



澳威流体  
ADD VALUE FLOW



科里奥利

质量流量计

Coriolis Mass Flow Meters



澳威流体  
ADD VALUE FLOW

青岛澳威流体计量有限公司

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# 01

## 企业介绍

### Company Introduction

青岛澳威流体计量有限公司隶属于青岛澳氏企业集团，集团成立于1996年，是一家拥有20余家公司的科技企业群，年销售额超过10亿的一家民营企业，在石化仪器仪表、智能家居、医疗器械、智能制造等领域拥有较高的知名度和品牌认可度。其中11家专注于石油化工领域，每家公司独立运营，在安全、计量、环保等各个细分市场为客户提供专业服务。澳氏企业秉承“为社会创造价值”的理念，坚持“顾客满意，持续创新，自组织式经营”的原则，力争在每个细分市场做到国内领先。

青岛澳威流体计量有限公司位于青岛市黄岛区保税港区，是一家集研发、生产、销售、服务于一体的高新技术企业。自成立以来，青岛澳威始终专注于流体计量产品的研发与制造，现已独立研发出科里奥利质量流量计和在线振动管液体密度计两大系列产品，并取得了国家发明专利。公司拥有先进的设备，建立了完善的生产检验流程，已顺利通过ISO9001质量管理体系和ISO14001环境管理体系认证，中国船级社认证等。目前，公司产品辐射全国绝大部分省市，广泛应用于船舶行业的燃油加注、燃油消耗监测、中石化、中石油及各大炼厂的定量装车自动化、化工过程质量控制等多种场合，稳定、精准的流体计量服务，获得了客户的一致好评。

青岛澳威矢志创新，以“稳定铸就卓越品质”为经营理念，专注于发展核心竞争力，独创的核心技术完美解决了零点漂移的问题，有效保证了产品长期稳定运行，为您免去后顾之忧。

我们期待成为您值得信赖的合作伙伴！



Qingdao Add Value Flow Metering Co., Ltd. is affiliated to Qingdao OCELL Enterprise Group, which was established in 1996. It is a high-tech enterprise group with more than 20 companies with annual sales exceeding 15 million. OCELL has a high reputation and brand recognition in the fields of petrochemical instrumentation, smart home, medical equipment, intelligent manufacturing, etc. 11 companies of them focus on the petrochemical field, and each company operates independently, providing professional services to customers in various market segments such as safety, measurement, and environmental protection. Adhering to the concept of "creating value for the society" and the principle of "customer satisfaction, continuous innovation, and self-organizing operation", OCELL strives to be the domestic leader in each market segments.

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 fuel filling in the shipbuilding industry, fuel consumption monitoring, quantitative loading automation and chemical process quality control of Sinopec, PetroChina and 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.

We aspire to be your trusted supplier!

Since  
1996

20余家  
Supplier

10亿  
Sales

Standard  
ISO 9001

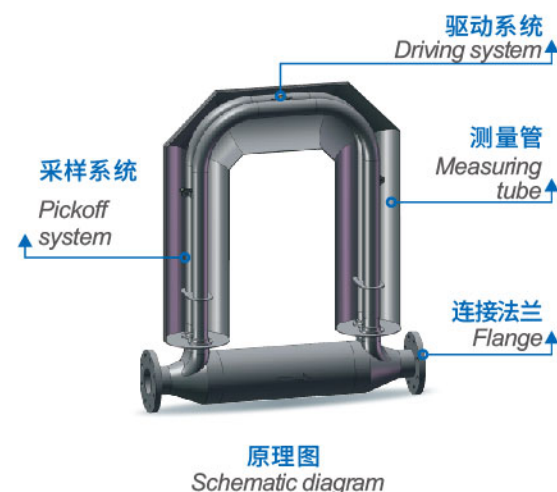
Standard  
ISO 14001

Certificate  
CCS



# 02 工作原理

## Measurement Principles



### 科里奥利力原理

科里奥利力(Coriolis effect), 简称: 科氏力, 是对旋转体系中进行直线运动的质点由于惯性相对于旋转体系产生的直线运动的偏移的一种描述。

质量流量计是科里奥利力的典型应用, 它让被测量的流体通过一个振动中的测量管, 流体在管道中的流动相当于直线运动, 测量管的振动会产生一个角速度, 由于振动是受到外加电磁场驱动的, 有着固定的频率, 因而流体在管道中受到的科里奥利力仅与其质量和运动速度有关, 而质量和运动速度即流速的乘积就是需要测量的质量流量, 因而通过测量流体在管道中受到的科里奥利力, 便可以测量其质量流量。

