



仪昌节流
YICHANG THROTTLE

第一册

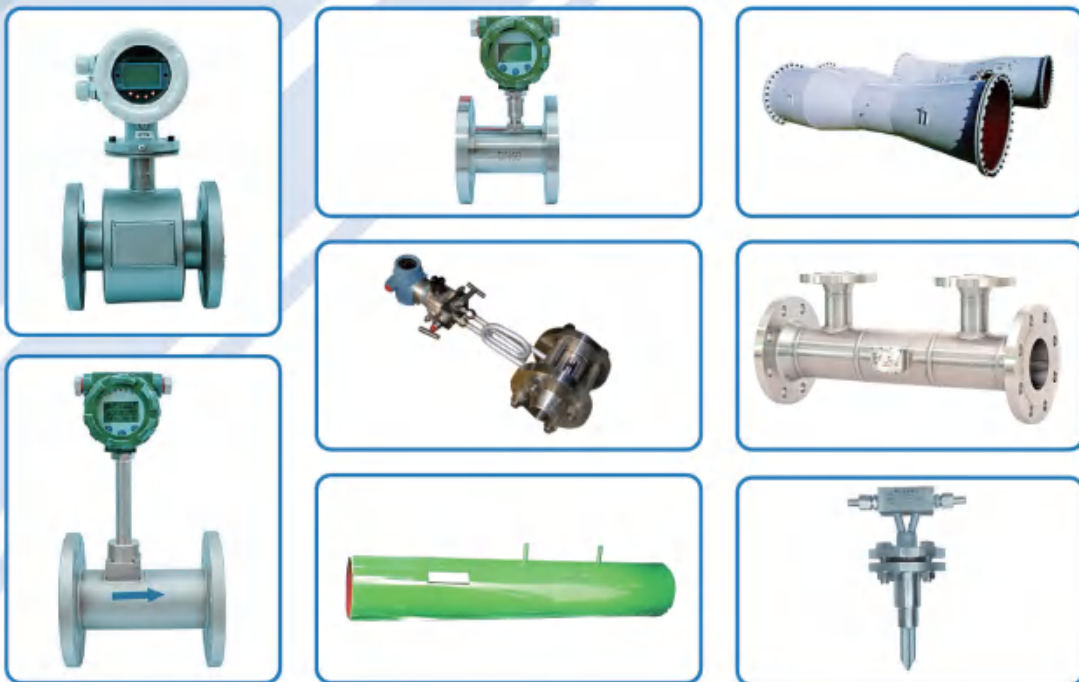
Book 1

中国第一块孔板在这里诞生

节流装置国家标准制定单位之一

The First Orifice Plate Manufactured There in China

One of the Qualified Company Meeting the National standard of Throttle Devices



YICHANG THROTTLE

产品样本
Product Sample

上海仪昌节流装置制造有限公司

沪制：02280048号 国家标准：GB/T 2624-2006

Shanghai Yichang Throttle Device Manufacturing Co., Ltd.

Shanghai: No. 02280048 GB National Standard: GB/T 2624-2006

公司简介

Company Introduction

上海仪昌节流装置制造有限公司成立于2001年,前身是上海自动化仪表股份有限公司上海自动化仪表一厂孔板分厂。是我国专业生产节流装置、差压式流量计的重点企业之一,是节流装置国家标准GB/T2624-2006制定单位之一,国家高新技术企业。

Shanghai Yichang Throttle Device Manufacturing Co., Ltd. was established in 2001, and formerly known as the orifice plate branch of the No. 1 Factory of Shanghai Automation Instrument Co., Ltd. It is one of the key companies specializing in the production of throttle devices, differential pressure flowmeters, speed flowmeter, etc. in China. It is also one of the manufacturers that formulated the national standard GB / T2624 2006 for throttle devices and national high-tech enterprise.

公司长期从事电力、冶金、石油、化工、军工、核电等工业领域生产过程控制和检测所需的节流装置、差压流量计的开发、生产和销售,多年来受到用户的一致好评。

The company has long time been engaged in the development, production and sales of throttle devices, differential pressure flowmeters, speed flowmeter and so on. Those products are required by the production process control and detection in the fields of electric power, metallurgy, petroleum, chemical industry, military industry, nuclear power and other industrial areas. The products and services provided by our company have been favored by clients for a long time.

公司主要产品有角接取压孔板、法兰取压孔板、焊接喷嘴、文丘里管、机翼测风装置、平衡流量计、V锥流量计、均速管流量计、楔型流量计等;其他产品有温度仪表、压力仪表、物位仪表、校验仪表等,欢迎选购。

The main products of our company are comer-tap orifice plate, flange-tap orifice plate, welding nozzle, venturi tube, wing-type air flow measurement device, balanced flowmeter, V-cone flowmeter, averaging velocity tube flowmeter, wedge flowmeter, and etc. We also produce other products such as temperature instruments, pressure instruments, level instruments, calibrated instruments. Orders are welcome.

