



ADD VALUE FLOW

## Coriolis Mass Flowmeters

*Custody  
Transfer*

*Two-way  
Metering*

*Water  
Content  
Monitoring*



**Stability**

**Succeed**

**Superbness**

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**QINGDAO ADD VALUE FLOW METERING CO., LTD.**



# Add Value Introduction

# Contents



Qingdao Add Value Flow Metering Co., Ltd. is located in Qingdao Free Trade Zone. It is a high-tech enterprise integrating R & D, production, sales and service. Since its establishment, Qingdao Add Value has always focused on the research and development and manufacture of fluid metering products. We have independently developed two series of products including Coriolis Mass Flow Meters and Vibration Tube Liquid Density Meter on Line, and have obtained national invention patents. The company has advanced equipment, established a complete production inspection process, and certified by ISO9001 and ISO14001. Currently, the Qingdao Add Value products are installed in most cities across the country. And they are widely used in various occasions such as quantitative loading automation and chemical process quality control in Sinopec, PetroChina and many major refineries. Stable and accurate fluid metering services have won unanimous praise from customers.

Qingdao Add Value is committed to innovation, with the business philosophy of "Stable performance creates excellent quality", focusing on the development of core competitiveness, and the original core technology perfectly solves the problem of zero drift, effectively ensuring the long-term stable operation of products, all products of the company are provided 12-month warranty.

We aspire to be your trusted supplier.

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# Flow Meter

The mass flow meter uses the Coriolis effect principle. By measuring the Coriolis force of fluid received in the tube, it can directly measure the mass flow of the fluid in the tube. The Coriolis force is only related to the mass and speed of the fluid. In principle, it eliminates the influence of temperature, pressure, fluid state, density and other parameters on the measurement accuracy, and directly obtains the accuracy flow value and density value of various media under complex environmental conditions. It doesn't need to go through the conversion of intermediate parameters, avoiding measurement errors due to the intermediate conversion, so as to realize the high-precision and accurate measurement.



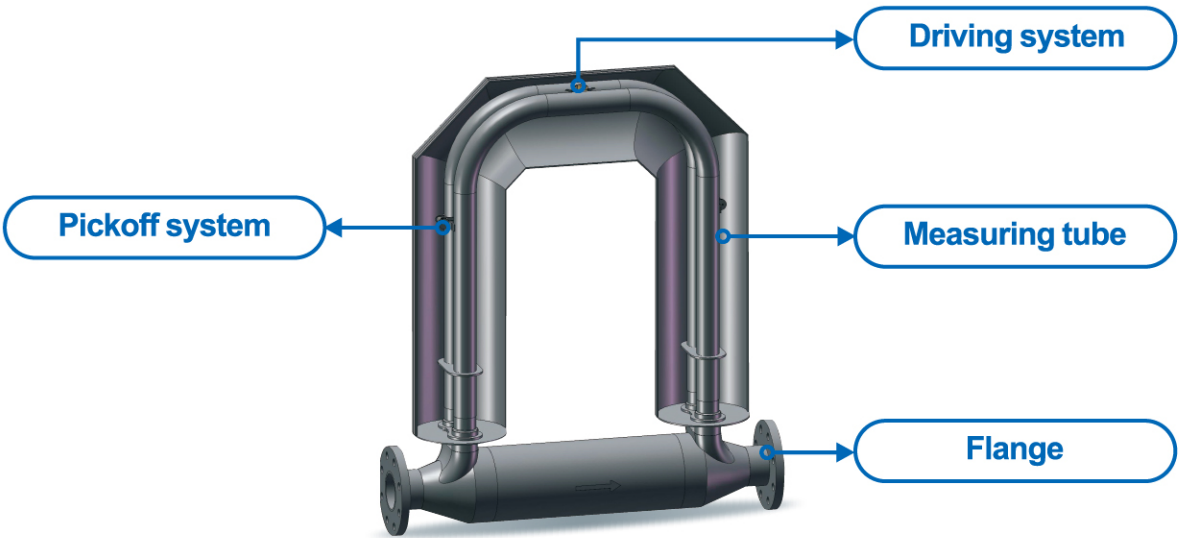
# K Series Mass Flow Meter

## Coriolis effect principle

Coriolis effect is a description of the deviation of a linear motion particle in a rotating system due to inertia relative to the linear motion of the rotating system.

The mass flow meter is a typical application of Coriolis Effect. It allows the measured fluid to pass through a measuring tube in vibration. The flow of fluid in the tube is equivalent to linear motion. The vibration of the measuring tube will produce an angular velocity. Because the vibration is driven by an applied electromagnetic field, it has a fixed frequency, so the Coriolis effect received by the fluid in the tube is only related to its mass and speed of motion, and the product of mass and speed of motion, that is, the flow velocity is the mass flow rate that needs to be measured, so by measuring the Coriolis effect of the fluid in the tube its mass flow can be obtained.

## Schematic diagram





# Meter Advantages

# Meter Advantages

ADD VALUE



$\pm 0.1$

## High Mass Accuracy

Measurement error is less than  $\pm 0.1\%$

Through the optimization of the structural parameters of the mass flow meter sensor and the application of digital technology to the transmitter, the mass measurement error of the K Series Mass Flow Meters is less than  $\pm 0.1\%$ , and the repeatability is higher than  $\pm 0.025\%$ .

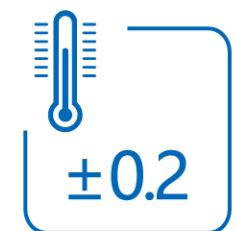


$\pm 0.0005$

## High Density Accuracy

Measurement error is less than  $\pm 0.0005\text{g/cm}^3$

K Series Mass Flow Meters realize direct online real-time density measurement, which is safe, convenient and reliable. It eliminates the disadvantages of manual measurement and improves the efficiency of operators.



$\pm 0.2$

## High Temperature Accuracy

Measurement error is less than  $\pm 0.2^\circ\text{C}$

K Series Mass Flow Meters use pt100 temperature sensors, cooperate with precision measurement circuits and advanced temperature compensation algorithms, to provide reliable guarantee for accurate measurement of flow rate and density.



STABLE

## Good Zero Stability to Ensure Long-Term Stable Operation

Zero stability is an important indicator for evaluating the measurement accuracy and long-term stability of mass flow meters.