在质量流量计中, 密度测量的基础是质量与谐振频率之间的线性关系, 与弹簧质量系统相似。

当质量增加时, 系统的谐振频率就减少。  
当质量减少时, 系统的谐振频率就增加。

物体的质量和它振动的频率成反比。整体质量 (测量管和内部介质之和) 越大, 其振动频率就越小。通过检测已知密度 (例如标准状态下的水和空气) 的介质流经测量管时的频率, 可以得到密度与频率之间的线性关系。然后通过振动频率换算到密度。

温度是通过贴在测量管壁上的精密铂电阻测量。

$$\rho = K_1 T^2 + K_2 T + K_0$$

!  $\rho$ : 液体密度/Liquid density     $T$ : 周期/Cycle  
 $K_1$ 、 $K_2$ 、 $K_0$ : 仪表系数/Meter factor

! 注: 对于同一个系统, 负载质量增加, 振动频率下降;  
负载质量减小, 振动频率提高。

Note: For the same system, when the load mass increases, the vibration frequency decreases; when the load mass decreases, the vibration frequency increases.

### 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.

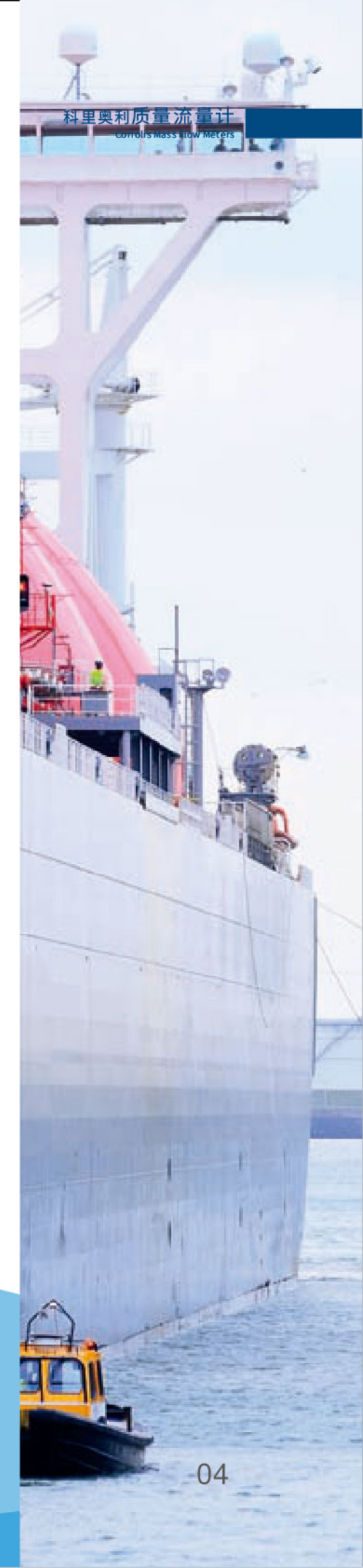
The mass flow meter is a typical application of Coriolis effect. It allows the measured fluid to pass through a measuring tube in vibration. The flow of fluid in the tube is equivalent to linear motion. The vibration of the measuring tube will produce an angular velocity. Because the vibration is driven 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.

In mass flow meters, density measurement is based on a linear relationship between mass and resonant frequency, similar to a spring-mass system.

As the mass increases, the resonant frequency of the system decreases.  
As the mass decreases, the resonant frequency of the system increases.

The mass of an object is inversely proportional to the frequency with vibration frequency. The greater the overall mass (the sum of the measuring tube and the medium inside), the lower its vibration frequency. A linear relationship between density and frequency can be obtained by detecting the frequency of a medium with known density (such as water and air in a standard state) flows through the measuring tube. The vibration frequency is then converted to density.

The temperature is measured by a precision platinum resistance attached to the wall of the measuring tube.





# 03 产品优势

## Product Advantages



**零点稳定性好** 零点稳定性达到满量程的  $1/40000$   
Good Zero Stability (Up to  $1/40000$  of full scale)

零点稳定性是评价质量流量计的测量精度和长期稳定性的重要指标。

K系列质量流量计采用了具有国家发明专利和美国发明专利的独创技术，使得产品本身具有超高的零点稳定性，即使在恶劣的工况条件下，也能长期准确、稳定的运行。

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.



