensation	Default is temperature compensation, and pressure compensation is optional			Default is temperature compensation, and pressure compensation is optional			Default is temperature compensation, and pressure compensation is optional		
Batteries	Lithium battery ER34615/3.6V			4 sections AA alkaline battery Lithium battery ER26500/3.6V			2.7~3.6VDC		
Accuracy Standard	Class 1.5			Class 1.5			Class 1.5		
Error	Q <sub>min</sub> ≤Q<Q <sub>t</sub>			±3%			±3%		
	Q <sub>t</sub> ≤Q≤Q <sub>max</sub>			±1.5%			±1.5%		
Working Temperature	-25°C~55°C			-25°C~55°C			-25°C~55°C		
Storage Temperature	-25°C~60°C			-25°C~60°C			-25°C~60°C		
Ex-Proof Approval	ExibIIBT4 Gb			ExibIIBT4 Gb			ExibIIBT4 Gb		
Verification Method	Optional: 1. LED optical pulse 2. EN62056-21 Standard infrared interface			Optional: 1. LED optical pulse 2. EN62056-21 Standard infrared interface			Optional: 1. LED optical pulse 2. EN62056-21 Standard infrared interface		

## Dimension (mm)



USM-G1.6/G2.5/G4  
Residential Steel Ultrasonic Gas Meter



USM-G1.6/G2.5/G4  
Residential Aluminum Ultrasonic Gas Meter

# Commercial Ultrasonic Gas Meter

USM Series Ultrasonic Gas Flow Meter is a type of electronic meter that adopts ultrasonic transit time difference method to measure the medium flow rate, which is suitable for natural gas flow measurement.



G6/G10/G16/G25/G40/G65 Class 1.5

## Performance Characteristics



### Small Size, Stable Measuring Performance

Simple structure, small volume, no moving parts, no mechanical wear, and no magnetic field effects.



### Long Life and Maintenance-free

No moving parts, long lifetime  
No need for factory repairs, convenient maintenance.



### Strong Expandability

Fully electronic structure, easily expandable for additional functions, such as remote charging, valve control, alarms, etc.



### High Sensitivity

Instantaneous flow monitoring to deal with various technical gas theft methods; Real-time temperature and pressure corrections, effectively improving supply-demand imbalance.



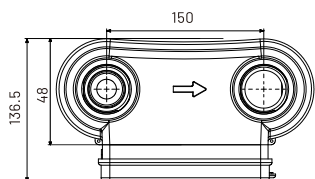
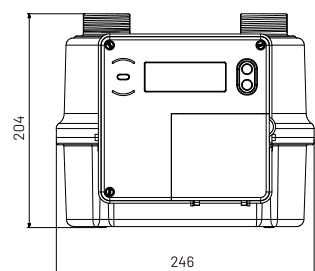
### High Security

Prevent minor leaks, and perform valve closing protection based on preset plan features including reverse installation alarm valve shutdown, abnormal large flow management, and illegal removal behavior monitoring function.

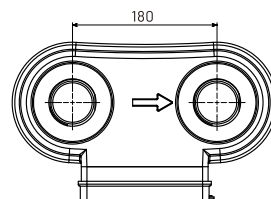
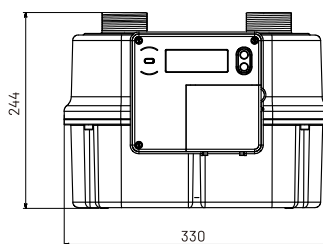
## Specifications