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公司简介

Company Introduction

上海仪昌节流装置制造有限公司作为我国第一家生产节流装置的著名厂家，历史悠久。由我厂六十年代初开发生产的第一套孔板就用于大庆炼油厂。几十年来，在设计及制造方面处于国内领先地位。2001年上海仪昌节流装置制造有限公司从国营企业改制为民营企业，企业完全保留了原厂的生产技术和科研开发能力，产品也扩大到核电、军工领域；企业具有自主开发生产国内领先水平新产品的能力。建立了完善的产品生产、质量管理体系，通过了GB/T19001-ISO9001:2008质量管理体系认证、ISO14000环境体系认证和ISO45001:2018职业健康安全管理体系认证证书，具有型式批准证书、特种设备生产许可证、核电产品合格供应商证书、中石油物资供应商准入证、中石化物资供应商准入证。

Shanghai Yichang Throttle Device Manufacturing Co, Ltd. is the first well-known manufacturer with a long history in China. The first set of orifice plates developed and produced by our company in the early 1960s was used for Daqing Oilfield. For decades, our company has been in the leading position of designing and manufacturing in China. In 2001, Shanghai Yichang Throttle Device Manufacturing Co., Ltd. was restructured from a state-owned enterprise to a private enterprise. The enterprise is fully retained the production technology and scientific research capacity of the original plant. Also, the product lines are expanded to nuclear power and military industry. The enterprise has the ability to develop and produce new products independently at the advanced level in China. We have established the perfect system of product production and quality management. We have passed GB/T19001-ISO9001:2008 Quality Management System Certification, ISO14000 Environmental System Certification and ISO45001:2018 Occupational Health and Safety Management System Certification. With type Approval Certificate, Production License of Special Equipment, Nuclear Power Products Qualified Supplier Certificate, Supplier Qualification Certificate for China Petroleum Materials, Sinopec Supplier Admission Certificate for Materials.

上海仪昌节流装置制造有限公司成立至今，在原上级主管部门（上海自动化仪表股份有限公司）监督管理下，在全体公司员工的努力下，日益壮大。上海仪昌节流装置制造有限公司将继承前身的优良传统，继续为广大用户服务。

Since the establishment of company, it has grown better and stronger under the supervision of the superior competent department (Shanghai Automation Instrument Co., Ltd.) and also with the efforts of all the staff. Shanghai Yichang Throttle Device Manufacturing Co., Ltd. will carry forward the fine tradition from its former plant and provide outstanding service to the user community.

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节流装置、节流件组件

Throttling Device / Throttling Assembly

节流装置是测量流量的差压感受元件。配合差压变送器以及显示、记录、积算和调节仪表，可用来测量、积算和控制液体、蒸汽和气体的瞬时流量值和累计流量值。由于结构简单制造方便，安装容易，使用时间长，价格便宜等特点，在流量仪器中应用最广泛，最成熟的一种。它广泛应用于石油、冶金、电力和轻工业等工业部门。

Throttling device is an element to measure the flow volume and to sense the differential pressure. It is coordinated with differential pressure transmitter and meters for display, recording, integrating and adjustment to measure, integrate and control the values of transient flow and accumulative flow rate of the liquid, stream and gas. As it has simple structure and easily manufactured, it is cheap, easy to be installed with a long service period. It is the most sophisticated and most widely used among the flow instruments and is widely used in the departments of petroleum, metallurgy, electric power and light industries etc.

- ◆ 节流装置由标准节流件，取压装置和符合要求的前、后直管组成。
- ◆ Throttling device consists of the standard throttling element, pressure obtaining device and the upstream, downstream straight pipe that meet with the requirements.
- ◆ 节流组件由节流件、取压装置（包括取压口、引压短管和阀门）、配套法兰组成。
- ◆ Throttling assembly consists of the throttling element, pressure obtaining device (including pressure tap and valve) and adapter flange.
- ◆ 标准节流件有标准孔板、标准喷嘴、标准文丘里管。
- ◆ Standard throttling element includes standard orifice plate, standard nozzle and standard venturi tube.
- ◆ 标准孔板按取压形式分：角接取压标准孔板、法兰取压标准孔板、径距取压标准孔板。
- ◆ Standard orifice plate is divided, according to the approaches to obtain pressure, into corner-tap standard orifice plate, flange-tap standard orifice plate, and diameter-tap standard orifice plate.
- ◆ 标准喷嘴按型式分：ISA1932喷嘴、长径喷嘴。
- ◆ Standard nozzle is divided into: ISA1932 nozzle and long-radius nozzle.
- ◆ 标准文丘里管按结构型式分：文丘里喷嘴、粗铸文丘里管、卷板文丘里管，机械加工文丘里管。
- ◆ Standard venturi tube is divided, according to the structure type, into: venturi nozzle, coarse casting venturi tube, rolled-plate venturi nozzle, and mechanical processing venturi tube.
- ◆ 非标准节流件有双重孔板、四分之一圆孔板、圆缺孔板、小口径孔板、偏心孔板等。
- ◆ Non-standard throttling element includes double orifice plate; quarter circular orifice plate; segmental orifice; minor-size orifice plate; eccentric orifice plate; etc.

□ 技术标准

□ Technical Standard

用安装在圆形截面管道中的差压装置测量满管流体流量

Use differential pressure device that installed in the circular section to measure the fluid flow in full pipe.