K Series Mass Flow Meter uses the original technology with national invention patent and American invention patent, which makes the product itself have ultra-high zero stability, even under harsh working conditions, it can operate accurately and stably for a long time.

## Fast Response Time Suitable for small batch and short time filling

K Series Mass Flow Meter transmitters use digital algorithms to increase the sampling rate, greatly shorten the response time, and ensure the consistency of small batch and short time filling.



FAST

## Wide Range Ratio Range ratio up to 20:1

K Series Mass Flow Meters use digital algorithms to filter out more noise and ensure the measurement accuracy of low flow rates. The range ratio can reach 20:1.



20:1

## Long Service Life Product design life is 20 years

The gears, rotors and other components of traditional Positive Displacement Flow Meter are easily affected by fluid erosion and need to be cleaned or replaced regularly.

The principle of the K Series Mass Flow Meter determines that it has no obstacles and moving parts inside, and there are no problems such as wear and tear. It fully guarantees its service life and accurately measures and greatly reduces maintenance costs, saving time, effort, and energy.



20 YEARS

## Other Advantages More reminder functions

K Series Mass Flow Meter transmitters can measure more variables and achieve more accurate status indications, such as gas-liquid two-phase flow status reminders.

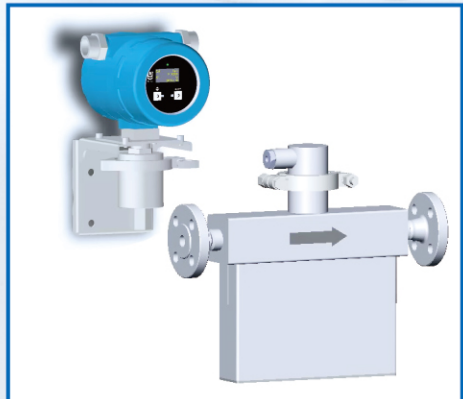


MORE

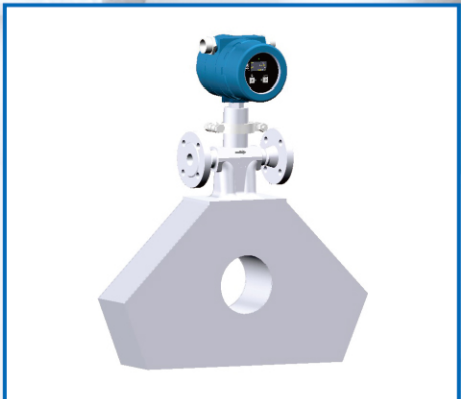


# Coriolis Mass Flowmeters

## K Series Mass Flow Meter



K010



K100

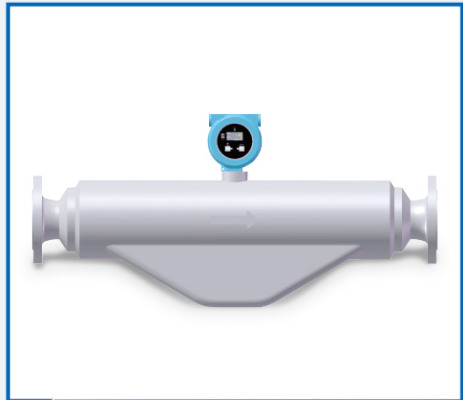


K300



K400

## KV Series Mass Flow Meter



KV200



KV300

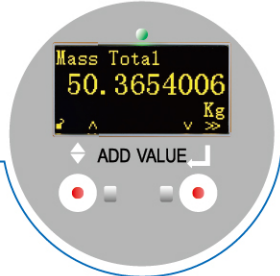
ADD VALUE

# Main Functions

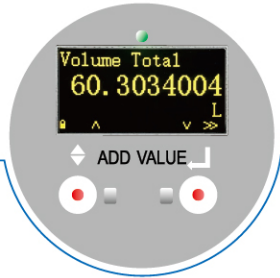
The K Series Mass Flow Meter can directly measure the mass flow, total mass, volume flow, total volume, temperature, density, etc. of the process medium.



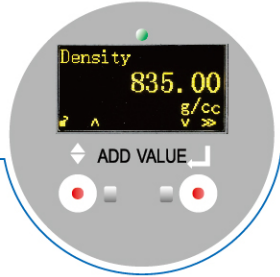
Direct display of total mass  
Direct display of mass flow



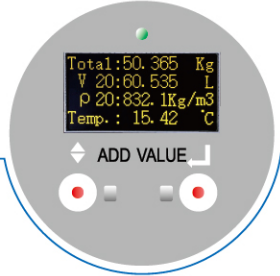
Direct display of total volume  
Direct display of volume flow



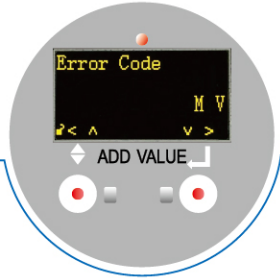
Direct display of apparent density



Direct display of total mass, total volume  $V_{20}$ , standard density  $\rho_{20}$ , temperature



Reminder function





# Performance Specifications

## Accuracy and Repeatability

	Model	Flange Compatibility	Nominal Flow Rate <sup>①</sup> kg/h	Maximum Flow Rate kg/h
Mass Flow	K010	DN5/DN8/DN10/DN15/DN20/DN25	96	110
	K015	DN10/DN15/DN20/DN25	270	310
	K025	DN15/DN20/DN25	1,000	1,420
	K050	DN15/DN20/DN25	3,000	4,200
	K100	DN25/DN32	15,200	21,600
	K200	DN40/DN50/DN65	52,500	75,000
	K300	DN80/DN100	155,000	220,000
	K350	DN100/DN125/DN150	290,000	403,000
	K400	DN150/(DN175)/DN200	462,000	652,000
	K600	DN200/(DN225)/DN250	900,000	1,463,000
	K800	DN200/(DN225)/DN250/DN300	1,604,000	2,350,000
	K1200	DN250/DN300/DN350	2,380,000	3,266,000
	KV200	DN40/DN50	52,000	87,000
	KV300	DN80/DN100	133,000	238,000
	Mass Flow Accuracy <sup>②</sup>		Mass Flow Repeatability	Volume Flow Accuracy <sup>③</sup>
Within 20:1 Range Ratio <sup>④</sup>	± 0.1%		± 0.025%	± 0.1%