**质量准确度高** 测量误差优于  $\pm 0.1\%$   
High Mass Accuracy (Measurement error is less than  $\pm 0.1\%$ )

通过对质量流量计传感器结构参数上的优化，以及数字技术在变送器上的应用，K系列质量流量计质量测量误差优于  $\pm 0.1\%$ ，重复性优于  $\pm 0.025\%$

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  $\pm 0.025\%$ .



**密度准确度高** 测量误差优于  $\pm 0.0005\text{g/cm}^3$   
High Density Accuracy (Measurement error is less than  $\pm 0.0005\text{g/cm}^3$ )

K系列质量流量计实现了直接在线实时测量密度，安全、方便、可靠，免除手动测量的种种弊端，提高操作人员的工作效率。

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.



**温度准确度高** 测量误差优于  $\pm 0.2^\circ\text{C}$   
High Temperature Accuracy (Measurement error is less than  $\pm 0.2^\circ\text{C}$ )

K系列质量流量计采用pt100温度传感器，配合精密测量电路和先进的温度补偿算法，为流量和密度的精准测量提供可靠保障。

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.



**响应时间快**  
Fast Response Time (All variables output 50ms, single variable output reaches 10ms)

K系列质量流量计变送器运用数字算法，提高了采样率，极大的缩短了响应时间，保证了小批量、短时间的灌装一致性。

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.



**量程比宽**  $40:1$  的量程比范围内能达到  $\pm 0.1\%$   
Wide Range Ratio ( $\pm 0.1\%$  over  $40:1$  range ratio)

K系列质量流量计运用数字算法，过滤掉了更多的噪音，保证了低流速的测量准确性，量程比可达  $40:1$ 。

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 reaches  $40:1$ .



**环境适应性好**  
Good Adaptability to the Environment

传感器采用自平衡技术，安装要求低，允许在振动等恶劣环境下使用（船舶、移动撬装等）。

The sensor adopts self-balancing technology, which has low installation requirements and is allowed to be used in harsh environments such as vibration (ships, mobile skids, etc.).



**功能全**  
Multifunction

有准确的驱动增益、密度、温度、含水率等测量信息，可以提示气液混合，团状流等，为过程诊断提供更多信息；有历史报警信息，便于追溯。

There is accurate measurement information such as drive gain, density, temperature, water content, etc., which can prompt gas-liquid mixing, slug flow, etc., to provide more information for process diagnosis; there is historical alarm information, which is easy to trace.





## BPM型变送器特点:

### Features of BPM Transmitter:



BPM型变送器具有**数字信号处理**和先进的**自诊断功能**  
With digital signal processing and advanced self-diagnostic



适用于具有**挑战性的流体条件**  
Suitable for challenging fluid conditions



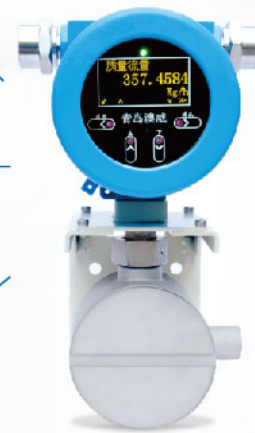
强大的**日志记录**和**追溯功能**  
Powerful recoding and traceability



可报告**双组分混合物的浓度**  
Reportable concentrations of two-component mixtures



**灵活的IO配置**: 2个通道全部有可配置与可编程的IO选项  
Flexible IO configuration: all of the 2 channels have configurable and programmable IO options



## K系列传感器特点:

### Features of K Series Sensor:

**高零点稳定性**, 流量和密度数据精度高, 低压损  
High zero stability, high accuracy of flow and density data, low pressure loss



采用双震荡管设计和DSP数字化修正变送器, 可**有效抵抗回路**  
**噪声干扰**  
Adopt double oscillator tube design and DSP digital correction transmitter, which can effectively resist the noise interference of the loop



介质中夹带气体时可在较宽的操作范围内保持**高精度测量**  
Maintains high-accuracy measurements over a wide operating range when gas is entrained in the medium