第1部分：一般原理和要求	GB/T 2624.1-2006 ISO 5167-1:2003
Section 1: General principles and requirements	GB/T 2624.1-2006 ISO 5167-1:2003
第2部分：孔板	GB/T 2624.2-2006 ISO 5167-2:2003
Section 2: Orifice plate	GB/T 2624.2-2006 ISO 5167-2:2003
第3部分：喷嘴和文丘里喷嘴	GB/T 2624.3-2006 ISO 5167-3:2003
Section 3: Nozzle and Venturi nozzle	GB/T 2624.3-2006 ISO 5167-3:2003
第4部分：文丘里管	GB/T 2624.4-2006 ISO 5167-4:2003
Section 4: Venturi Pipe	GB/T 2624.4-2006 ISO 5167-4:2003

☐ 主要技术指标 ☐ Main Technical Specifications

节流装置：

Throttle device:

标准孔板流出系数的不确定度 $\delta c/C$ 如下：

Discharge coefficient uncertainty of standard orifice plate $\delta c/C$:

当 $0.1 \leq \beta < 0.2$ 时	$\delta c/C = (0.7 - \beta) \%$
If $0.1 \leq \beta < 0.2$,	$\delta c/C = (0.7 - \beta) \%$
当 $0.2 \leq \beta \leq 0.6$ 时	$\delta c/C = 0.5 \%$
If $0.2 \leq \beta \leq 0.6$,	$\delta c/C = 0.5 \%$
当 $0.6 < \beta \leq 0.75$ 时	$\delta c/C = (1.667 \beta - 0.5) \%$
If $0.6 < \beta \leq 0.75$,	$\delta c/C = (1.667 \beta - 0.5) \%$
当 $D < 71.12 \text{ mm}$ 时上述值应算术相加 $0.9 (0.75 - \beta) (2.8 - D/25.4) \%$	
If $D < 71.12 \text{ mm}$, the above values shall be added arithmetically by $0.9 (0.75 - \beta) (2.8 - D / 25.4) \%$	
当 $\beta > 0.5$ 和 $R_{ed} < 10\,000$ 时上述值应算术相加 0.5%	
If $\beta > 0.5$ and $R_{ed} < 10\,000$, the above values shall be added arithmetically by 0.5%	

标准喷嘴流出系数的不确定度 $\delta c/C$ 如下：

The uncertainty of standard nozzle discharge coefficient $\delta C / C$:

当 $\beta \leq 0.6$ 时	$\delta c/C = 0.8 \%$
If $\beta \leq 0.6$,	$\delta c/C = 0.8 \%$
当 $\beta > 0.6$ 时	$\delta c/C = (2 \beta - 0.4) \%$
If $\beta > 0.6$,	$\delta c/C = (2 \beta - 0.4) \%$

长径喷嘴流出系数的不确定度为： $\delta c/C = 2.0 \%$

The uncertainty of discharge coefficient of long-diameter nozzle is as follows: $\delta c/C = 2.0 \%$

当 $0.2 \leq \beta \leq 0.8$ 时

If $0.2 \leq \beta \leq 0.8$,

文丘里喷嘴流出系数的不确定度为： $\delta c/C = \pm (1.2 + 1.5 \beta^4) \%$

The uncertainty of flow coefficient of venturi nozzle: $\delta c/C = \pm (1.2 + 1.5 \beta^4) \%$

粗铸文丘里管流出系数的不确定度为： $\delta c/C = \pm 0.7 \%$

The uncertainty of the outflow coefficient of the coarse casting venturi tube: $\delta c/C = \pm 0.7 \%$

卷板文丘里管流出系数的不确定度为： $\delta c/C = \pm 1.5 \%$

The uncertainty of the exit coefficient of the rolled-plate venturi tube: $\delta c/C = \pm 1.5 \%$

机械加工文丘里管流出系数的不确定度为:

$$\delta c/C = \pm 1\%$$

The uncertainty of outflow coefficient of mechanical processing venturi tube: $\delta c/C = \pm 1\%$