	Model	kg/h
Zero Stability <sup>⑤</sup>	K010	0.0072
	K015	0.02025
	K025	0.075
	K050	0.15
	K100	0.76
	K200	2.62
	K300	7.76
	K350	21.75
	K400	34.65
	K600	67.5
	K800	120.3
	K1200	178.5
	KV200	4.35
	KV300	9.0

①Nominal flow rate is the flow rate at which water at reference conditions causes approximately 0.1 Mpa of pressure drop across the meter.  
 ②Stated flow accuracy includes the combined effects of repeatability, linearity, hysteresis. Liquid indicators are based on water at 20 ~ 25 °C and 0.1 ~ 0.2 Mpa reference conditions, unless otherwise stated.  
 ③The volume flow error is based on the process fluid with a density of 1 g/cm³. For process fluids with a density other than 1 g/cm³, the volume flow is equal to the mass flow / fluid density.  
 ④Range ratio is the ratio of nominal flow and minimum flow.  
 ⑤Zero stability is used when the flow rate approaches the low end of the flow range where the meter accuracy begins to deviate from the stated accuracy rating. The zero stability is measured under the condition of no mount stress.

# Performance Specifications

## General Specifications

Power Supply (AC or DC)	AC Power Supply	(85-265 VAC), 50/60 HZ
	DC Power Supply	(18-100) VDC
Pressurization and Sealability	Perform CCS test upon the pressurized part of the flowmeter, test medium is water, and test pressure is 1.5 times of the nominal pressure. After 5 minutes, all connections present no penetration and no leakage.	

## Output Signal And Integration

Analog communication (Two optional output channels)	It can be set according to site requirements: two-way current communication,two-way pulse communication or one-way current communication and one-way pulse communication.	
Pulse output	Output range	(0 ~ 10) kHz
	Basic error	<1 pulse
	Temperature effect	±0.001% F.S/ °C
Digital communication	RS485 interface, Modbus communication protocol, HART Baud rate can be selected: 9600,19200,38400, etc. Multi-machine communication and Modbus connection are available.	
Current output	Output range	(4 - 20) mA
	Basic error	±0.05%
	Temperature effect	±0.005% F.S/ °C
Power consumption	BPM transmitter maximum power ≤11W	

## Hazardous Area Classifications

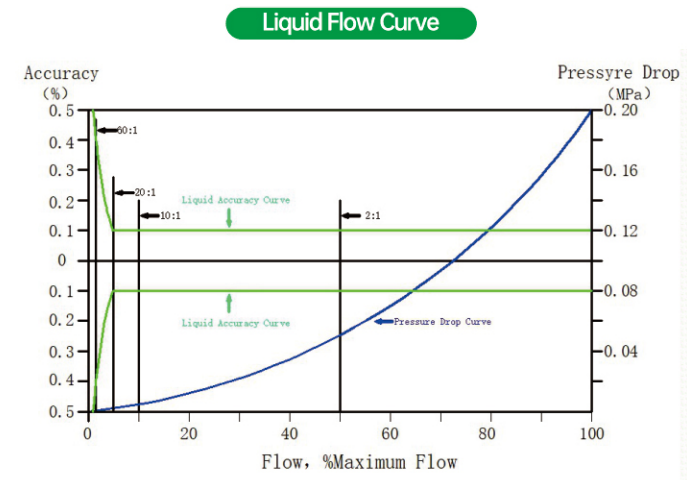
Explosion-proof grade	Sensor	Ex ib IIC T1~T6 Gb
	Transmitter	Ex d [ib] IIC T6 Gb
	Explosion-proof performance conforms to GB3836.1-2010,GB3836.2-2010,GB3836.4-2010.	
	Application: Suitable for Zone 1 and Zone 2 of explosive hazardous locations,	
	Equipment category IIC, backward compatible with IIA, IIB,	
Protection level	Temperature group T1-T6.	
	Sensor	IP66/IP67
	Transmitter	IP66/IP67

⚠ Separate or integrated installation of the sensor and transmitter does not affect the explosion-proof performance.



# Performance Specifications

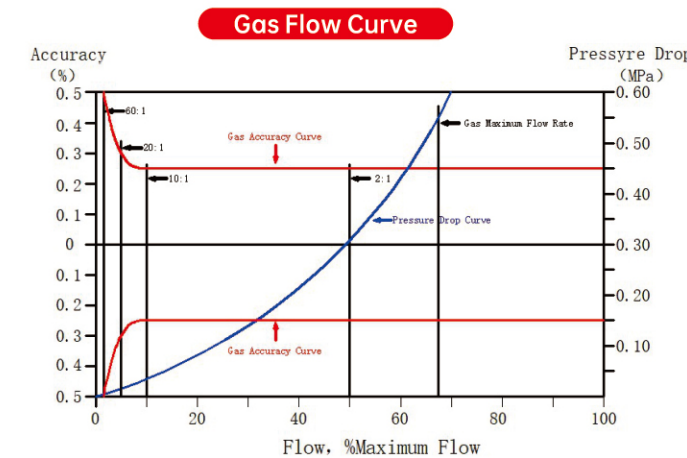
## Typical Example for K-Series Mass Flow Meter Accuracy and Pressure Drop



Liquid indicator is based on the reference conditions of water at (20~25) °C and (0.1~0.2) Mpa

The maximum liquid flow rate is the corresponding flow rate when the pressure drop is approximately 0.2MPa caused by the water flow under the reference conditions

Range Ratio <sup>①</sup>	60:1	20:1	10:1	2:1	1:1
Accuracy <sup>②</sup> (±%)	0.4	0.1	0.1	0.1	0.1
Pressure Drop (MPa)	0.00008	0.0008	0.002	0.051	0.2



The gas indicator is based on the reference conditions of air at 25 °C and 10 Mpa

The maximum gas flow rate is the corresponding flow rate when the Mach number is 0.3 under reference conditions, but not greater than the maximum liquid flow rate, taking the lower one of the two flow rates.

Range Ratio <sup>①</sup>	60:1	20:1	10:1	2:1	Gas Maximum Flow Rate
Accuracy <sup>②</sup> (±%)	0.5	0.3	0.25	0.25	0.25
Pressure Drop (MPa)	0.0004	0.006	0.013	0.31	0.55

①Range ratio is the ratio of the maximum liquid flow rate to each flow point.

②Accuracy is the actual measurement accuracy. Since the highest accuracy of "JJG 1038-2008 Coriolis Mass Flow Meter" is 0.15, the relevant certificates and qualifications can only be 0.15.