**紧凑型**尺寸设计  
Compact size design



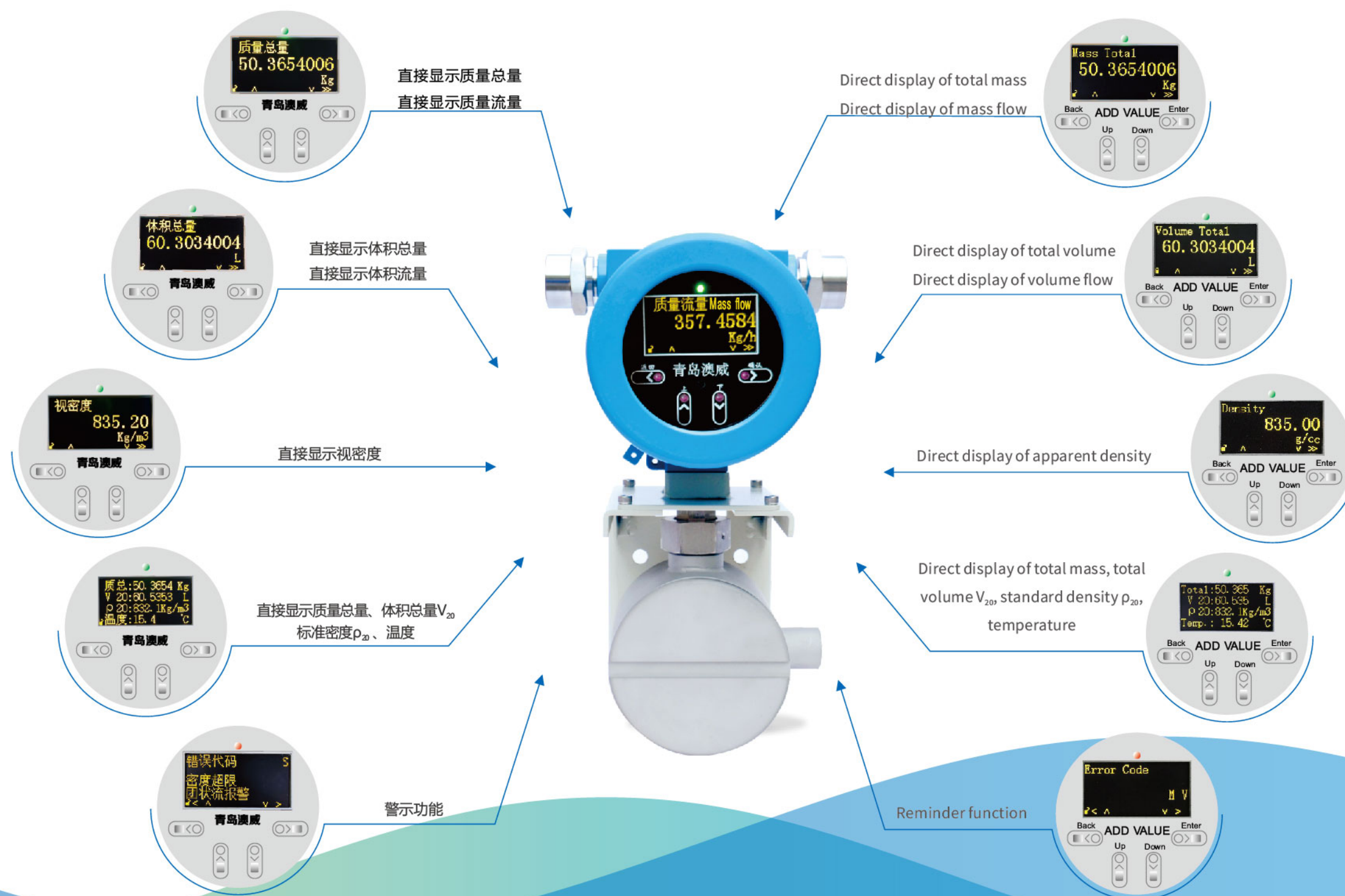
**更好的自诊断功能**  
Better self-diagnostics



# 04 产品功能 Product Function

K系列质量流量计可直接测量过程介质的质量流量、质量总量、体积流量、体积总量、温度、密度等。

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.