□ 工作原理

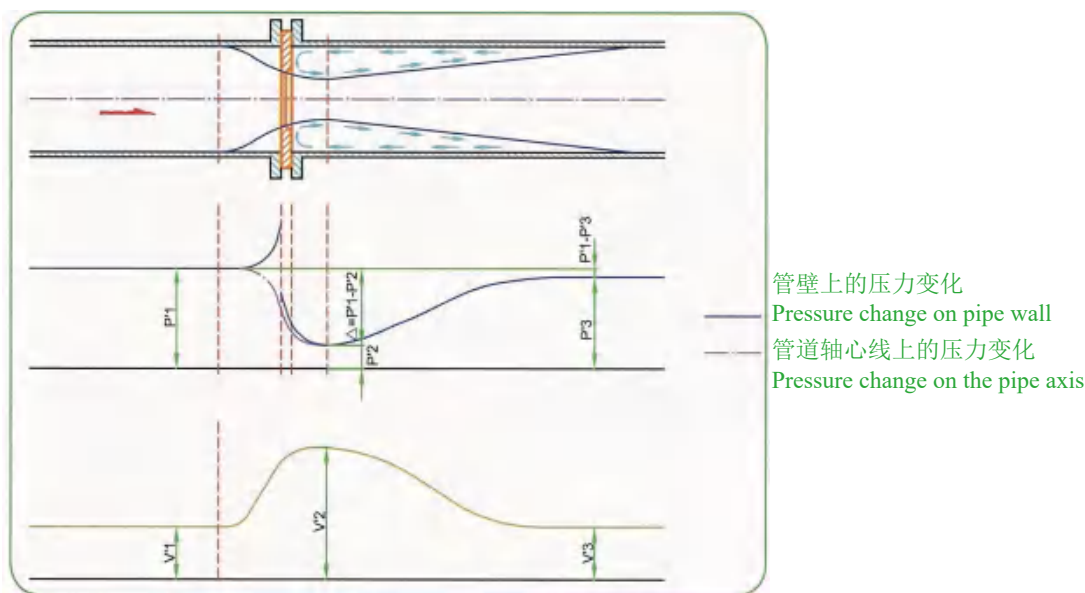
□ Operation Principle

在充满流体的圆形管道中安装了节流件后,当被测流体流过节流件时,流束将在节流件处形成局部收缩,从而使收缩截面内平均流速增加,在节流件的上游侧静压力上升,下游侧静压力下降,于是在节流件的上、下游侧产生静压力差 ΔP 。流体的流速愈大,在节流件前后产生静压力差愈大,这个静压力差与流量之间呈一定的函数关系,所以可通过测量压差来衡量流体流过节流装置的流量大小,这种测量方法是以能量守恒定律和流动连续性方程为基础的。

When the measured fluid flows through the throttling element after the latter is installed in the circular fluid-filled pipe, flow filaments will contract locally, which makes the average fluid flow increase within the contraction cross-section. In terms of the throttling element, the upstream sided static pressure will be higher and the downstream sided static pressure will be lower, therefore a differential pressure ΔP coming into being between the upstream and downstream sides. The faster the velocity of fluid is, the larger the static pressure difference between the front and back throttling element is. This static pressure difference has certain functional relationship with static pressure difference and flow volume, therefore the volume flowing through the throttling device can be measured on the ground of law of conservation of energy and function of flow continuity by computing the pressure difference.

□ 原理示意图

□ Principle Illustration



用差压变送器测量这个静压力差 ΔP ,经过转换即可在记录、显示、积算等仪器中求得瞬时流量值或累计流量值。通过调节仪表也可对流量进行控制调节。

Differential pressure transmitter is used to measure that static pressure difference ΔP . After transmission, value of transient flow or integrated flow is obtained from meters for recording, display and integrating. Meters can also be used to control and adjust the flow volume.

若节流件喉部孔径为 $d(m)$ ，管道内径 $D(m)$ ，流体的体积流量为 $Q(m^3/s)$ ，质量流量为 $G(Kg/s)$ ，流体在工作状态下密度为 $\rho(Kg/m^3)$ ，差压为 $\Delta p(Pa)$ ，则根据伯努利方程和流动连续性方程可导出如下关系式：

The diameter of throat to the throttling device is $d(m)$; the inner diameter of pipe is $D(m)$; the volume flow rate of fluid is $Q(m^3/s)$; quality volume is $G(Kg/s)$; the density of fluid under working status is $\rho(Kg/m^3)$, differential pressure is $\Delta p(Pa)$, thereby below relational expression is derived by Bernoulli equation and flow continuity equation:

$$G = \frac{C}{\sqrt{1-\beta^4}} \varepsilon \frac{\pi}{4} d^2 \sqrt{2\Delta P \times \rho}$$

$$Q = \frac{C}{\sqrt{1-\beta^4}} \varepsilon \frac{\pi}{4} d^2 \sqrt{2\Delta P / \rho}$$

$$\alpha = \frac{C}{\sqrt{1-\beta^4}} \quad \beta = \frac{d}{D}$$

式中： C：为流出系数
 α ：为流量系数
 β ：为节流件的直径比
 ε ：为流束膨胀系数

In the equation above: C: discharge coefficient
 α : flow coefficient
 β : diameter ratio of throttling element
 ε : expansion coefficient of flow filaments

从关系式中可知当节流件孔径为 d ，流体密度 ρ 一定时，则流量与静压力差 ΔP 成平方根关系，根据差压仪表所测的静压差的大小即可知道流量的大小。

Known from the equation above, when the pore diameter of the throttling element is d and the density of fluid ρ is fixed, flow volume is in square root relationship ΔP to the static pressure difference and the value of flow volume can be known immediately according to the value of static pressure difference measured by ΔP instruments.