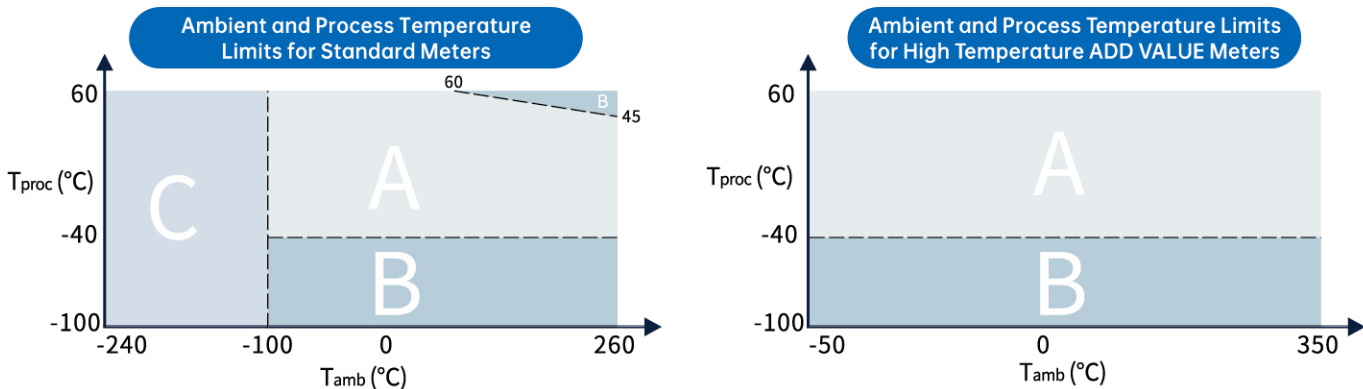
# Performance Specifications

## Density Performance Indicator (Liquid)

Density Accuracy <sup>①</sup>	Repeatability	Measurement Range
±0.0005g/cm <sup>3</sup>	±0.0001g/cm <sup>3</sup>	(0.2~2.0)g/cm <sup>3</sup>
±0.5kg/m <sup>3</sup>	±0.1kg/m <sup>3</sup>	(200~2000)kg/m <sup>3</sup>

① Density Accuracy includes the effects of repeatability, linearity, and hysteresis. The density accuracy of ±0.0005 g/cm<sup>3</sup> (±0.5kg/m<sup>3</sup>) is based on water at 20°C and (0.1~0.2) MPa reference conditions. Different operating conditions may lead to a decrease in accuracy.

## Temperature Performance Indicators



- A= All available electronic options  
B= Remote mount electronics only  
C= Recommend special order cryogenic sensor options when operating at a process temperature below -100 °C
- In all cases, the electronics cannot be operated where the ambient temperature is below 40.0 °C or above 60.0 °C. If a sensor is to be used where the ambient temperature is outside of the range permissible for the electronics, the electronics must be remotely located where the ambient temperature is within the permissible range, as indicated by the shaded areas of the temperature limit graphs.
  - Sensors can be used in the process and ambient temperature ranges shown in the temperature limit graphs.

Accuracy	Repeatability	Temperature Limit <sup>②</sup>	Temperature Measurement Range	Ambient Temperature
±0.2°C	±0.1°C	(-240~ 350)°C	(-240~ 350)°C	Working Temperature(-40~ 60)°C Storage Temperature(-40~ 70)°C

② Temperature limits is defined as a temperature range that are installed at hazardous area and further restricted by proof approvals



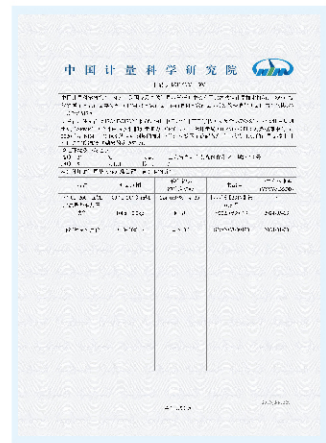
# Calibration System

The top domestic calibration system certified by the China Academy of Metrology-Uncertainty  $\pm 0.03\%$

Calibration System	Verification Accuracy	Maximum Flow Rate
Qingdao Add Value	$\pm 0.03\%$	10m/s
Other Factories	$\pm 0.05\%$	7~8m/s



The key components of the calibration system all use the best original imported equipment: weighing instrument-METTLER TOLEDO's highest-precision electronic scale to ensure calibration accuracy; water pump- Grundfos variable frequency control water pump to ensure stable flow rate.

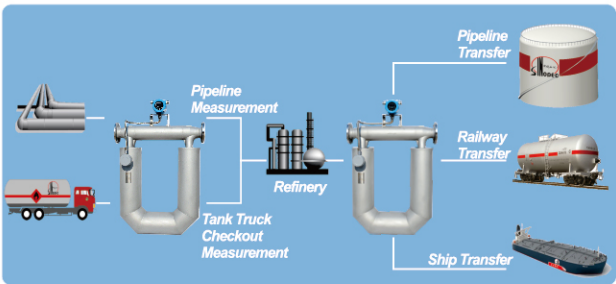


Obtained the verification certificate of "Static Mass Water Flow Standard Device" issued by the National Institute of Metrology of China.

# Application Cases

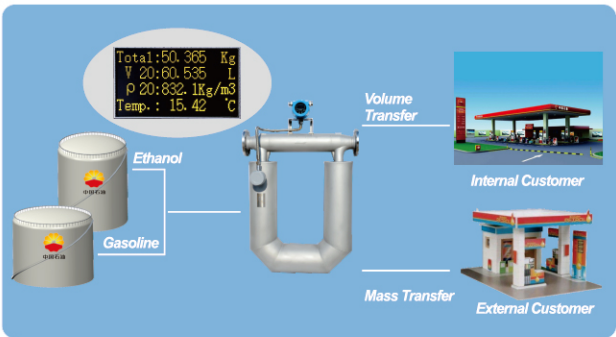
## Application in mass custody transfer

The mass measurement error of K Series Mass Flow Meter is less than  $\pm 0.1\%$ , with high stability and can realize custody transfer.



## Application in standard volume (V<sub>20</sub>) handover

The mass measurement error of the K Series Mass Flow Meter is less than  $\pm 0.1\%$ , the density measurement error is less than  $\pm 0.0005 / \text{cm}^3$ , the temperature measurement error is less than  $\pm 0.2^\circ\text{C}$ , and the measurement error of the standard volume (V<sub>20</sub>) is guaranteed to be less than  $\pm 0.15\%$ .