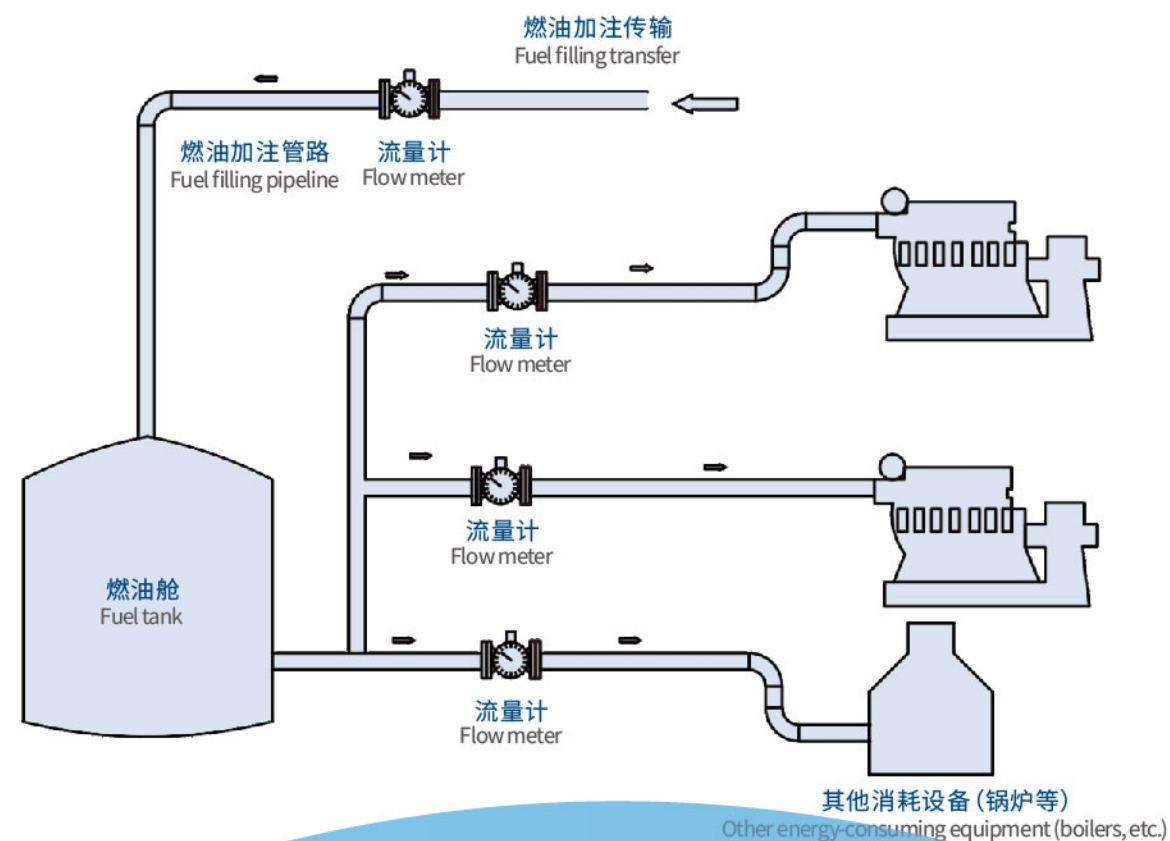
# 05 应用场合 Application



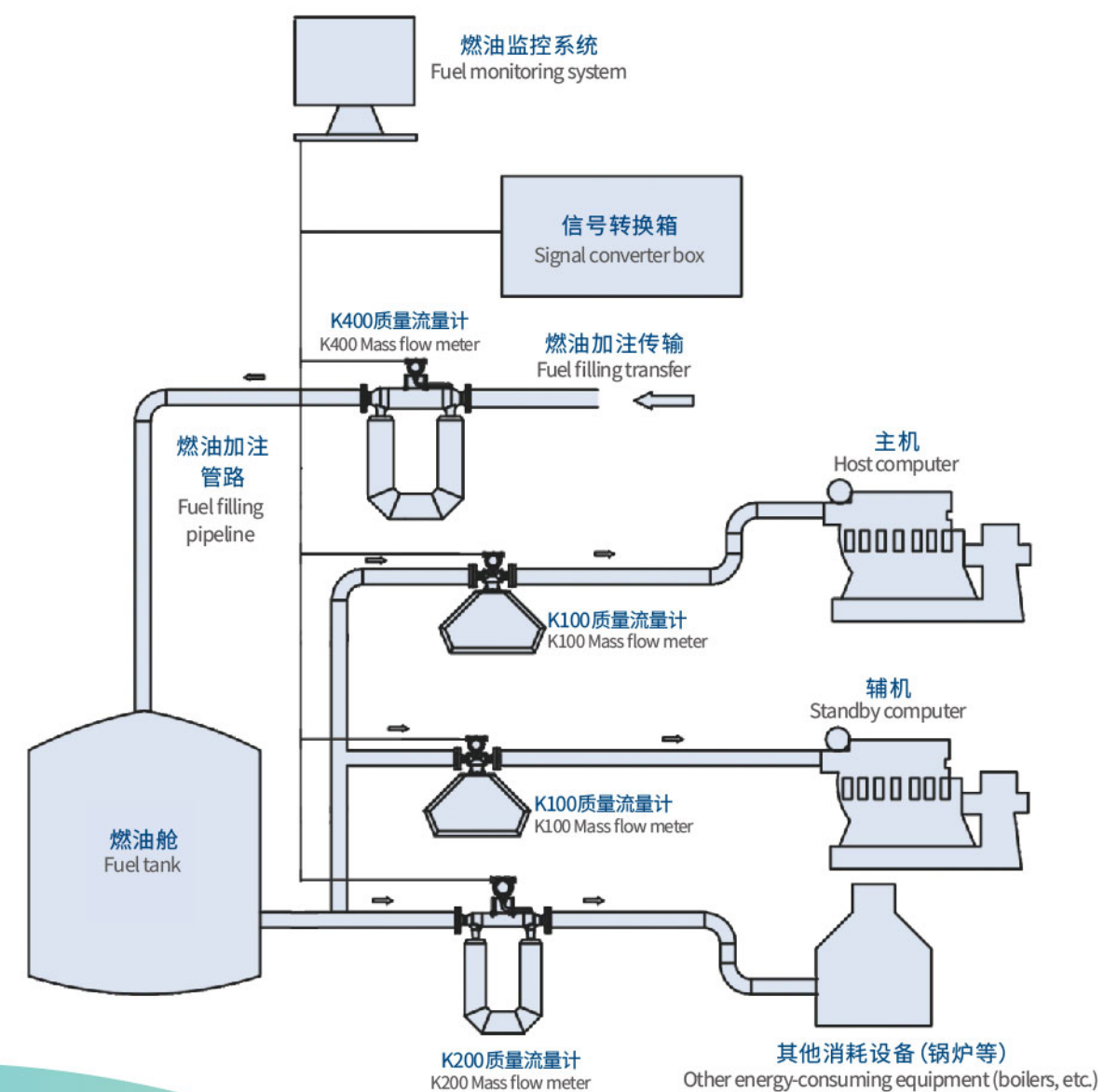
## 燃油加注/燃油消耗监测

### Fuel filling/Fuel consumption monitoring

- 旧模式  
Old mode



- 新模式  
New mode





# LNG 加注

## LNG filling

- 船舶LNG加注分为三种模式：  
Three modes for LNG filling of ships:

车到船 Vehicle-to-ship	船到船 Ship-to-ship	港到船 Port-to-ship
<p>车到船的模式下，LNG加注车通常使用柔性软管通过低温质量流量计连接到码头上的接收船。加注量大约在50-100立方米，加注速度大约在40-60立方米/小时。</p> <p>In vehicle-to-ship mode, the LNG filling vehicle is usually connected to the receiving vessel on the quay using a flexible hose through a cryogenic Mass Flow Meter. The filling volume is about 50-100 m<sup>3</sup>, and the filling rate is about 40-60 m<sup>3</sup>/h.</p>	<p>船到船的模式下，LNG是由另一艘船舶或驳船通过低温质量流量计来计量运送到接收船的。加注量大约在100-6500立方米，加注速度大约在500-1000立方米/小时。</p> <p>In ship-to-ship mode, LNG is metered by another ship or barge to the receiving vessel via a cryogenic Mass Flow Meter. The filling volume is about 100-6500 m<sup>3</sup>, and the filling rate is about 500-1000 m<sup>3</sup>/h.</p>	<p>港到船的模式下，LNG可以直接从小型LNG燃料存储单元（LNG储罐），小型加注站或LNG进出口码头加注。加注量大约在500-20000立方米，加注速度可达大约1000-2000立方米/小时。</p> <p>In the port-to-ship mode, LNG can be refueled directly from small LNG fuel storage units (LNG storage tanks), small filling stations or LNG loading and unloading terminals. The filling volume is about 500-20000 m<sup>3</sup>, and the filling speed can reach about 1000-2000 m<sup>3</sup>/h.</p>



### 在LNG配送站定量装车现场的应用

Application in quantitative loading site of LNG distribution station

K系列质量流量计在超低温工况下完美解决了客户的计量难题，为客户创造价值。

The K series Mass Flow Meter perfectly solves the customer's measurement problems under ultra-low temperature conditions and creates value for customers.