□ 型号表示

□ Type Illustration

□ □ □ □ - Y C - □ - □ □ □ □ - □ □ □ □

检定Determination

- A) 第三方检测Third party testing
- B) 第三方几何检测Third-party geometric inspection
- C) 第三方监检Third party monitoring and inspection

供货范围Good Supply Scope

- 1) 节流件
- 1) Throttling Element
- 2) 节流组件 (节流件, 夹持环取压装置)
- 2) Throttling assembly (throttling element, carrier-ring orifice plate package)
- 3) 节流组件 (节流件, 夹持环取压装置, 法兰)
- 3) Throttling assembly (throttling element, carrier-ring orifice plate package, flange)
- 4) 节流组件 (节流件, 法兰 (即非夹持环取压装置))
- 4) Throttling assembly (throttling element, flange (viz., non-carrier-ring orifice plate package))
- 5) 节流装置 (节流件, 取压装置, 前后直管段)
- 5) Throttling device (throttling element, orifice plate package, and upstream and downstream straight pipe section)
- 6) 节流装置 (节流件, 取压装置, 前后直管段) 附标定书
- 6) Throttling device (throttling element, orifice plate package, and upstream and downstream straight pipe section) attached by notes of calibration

管道装置

Pipe Device

- X) 水平安装
- X) Horizontal installation
- Y) 垂直安装 (流向自上而下)
- Y) Vertical installation (when flow runs from the top to bottom)
- Z) 垂直安装 (流向自下而上)
- Z) Vertical installation (when flow runs from the bottom to top)
- L) 冷凝器 (用于蒸汽时再加L)
- L) Condenser (L is attached when used for vapor)

材料: 由两位参数组成, 第一位表示管道材料, 第二位表示节流件材料
Materials: comprises of two parameters with the first parameter denoting the pipe materials and the second parameter denoting materials for throttling element.

- | | |
|--------|--------------------------|
| 1 20# | 5 316L |
| 2 304 | 6 10CrMo910 |
| 3 304L | 7 12Cr1MoV |
| 4 316 | T 其他材料
other material |

密封面形式

Form of Seal Face

- | | |
|------------------------------------|----------------------|
| R RF凸面 | J RJ环连接面 |
| R RF raised | J RJ ring joint face |
| M M凸面 | F FM凹面 |
| M M raised | F FM concave face |
| N HJ焊接法兰无此选项 | |
| N HJ welded flange No such options | |

公称压力等级(MPa)

Nominal Pressure Degree (MPa)

- 0.25 0.6 1.0……6.3MPa
150 300 600……2500 (即Class150~Class2500)
150 300 600……2500 (Class150~Class2500)

法兰类型

Type of Flange

- | | |
|-------------------------|--------------------------|
| P PL平焊法兰 | B BC (八槽) 法兰 |
| P PL Flat welded flange | B BC (Eight-slot) flange |
| W WN对焊法兰 | H HJ焊接法兰 |
| W WN Butt welded flange | H HJ Welding flange |



型号 Type	名 称 Name	公 称 压 力 Nominal pressure		公 称 直 径 DN (mm)																											
		PN(MPa)	Class	15	20	25	32	40	50	65	80	100	125	150	175	200	225	250	300	350	400	450	500	600	700	800	900	1000	1200	1300~2000	
LGBK	角接管压板标准孔板节流装置 Corner-tap Standard Orifice Plate Throttling Set	2.5~6.4		-	-				△	△	△	△	△	△	△	△	△	△	△	△	△	△	△	△							
LGBF	法兰取压标准孔板节流装置 Flange-tap Standard Orifice Plate Throttling Set	2.5~16	150~2500	--	--				△	△	△	△	△	△	△	△	△	△	△	△	△	△	△	△							
LGBJ	径距取压标准孔板节流装置 Diameter-tap Standard Orifice Plate Throttling Set	2.5~4		-	-				△	△	△	△	△	△	△	△	△	△	△	△	△	△	△	△							
LGBK	夹持环取压标准孔板组件 Carrier-ring Standard Orifice Plate Package	2.5~6.4		-	-				□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□							
LGBZ	直钻孔取压标准孔板组件 Vertical Drilling Hole - tap Standard Orifice Plate Package	2.5		-	-																										
LGBF	法兰取压标准孔板组件 Flange-tap Standard Orifice Plate Package	2.5~16	150~2500	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	△	△	□	□	□	□	□	□	□	□	□	□	□
LGBJ	径距取压标准孔板组件 Diameter - tap Standard Orifice Plate Package	2.5~4	150~300	-	-				□	□	□	□	□	□	□	□	□	□	△	□	□	□	□	□	□	□	□	□	□	□	□
LGBB	八槽孔板组件 Eight-slot Orifice Plate Package	10~20		-	-				□	□	□	□	□	□	□	□	□	□	□	□	□										
LGPB	八槽喷嘴组件 Eight-slot Nozzle Package	10~20		-	-																										
LGBH	焊接孔板组件 Welded Orifice Plate Package	18.4,23,28						□	□	□	□	□	□	□	□	□	□	□	□	□											
LGPH	焊接喷嘴组件 Welded Nozzle Package	10, 14																													
LGBT	高压透镜孔板组件 High-pressure Lens Orifice Plate Package	22, 32		-	-			□	□	□	□	□	□	□	□	□	□	□	□												
LGHZ LGHK	四分之一圆孔板组件 Quarter Round Orifice Plate Package	2.5~6.4	150~1500	-	-	□	□	□	□	□	□	□	□	□	□	□	□														
LGSK	双重孔板组件 Dual Orifice Plate Package	2.5		-	-																										
LGBQ	圆缺孔板组件 Segmental Orifice Plate Package	2.5	150~300	-	-				□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