## Application in ultra-low temperature media

K Series Mass Flow Meters can be applied to ultra-low temperature media such as LNG and liquid nitrogen with a temperature not lower than  $-240^\circ\text{C}$



## Application in high temperature and high viscosity media

K Series Mass Flow Meters can be applied to high temperature and high viscosity media such as maleic anhydride, residual oil, crude oil, resin, maltose etc., whose temperature is not higher than  $260^\circ\text{C}$ .



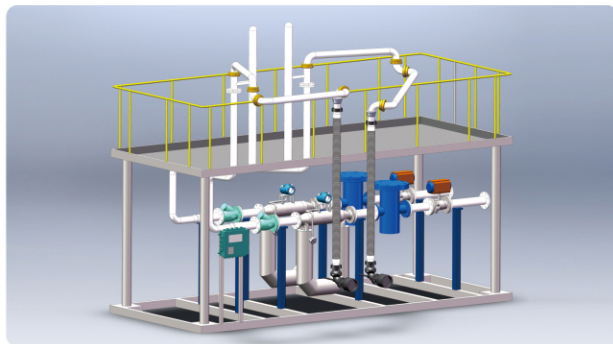


# Application Cases

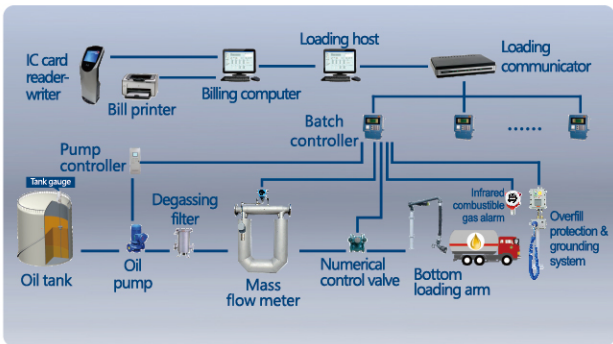
## Application in quantitative loading

- 1. The measurement error of the mass flow meter is less than  $\pm 0.1\%$  to achieve accurate loading and improve loading efficiency;
- 2. The measurement accuracy is not affected by changes in medium density.

*Schematic diagram of quantitative loading automatic pipeline*



*Application of K Series Mass Flow Meter in quantitative loading system*



## Application in process control

K Series Mass Flow Meters are used for process control, reaction kettle feeding, and directly measure the mass of the medium without being affected by density, simplify the production process, and improve work efficiency.



## Application in batch filling

The flow response time of K Series Mass Flow Meter is 50ms, and the response speed is fast, which ensures the consistency of batch filling.



# Application Cases

## Application in gas measurement

K Series Mass Flow Meters can be used to measure gas under high pressure, high flow rate and other working conditions.



## Application in oil field

K Series Mass Flow Meters have good zero stability and can be used for intermittent flow measurement, ensuring accurate measurement of oil output from oil wells.



## Application in density measurement

K Series Mass Flow Meters have no choke or moving parts, its pipeline is wear resistance and its density measurement accuracy is high. It is suitable for the measurement of parameters such as lime slurry concentration, pulp concentration, ammonia concentration, alcohol content, sugar Baume degrees and water content.



## Application in high-power equipment fuel detection

K Series Mass Flow Meters has a wide range ratio, fast response speed, strong anti-interference ability and can detect intermittent flow, suitable for fuel monitoring of large equipment, such as marine fuel monitoring and large equipment fuel consumption monitoring.





# Application Cases

## Case 1 Ethanol gasoline blending



K Series Mass Flow Meters are used for CNOOC ethanol gasoline custody transfer. DN80 caliber mass flow meter is used to measure the mass of component oil. DN50 caliber mass flow meter is used to measure the mass of ethanol gasoline. Cooperated with automation equipment according to the required ratio, directly display in units of mass in the warehouse.

## Case 2 Side-mounted



The K Series Mass Flow Meters is directly installed the reaction kettle in the pharmaceutical factory, and at the same time monitor the density of the medium. The side-mounted installation is used due to the insufficient installation space, which solves the problem of insufficient space and at the same time ensures the aesthetics and consistency of the site.

# Application Cases

## Case 3 Sites with insufficient installation space



It is a transformed oil depot, which is limited by the height of the pipeline, so a ground groove is added below the flow meter, and both ends are fixed to reduce the impact of pipeline vibration on the accuracy of the flow meter. This installation method can be used when the installation space is insufficient.

## Case 4 Top installation

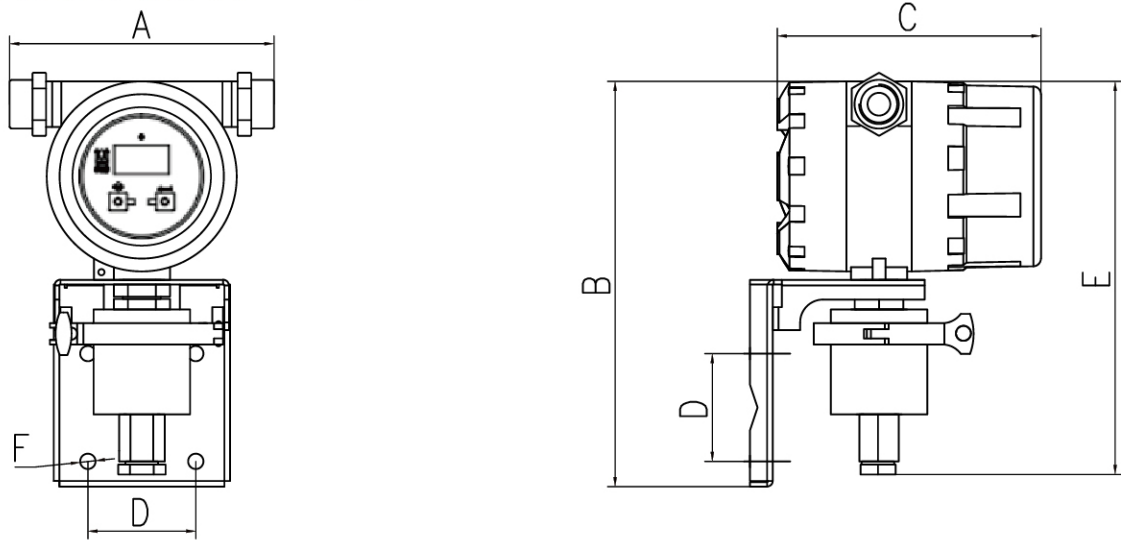


When the bottom installation space is insufficient, the K Series Mass Flow Meters can be installed on the top on the premise of ensuring that the pipeline medium does not contain gas.