### 在LNG槽车尾部或者集成在卸车撬部位的应用

Application at the rear of LNG tanker or integrated in unloading skid

K系列质量流量计安装在液化天然气槽车尾部或者集成在卸车撬部位，为气化站的液化天然气贸易计量保驾护航。

The K series Mass Flow Meter is installed at the rear of the LNG tanker or integrated in the unloading skid to protect the LNG trade measurement of the gasification station.



### 在集成撬装或低温流体设备的应用

Applications in integrated skid or cryogenic fluid equipment

K系列质量流量计应用于各大低温集成撬装或者低温流体设备的实验与检测，包括低温潜液泵的液氮计量，助力客户积累宝贵的实验数据，为企业或者实验室研发创造价值。

The K series Mass Flow Meter are used in the experiments and testing of major cryogenic integrated skid or cryogenic fluid equipment, including liquid nitrogen measurement of cryogenic submersible pumps, helping customers accumulate valuable experimental data and creating value for enterprise or laboratory research and development.



### 在LNG加液机上的应用

Application in LNG dispenser

K系列质量流量计在液化天然气加液机上的应用，包括液相上替代进口流量计，同时响应国家号召，在加气机回气流量计的推广与应用上为客户降成本，保质保量，推动计量设备国产化，高端化发展。

The application of K series Mass Flow Meter in liquefied natural gas dispenser, including replacing foreign Mass Flow Meter in liquid phase, and responding to the call of the state to reduce costs for customers in the promotion and application of gas return flowmeters for gas dispensers. It guarantees quality and quantity, and promotes the localization and high-end development of metering equipment.





质量流量Mass Flow RATE			
产品型号	选配法兰规格	额定流量 kg/h (千克/小时)	最大流量 kg/h (千克/小时)
Model	Flange	Rated Flow(kg/h)	Max. Flow(kg/h)
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

质量Mass		
流量误差	Flow Error	±0.1%/±0.15%/±0.2%/±0.35%/±0.5%
重 复 性	Repeatability	±0.025%

密度Density		
密度误差	Density Error	±0.0005g/cm <sup>3</sup>
重 复 性	Repeatability	±0.0001g/cm <sup>3</sup>
测量范围	Measuring Range	(0.2-2.0)g/cm <sup>3</sup>

温度Temperature		
误 差	Error	±0.2℃
重 复 性	Repeatability	±0.1℃
测量范围	Measuring Range	(-204-204)℃

电气参数Electrical Parameters			
供电电源	Power Supply	24VDC或者220VAC自适应	24VDC or 220VAC adaptive
信号方式	Signal Way	4-20mA、脉冲、RS485、HART 可定制双电流或双脉冲	4-20mA, Pulse, RS485, HART Dual current or dual pulse is available upon request

环境参数Ambient Parameters		
环境温度	Ambient Temperature	(-40-60)℃

防爆Explosion-proof				
防爆等级	Explosion-proof Grade	传感器	Sensor	Ex ib IIC T1~T6 Gb
		变送器	Transmitter	Ex d [ib] IIC T6 Gb

防护Protection				
防护等级	Protection Class	传感器	Sensor	IP66/IP67
		变送器	Transmitter	IP66/IP67

材质Material		
接液材质	Measuring Tube Material	S31603;S30403;S22053;HC276;
外壳材质	Shell Material	S31603;S30403;

功耗Power Consumption			
BPM变送器	BPM Transmitter	最大功耗≤11W	Maximum Power Consumption ≤ 11W





# 质量式与容积式的优缺点对比

## Comparison of Mass and Volumetric Flow Meter

参数对比	青岛澳威--质量流量计	容积式流量计
交 接 方 式	质量、体积	体积
质量测量精度	$\pm 0.1\% / \pm 0.15\% / \pm 0.2\% / \pm 0.35\% / \pm 0.5\%$	无法测量
体积测量精度	优于 $\pm 0.2\%$	$\pm 0.2\%、\pm 0.5\%$
密度测量精度	$\pm 0.0005\text{g}/\text{cm}^3$	无法测量
温度测量精度	$\pm 0.2^\circ\text{C}$	无法测量
温 度 范 围	$(-204\sim 204)^\circ\text{C}$	$(-20\sim 200)^\circ\text{C}$
适 用 介 质	液体、气体	干净的液体
测 量 功 能	质量流量、质量总量、体积流量、体积总量、密度、温度、含水率	体积流量、体积总量
信 号 输 出	电流、脉冲、RS485、HART	电流、脉冲、RS485
电 源	24VDC或220VAC自适应	24VDC或220VAC需定制
维 护	免维护	需要定期清理齿轮等
寿 命	20年	3-5年
结 构	1. 无可动部件 2. 无磨损件 3. 工况的适用性强 4. 对介质要求低	结构复杂, 内部有齿轮属于易磨损件, 对测量中杂质敏感, 容易卡死, 产生噪音, 甚至产生振动
显 示 界 面	OLED液晶显示、光敏按键、数字显示、清晰明了	指针、滚轮显示