型号 Type	名 称 Name	公 称 压 力 Nominal pressure		公 称 直 径 DN (mm)																												
		PN(MPa)	Class	15	20	25	32	40	50	65	80	100	125	150	175	200	225	250	300	350	400	450	500	600	700	800	900	1000	1200	1300—2000		
LGBX	限流孔板组件 Limited Flow Orifice Plate Package	2.5~16	150~1500	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○											
LGPC	长径喷嘴组件 Long-radius Nozzle Package	0.25~20							○	○	○	○	○	○	○	○	○	○	○	○	○	○	○									
LGWC	粗铸文丘里管 Coarse Casting Venturi Tube	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
LGWB	卷板文丘里管 Rolled-plate Venturi Nozzle	0.25~1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○
LGWJ	机械加工文丘里管 Mechanical Processing Venturi Tube	0.25~6.4	150~600						○	○	○	○	○	○	○	○	○															
LGWP	文丘里喷嘴 Venturi Nozzle	0.25~1																				○	○	○	○	○	○	○	○	○	○	
LGSW	双文丘里测速管 Dual Venturi Pitot Tube	1																○														○

注：表中“△”处为成套节流装置

Note: In the table above “△” Complete set of throttling device

“□”处为供应节流件组件，或节流件，或夹持环取压装置和节流件

“○”处为供应节流件，或夹持环取压装置和节流件

“○”处为供应节流件，或夹持环取压装置和节流件

“○”处为供应节流件，或夹持环取压装置和节流件

“-”处为无此规格

“-”处为无此规格

表中未标记处可面洽

The unmarked parts in the table can be negotiated face to face

□ 安装
□ Installation

节流装置安装的正确与否直接影响其对流量测量的精确程度，因此掌握节流装置正确安装是非常重要的。

Whether the throttling element is correctly installed will directly influence the precision of its measurement on flow volume, therefore mastering the correct installation of throttling device is extremely important.

● 节流装置的使用条件：

● The usage conditions of throttling device:

1. 流体必须充满圆管，并连续不断地流经节流装置。
1. Fluid must fully fill the circular tube and continuously flow throughout the throttling device.
2. 流体在物理上和热力学上必须是均匀的单相流体。
2. Fluid must be uniform and unidirectional fluid in terms of the sciences of physics and thermodynamics.
3. 流体流经节流装置时不得发生相变。
3. Phase transformation should not take place when fluid flows throughout the throttling device.
4. 节流装置所测的流体必须是稳定流，或可看作是稳定的缓慢变化的流体，不适用于脉动流和临界的流量测量。
4. Throttling device measures fluid that is steady or steady but slowly changes, and it is a device not applicable to measure the pulsed flow and the critical influx.
5. 流束必须与管道平行，不得有旋转流。
5. Flow filaments must be parallel to tube without rotational flow.

● 安装基本要求：（适用于只订购节流件和节流组件的用户）

● The basic requirement for installation: (only applicable to the clients who order throttling element and assembly)

1. 垂直度

1. Verticality

节流件上游端面与管道轴线的垂直度不大于 1° 。

The verticality between the upstream end face and axial line of pipe is no more than 1° .

2. 不同轴度

2. Different axial degree

节流件应与管道同轴。

Throttling element should be coaxial to the pipe.

当节流件的轴线与上、下游侧管道轴线之间距离 e_x 满足下式时流出系数C无附加不确定度。

When the distance between the axial line of throttling element and upstream, downstream pipe axial lines e_x meets with below equation, outflow factor C is of no additional uncertainty.

$$e_x \leq \frac{0.0025D}{0.1+2.3\beta^4}$$

如上式不能满足，而满足下式时，流出系数以C的不确定度应算术相加 $\pm 0.3\%$ 。

If the above-mentioned equation can't be satisfied and below equation is satisfied, outflow is calculated by adding or reducing $\pm 0.3\%$ of the degree of uncertainty.

$$\frac{0.0025D}{0.1+2.3\beta^4} < e_x \leq \frac{0.005D}{0.1+2.3\beta^4}$$

3. 直管段长度

3. Length of the straight pipe section

节流装置应安装在两段有恒定横截面积的圆管形直管段之间，最短直管段长度随节流件形式，阻流件形式和直径比而异，见表2、表3。

Throttling device should be installed between two circular straight pipe sections with constant cross-sectional area. The shortest straight pipe section length varies with the form of throttling device, the form of flow plug and their diameter ratio. See figure 2 and 3.