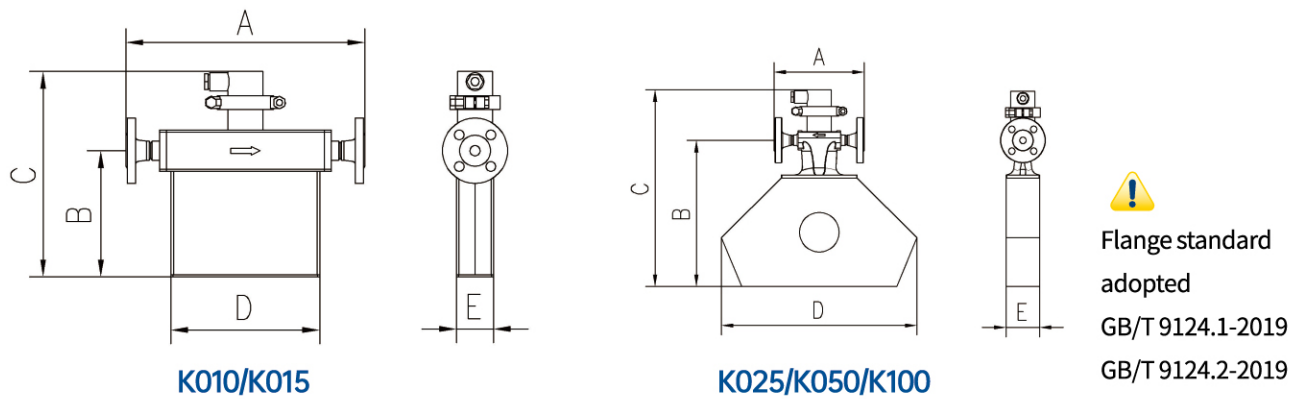
# Outline Dimensions

BPM-B Transmitter (Unit: mm)



Model	A	B	C	D	E	F
BPM-B	166	284	174	71	294	4 x Φ10

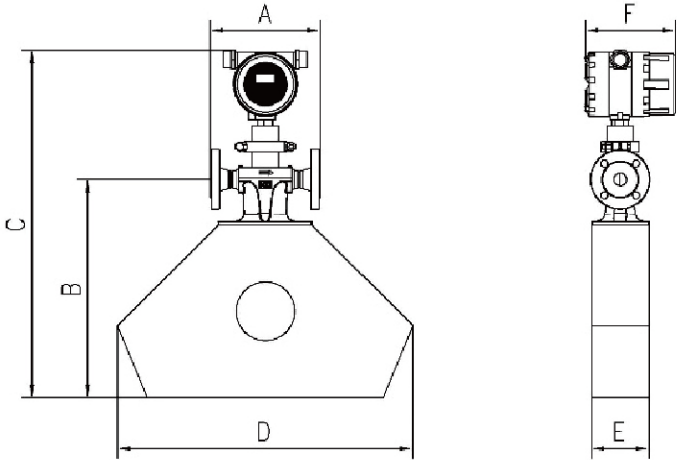
K-Series Mass Flow Meter (Separate Mount) (Unit: mm)



Model	Flange Compatibility	A (Customizable)	B	C	D	E
K010	DN5/DN8/DN10/DN15/DN20/DN25	353~363	183	298	223	54
K015	DN10/DN15/DN20/DN25	345~355	183	298	216	54
K025	DN15/DN20/DN25	161~165	217	339	278	54
K050	DN15/DN20/DN25	189~193	306	412	410	70
K100	DN25/DN32	212~216	420	531	569	111

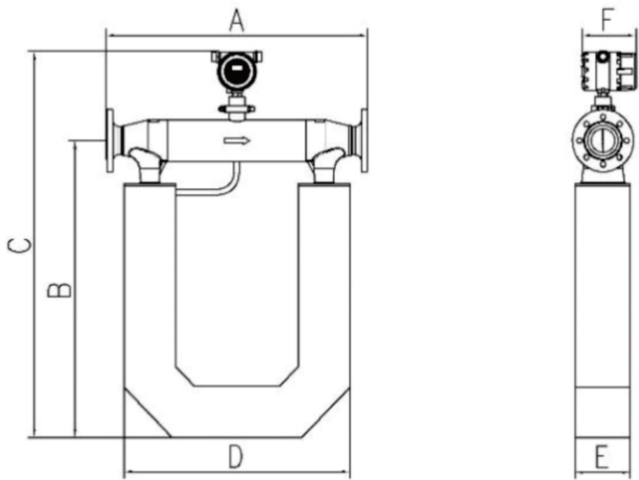
# Outline Dimensions

K-Series Mass Flow Meter (Integral Mount) (Unit: mm)



! Flange standard adopted  
GB/T 9124.1-2019  
GB/T 9124.2-2019

Model	Flange Compatibility	A	B	C	D	E	F
K100	DN25/DN32	212~216	420	668	569	111	174