Model	USM-G6	USM-G10	USM-G16	USM-G25	USM-G40	USM-G65
Measurement Range (m <sup>3</sup> /h)	0.06~10	0.1~16	0.16~25	0.25~40	0.4~65	0.65~100
Pressure Loss	≤200Pa (Factory verification with control valve)	≤375Pa (Factory verification with control valve)			≤300Pa (Without control valve Factory verification)	≤400Pa (Without control valve Factory verification)
Working Pressure	0~50kPa					
Dimensions (mm)	246*204*110.5			330*248*167		
Weight (kg)	2.3			4		
Center Distance of Connectors (mm)	150			180		
Connector Type	Screw thread, G1-1/2			Screw thread, G2	Screw thread, G2-1/2	
Protection Class	IP65					
Flow Compensation	Temperature and pressure compensation					
Batteries	Lithium battery ER34615/3.6V					
Accuracy Standard	Class 1.5					
Error	0min≤Q<Qt		±3%			
	Qt≤Q≤Qmax		±1.5%			
Working Temperature	-25°C~55°C					
Storage Temperature	-25°C~60°C					
Ex-Proof Approval	ExibII BT4 Gb					
Verification Method	Optional: 1) LED optical pulse 2) EN62056-21 Standard infrared interface					

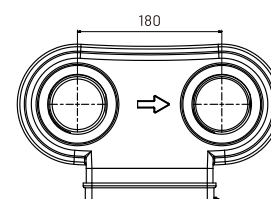
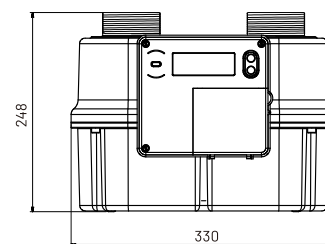
## Dimension (mm)



**USM-G6/G10/G16**  
**Commercial Ultrasonic Gas Meter**



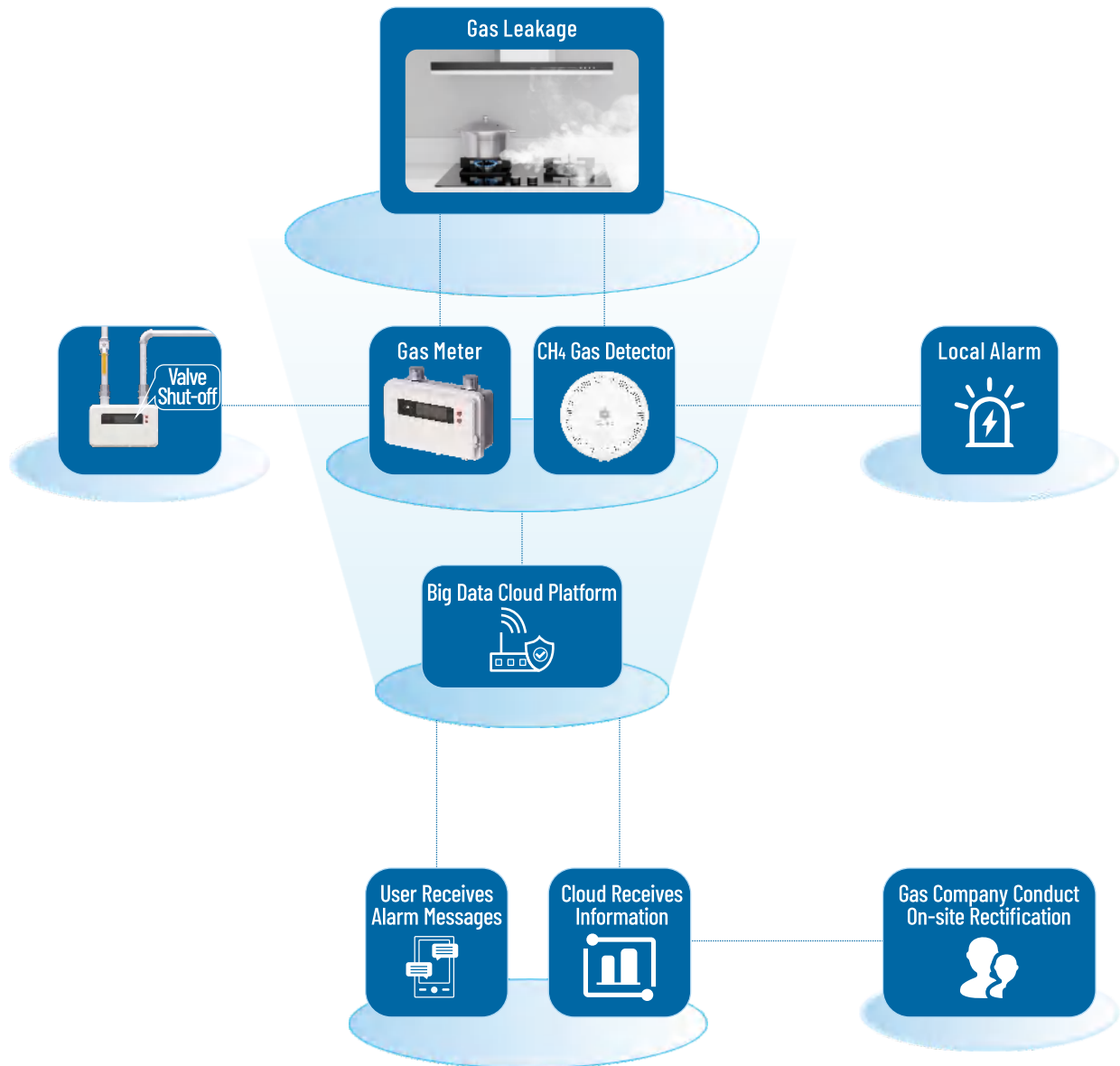
**USM-G25**  
**Commercial Ultrasonic Gas Meter**