孔板、喷嘴和文丘里喷嘴所要求的最短直管段长度

表2

The Shortest Length of Straight Pipe Section Required by Orifice Plate, Nozzle and Venturi Nozzle

Table 2

直径比 $\beta \leq$ Diameter ratio $\beta \leq$	节流件上游侧阻流形式和最短直管段长度 Upstream side choked flow type of throttling element and the shortest length of straight pipe section							节流件下游最短直管段长度（包括在本表中的所有阻流件） The Shortest Length of Straight Pipe Section of the downstream of throttling element (including all baffles in the table)
	单个90°弯头或三通（流体仅从一个支管流出） single 90° elbow or tee (fluid just flows out from one branch)	在同一平面上的两个或多个90°弯头 Two or more 90° elbows on the same plane	在不同平面上的两个或多个90°弯头 Two or more 90° elbows on the same plane	渐缩管（在1.5D至3D的长度内由2D变为D） Contraction tube (turn 2D to D within the length of 1.5D to 3D)	渐扩管（在1D至2D的长度内由0.5D变为D） Diverging tube (turn 0.5D to D within the length of 1D to 2D)	球形阀全开 Pherical valve is fully open	全孔球阀或闸阀全开 Full-hole spherical valve or the brake valve is fully open.	
0.20	10(6)	14(7)	34(17)	5	16(8)	18(9)	12(6)	4(2)
0.25	10(6)	14(7)	34(17)	5	16(8)	18(9)	12(6)	4(2)
0.30	10(6)	16(8)	34(17)	5	16(8)	18(9)	12(6)	5(2.5)
0.35	12(6)	16(8)	36(18)	5	16(8)	18(9)	12(6)	5(2.5)
0.40	14(7)	18(9)	36(18)	5	16(8)	20(10)	12(6)	6(3)
0.45	14(7)	18(9)	38(19)	5	17(9)	20(10)	12(6)	6(3)
0.50	14(7)	20(10)	40(20)	6(5)	18(9)	22(11)	12(6)	6(3)
0.55	16(8)	22(11)	44(22)	8(5)	20(10)	24(12)	14(7)	6(3)
0.60	18(9)	26(13)	48(24)	9(5)	22(11)	26(13)	14(7)	7(3.5)
0.65	22(11)	32(16)	54(27)	11(6)	25(13)	28(14)	16(8)	7(3.5)
0.70	28(14)	36(18)	62(31)	14(7)	30(15)	32(16)	20(10)	7(3.5)
0.75	36(18)	42(21)	70(35)	22(11)	38(19)	36(18)	24(12)	8(4)
0.80	46(23)	50(25)	80(40)	30(15)	54(27)	44(22)	30(15)	8(4)

续表

Continued table

对于所有的直径比 β For all diameter ratio β	阻流件 Baffle	上游侧最短直管段长度 Length of the shortest straight pipe section on the upstream side
	直径比大于或等于0.5的对称骤缩异径管 Symmetrical reducer with diameter ratio greater than or equal to 0.5	30(15)
	直径小于或等于0.03D的温度计套管和插孔 Thermowell and socket with diameter less than or equal to 0.03D	5(3)
	直径在0.03D和0.13D之间的温度计套管和插孔 Thermowell and socket with diameter between 0.03D and 0.13D	20(10)

文丘里管所要求的最短直管段长度

表3

The Shortest Length of Straight Pipe Section Required by Venturi Nozzle

Table 3

直径比 $\beta \leq$ Diameter ratio $\beta \leq$	单个90°短半径弯头 Single 90° short-radius elbow	在同一平面上的两个或多个90°弯头 Two or more 90° elbows on the same plane	在不同平面上的两个或多个90°弯头 ¹⁾ Two or more 90° elbows on the different planes	在3.5D长度范围内由3D变为D的渐缩管 Contraction tube (turn 3D to D within the length range of 3.5D)	在D长度范围内由0.75D变为D的渐扩管 Diverging tube (turn 0.75D to D within the length range of D)	全开球阀或闸阀 Fully open spherical valve or the brake valve
0.30	0.5 ²⁾	1.5(0.5)	(0.5)	0.5 ²⁾	1.5(0.5)	1.5(0.5)
0.35	0.5 ²⁾	1.5(0.5)	(0.5)	1.5(0.5)	1.5(0.5)	2.5(0.5)
0.40	0.5 ²⁾	1.5(0.5)	(0.5)	2.5(0.5)	1.5(0.5)	2.5(1.5)
0.45	1.0(0.5)	1.5(0.5)	(0.5)	4.5(0.5)	2.5(1.0)	3.5(1.5)
0.50	1.5(0.5)	2.5(1.5)	(8.5)	5.5(0.5)	2.5(1.5)	3.5(1.5)
0.55	2.5(0.5)	2.5(1.5)	(12.5)	6.5(0.5)	3.5(1.5)	4.5(2.5)
0.60	3.0(1.0)	3.5(2.5)	(17.5)	8.5(0.5)	3.5(1.5)	4.5(2.5)
0.65	4.0(1.5)	4.5(2.5)	(23.5)	9.5(1.5)	4.5(2.5)	4.5(2.5)
0.70	4.0(2.0)	4.5(2.5)	(27.5)	10.5(2.5)	5.5(3.5)	5.5(3.5)
0.75	4.5(3.0)	4.5(3.5)	(29.5)	11.5(3.5)	6.5(4.5)	5.5(3.5)

注：① 表2所列数值为位于节流件上游或下游的各种阻流件与节流件之间所需要的最短直管段长度，表3所列数值为文丘里管上游的各阻流件与文丘里管之间所需要的最短直管段长度。

Notes: ① Value in figure 2 denotes the shortest length of straight pipe section that is needed for baffles and throttling elements located the upstream or downstream of the throttling element. Value in figure 3 denotes the shortest length of straight tube section that is needed for baffles and venturi located upstream of the venturi tube.