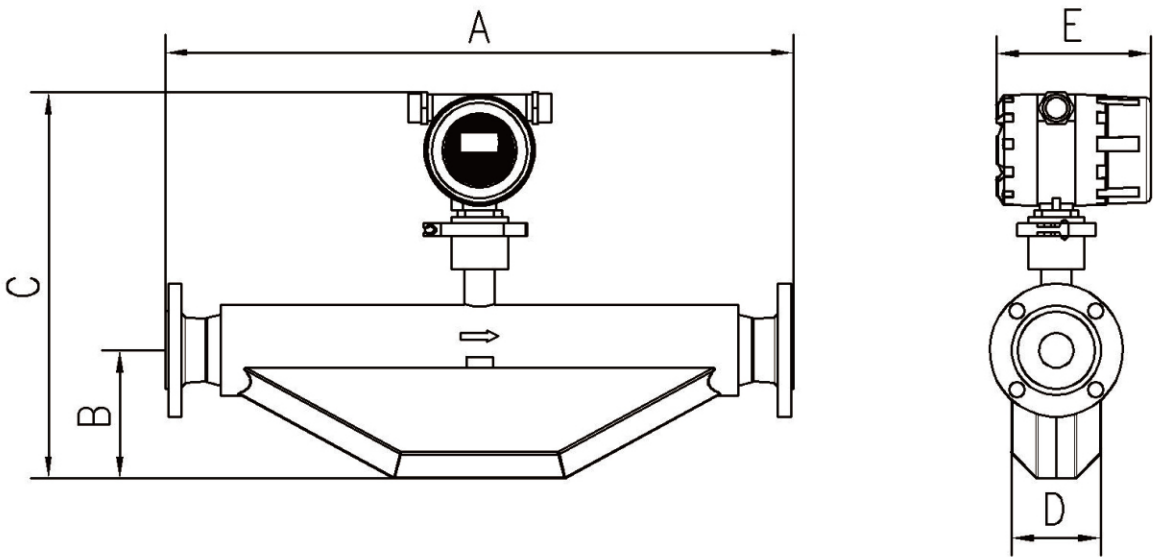
! Flange standard adopted  
GB/T 9124.1-2019  
GB/T 9124.2-2019

Model	Flange Compatibility	A (Customizable)	B	C	D	E	F
K200	DN40/DN50/DN65	582~596	681	932	491	125	174
K300	DN80/DN100	836~866	955	1243	726	176	174
K350	DN100/DN125/DN150	830~876	948	1235	720	234	174
K400	DN150/(DN175)/DN200	990~1056	1056	1362	800	280	174
K600	DN200/(DN225)/DN250	1023~1109	1244	1592	840	325	174
K800	DN200/(DN225)/DN250/DN300	1032~1138	1376	1718	884	397	174
K1200	DN250/DN300/DN350	1228~1330	1878	2285	815	491	174



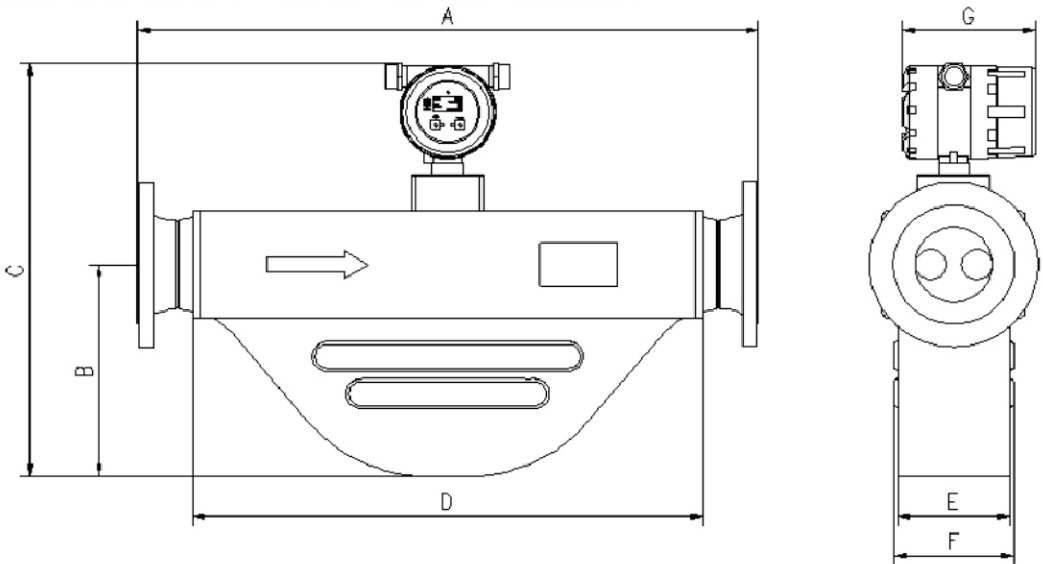
# Outline Dimensions

KV200 Mass Flowmeter Sensor (Unit: mm)



Model	A (Customizable)	B	C	D	E
KV200	707~727	145	345	100	174

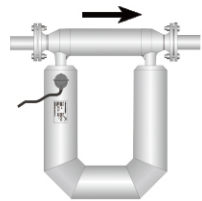
KV300 Mass Flowmeter Sensor (Unit: mm)



Model	A	B	C	D	E	F	G
KV300	805-900 (Customizable)	283	551	663	145	155	174

# Installation Instructions

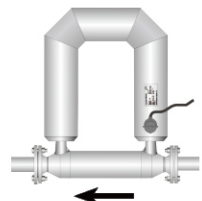
## K Series sensor installation



### Horizontal installation—bottom mounted

#### Applicable medium: liquid

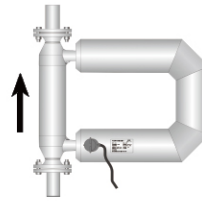
⚠ Generally, the sensor is installed with the shell facing down to prevent air from accumulating in the sensor measurement tube, thereby achieving the purpose of accurately measuring the mass flow.



### Horizontal installation—top mounted

#### Applicable medium: gas

⚠ Generally, the sensor is installed with the shell facing upward to avoid the accumulation of condensate in the measuring tube of the sensor.



### Flag installation—side mounted

#### Applicable medium: liquid or solid-liquid mixing

⚠ Generally, the sensor is installed on the vertical pipeline to avoid the accumulation of particles in the measuring tube of the sensor.

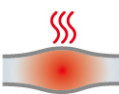
## Notes on installation location



The sensor should be away from interference sources that can cause mechanical vibration of the pipeline, such as the pump on the process pipeline.



The measuring tube of the sensor should always be filled with liquid and have a certain back pressure, which requires the installation position to be at the lower end of the pipeline.



The sensor should pay attention to the expansion and deformation of the process pipeline due to temperature changes, especially cannot be installed near the expansion joint of the process pipeline.



The sensor flange must be coaxially connected to the pipeline flange to ensure no installation stress.



The sensor should be far away from industrial electromagnetic interference sources, such as high-power motors, transformers, etc.