**USM-G40/G65**  
**Commercial Ultrasonic Gas Meter**

# Gas Safety Solution

- Cubic Gas Safety Solution provides precise detection for various gas usage scenarios 24/7. In the event of a gas leak, the gas meter and gas alarm will promptly capture the leakage information, triggering the alarm and automatically shutting off the gas valve.
- Timely send gas leakage information to self-developed apps and synchronize it to the gas company's server.
- Gas company can immediately dispatch personnel to conduct on-site investigations and rectifications, ensuring gas safety, when abnormal information is received.



## Alarm Scenarios



When a household gas alarm detects gas leakage exceeding the standard, it will sound an alarm signal, and connect to the solenoid valve to quickly close the valve, ensuring gas safety.

### 01 Gas Leakage



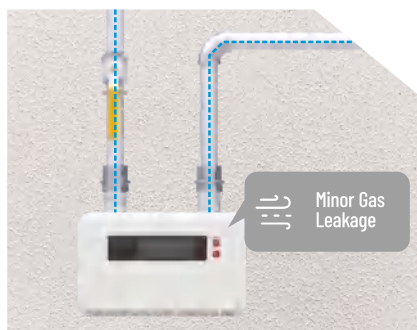
When the ultrasonic gas meter detects gas usage exceeding the user's maximum load, it automatically closes the valve and reports to the gas company promptly.

### 02 Abnormal High Flow Cut-off and Alarm



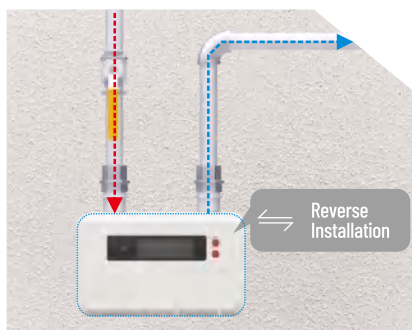
When the ultrasonic gas meter detects prolonged gas usage, it automatically closes the valve and reports to the gas company promptly.

### 03 Extended Continuous Gas Usage Cut-off with Alarm



When the ultrasonic gas meter detects a minor gas leakage, it automatically closes the valve and reports to the gas company promptly.

### 04 Microflow Cut-off with Alarm



When the ultrasonic gas meter detects reverse installation, it automatically closes the valve and reports to the gas company promptly.

### 05 Reverse Installation Cut-off with Alarm



When the ultrasonic gas meter detects meter tampering, it automatically closes the valve and reports to the gas company promptly.

### 06 Illegal Meter Tampering Alarm Cut-off



## **Cubic Sensor and Instrument Co.,Ltd.**

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All products are in continuous development and therefore specifications may be subject to change without prior notice.