Parameter comparison	Mass Flow Meter from QINGDAO ADD VALUE	Volumetric Flow Meter
Handover Method	Mass, Volume	Volume
Mass Measurement Accuracy	$\pm 0.1\% / \pm 0.15\% / \pm 0.2\% / \pm 0.35\% / \pm 0.5\%$	Cannot be measured
Volume Measurement Accuracy	Better than $\pm 0.2\%$	$\pm 0.2\%、\pm 0.5\%$
Density Measurement Accuracy	$\pm 0.0005\text{g}/\text{cm}^3$	Cannot be measured
Temperature Measurement Accuracy	$\pm 0.2^\circ\text{C}$	Cannot be measured
Temperature Range	$(-204\sim 204)^\circ\text{C}$	$(-20\sim 200)^\circ\text{C}$
Applicable Media	Liquid, Gas	Clean liquid
Measurement Function	Mass flow, otal mass, volume flow, total volume, density, temperature, water content	Volume flow, total volume
Signal Output	Current,Pulse, RS485, HART	Current, Pulse, RS485
Power Supply	24VDC or 220 VAC adaptive	24 VDC or 220VAC to be customized
Maintain	Maintenance Free	Requires regular cleaning of gears etc.
Life	20 years	3 to 5 years
Structure	1.No moving parts 2.No wear parts 3.Strong applicability to working conditions 4.Low requirements for media	The structure is complex, and the gears inside are easy to wear, which are sensitive to impurities in the measurement, easy to get stuck, generate noise, and even vibration.
Interface	OLED liquid crystal display,photosensitive keys. digital display, clear easy to see	Pointer,wheel display



# 8 安装注意事项

## Installation Precautions

### K系列传感器安装方式

#### K Series Sensor Installation

**水平安装——下装****Horizontal installation—bottom mounted****适用介质: 液体****Applicable medium: liquid**

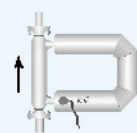
! 一般采用外壳朝下安装传感器, 避免空气聚积在传感器测量管内, 从而达到准确测量质量流量的目的;

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.

**水平安装——上装****Horizontal installation—top mounted****适用介质: 气体****Applicable medium: gas**

! 一般采用外壳朝上安装传感器, 避免冷凝液聚积在传感器测量管内;

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

**旗式安装——侧装****Flag installation—side mounted****适用介质: 液体或固液混合****Applicable medium: liquid or solid-liquid mixing**

! 一般将传感器安装在垂直管道上, 避免微粒聚积在传感器测量管内。

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

### 安装位置注意事项

#### Notes on Installation Location



传感器应远离能引起管道机械振动的干扰源, 如工艺管线上的泵等;

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



传感器测量管内应保证始终充满液体, 且有一定背压, 这就要求安装位置在管道的低端;

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.



传感器应注意工艺管线由于温度变化引起的伸缩和变形, 特别不能安装在工艺管线的膨胀节附近;

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.



传感器安装法兰必须与管道法兰同轴连接, 保证无安装应力;

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



传感器应远离工业电磁干扰源, 如大功率电动机、变压器等;

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



传感器的上游、下游应分别安装截止阀。

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



在安装传感器时, 要选择好合适的安装位置, 为了消除振动对测量的影响, 除了要远离振动源外, 在安装中还要采用支撑杆将管道及阀门固定牢固。支撑杆的下端必须固定在稳固的基础上, 上端与管道卡箍相配合来固定工艺管道线。(切忌用传感器外壳来支撑传感器、管道线、阀门和泵等。)

传感器安装后, 其外壳应处于自由悬空状态。



**产品安装前后无需预留直管段的要求。**



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.



**There is no requirement to reserve straight pipe before and after the installation.**



# 09 产品资质 Certificates



# 10 产品现场照片 Achievements