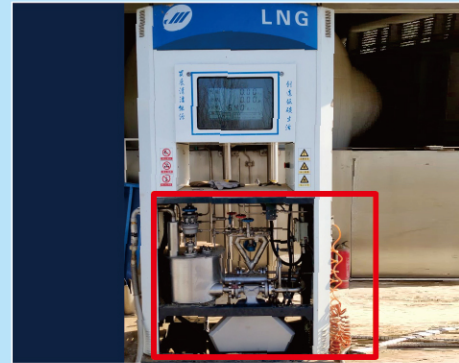
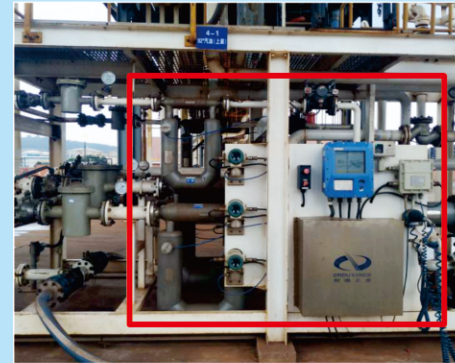
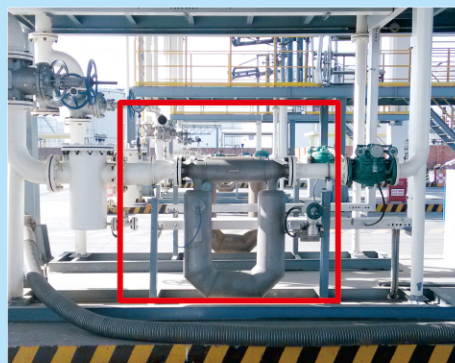
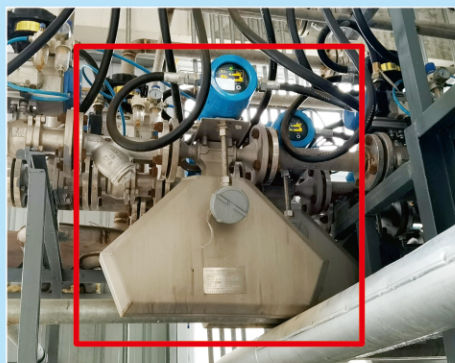
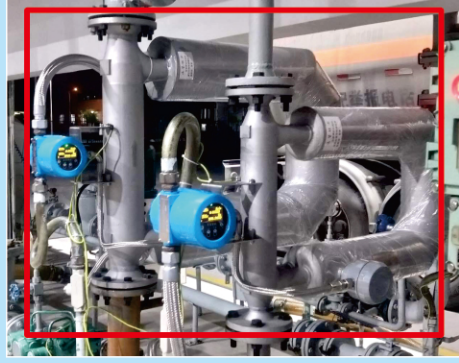
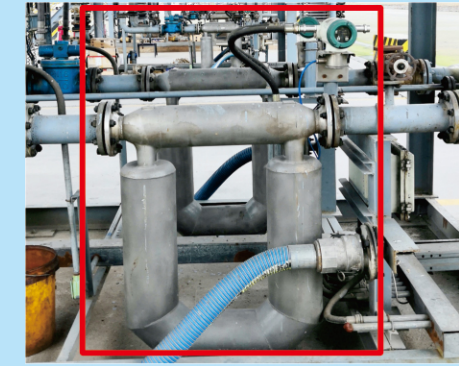
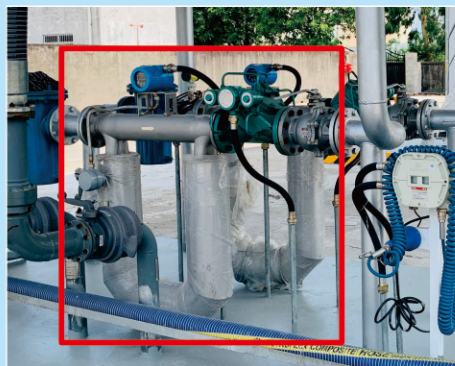
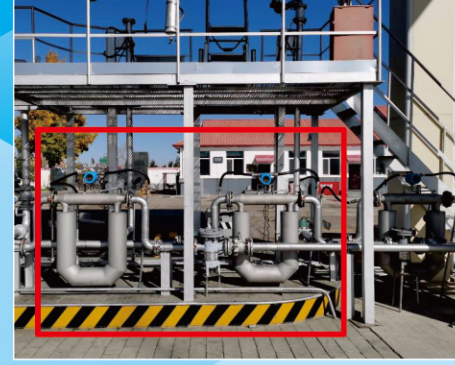
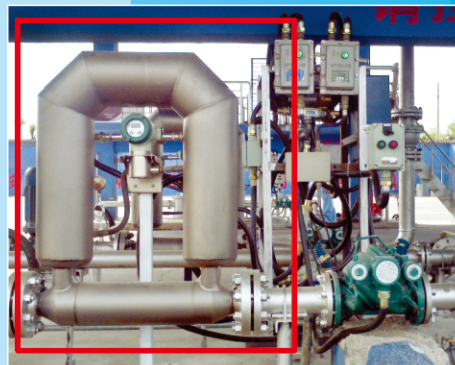
The upstream and downstream of the sensor should be installed with shut-off valves respectively.

⚠ When installing the sensor, you must choose a suitable installation location. In order to eliminate the impact of vibration on the measurement, in addition to staying away from the vibration source, a support rod is also required to fix the pipeline and valve firmly during installation. The lower end of the support rod must be fixed on a stable foundation, and the upper end is matched with the pipe clamp to fix the process pipeline. (Do not use the sensor housing to support sensors, pipelines, valves, pumps, etc.)

⚠ After the sensor is installed, its housing should be in a free floating state.



# Achievements



ADD VALUE

# Achievements

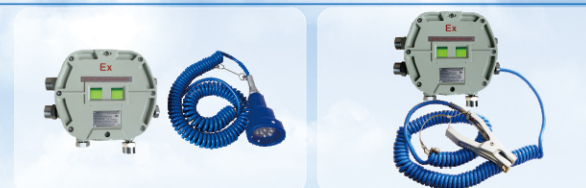




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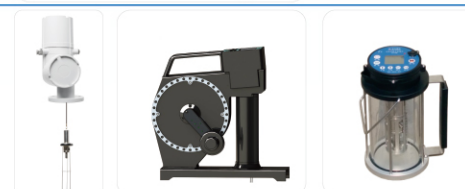
*Filters for fuel dispenser*



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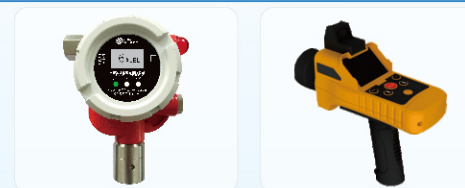
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