② 不带括号的值为“零附加不确定度”的值

② The value not included in the parentheses denotes the value “of uncertainty plus zero additional value”.

③ 带括号的值为“0.5%附加不确定度”的值

③ The value included in the parentheses denotes the value “of uncertainty plus 0.5% uncertainty”.

④ 直管段长度均以直径D的倍数表示，它应从节流件上游端面（文丘里管为上游取压口）量起。

④ All the lengths of the straight tube section are denoted by the multiple of diameter D. They should be measured from the upstream end face of throttling element (with the venturi tube serving as the upstream tap to obtain pressure).

⑤ 文丘里管下游直管段：位于喉部取压口平面下游至少4倍喉部直径处的管件或其它阻流件（见表3）不影响测量的不确定度。

⑤ The downstream straight tube section of venturi tube: tubes and other flow plugs (see figure 3) located downstream of pressure obtaining throat and at least 4 multiples of the diameter of the throat will not influence the uncertainty of measurement.

⑥ 弯头的弯曲半径应等于或大于管道直径。

⑥ The bending semi-diameter of elbow should equal to or larger than the tube diameter.

1) 由于这些管件或阻流件对管内流速的影响在40D后可能会出现，因此表3不能给出不带括号的值。

1) As these tubes or baffles may impose influence on internal tube's velocity after 40D, figure 3 can't give any value included in the parentheses.

2) 由于没有管件或阻流件距文丘里管上游取压口轴线的距离比0.5D还小，所以表3未给出带括号的值。

2) In absence of the tube and the space is lower than 0.5 D between baffles and the axial line, the tap of which for venturi tube obtains pressure upstream; therefore figure 3 hasn't given the value included in the parentheses.

⑦ 本厂节流装置的直管段长度：上游侧直管段长度为10D，下游侧直管段5D，当前后直管段长度>1500mm时，上游侧直管段长度，下游侧直管段长度按1500mm考虑。其余长度直管段由用户根据管道中实际阻流件的形式（见表3）在管道设计中设置，予以保证。

⑦ The length of straight tube section of our plant: the straight tube section is 10D in length at upstream side; the straight tube section is 5D in length at downstream side. When upstream and downstream straight pipe is >1500 mm, the upstream-downstream straight tube length is taken into account as 1500 mm.

Straight tube section of other lengths are provided and guaranteed in the form of ba!e (see figure 3) according to the real practice.

4. 取压口位置:

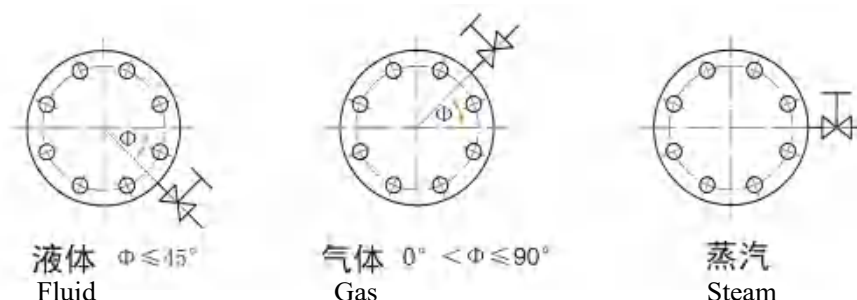
4. The position of pressure tapping points

节流装置安装在垂直管段上时，取压口的位置在取压装置的平面上任意选择。

When throttling device is installed on the vertical tube section, selection of the positions of pressure tapping points on the plane of pressure obtaining device is random.

节流装置安装在水平管道(或斜管道)时取压口位置的选择取决于被测介质的特性。可按下图选择。

When the throttling device can be installed on the horizontal tube (or inclined tube), the election orientation depends on the characteristics of the medium to be measured. Selection can be made according to the below diagram.



组件出厂时，取压口，导压管均设置在二螺栓孔中间，现场法兰焊接时，应注意螺孔及取压口的相对位置。

When assemblies are delivered out of the factory, the tap for pressure obtaining and pressure introducing tube are jointly provided between two blot holes. When welding the flange at site, the relative position of the blot hole and tap for pressure obtaining should be paid attention to.

5. 导压管

5. Pressure introducing tube

(以下对订购节流装置、节流组件、节流件用户都适用)

(The followings are applicable to the subscription of throttling device, throttling assembly and user of throttling element)

导压管应按被测流体的性质和参数适用耐压、耐腐蚀的材料制造，其内径不得小于6mm，长度最好在16m之内。

Pressure introducing tube should be manufactured with applicable pressure and corrosion resistant materials according to the nature and parameter of the measured fluid. It should have an internal diameter not lower than 6 mm and a length within 16 m.

不同流体不同长度下的最小内径按表4选择

The minimum internal diameter of fluid flowing in it whose length varies should be selected according to figure 4.

导压管的内径和长度 (mm)

表4

Inner diameter and length of impulse pipe (mm)

Table 4

被测流体 Measured fluid	导压管长度 Length of impulse pipe	<16000	16000~45000	45000~90000
	导压管内径 Inner diameter of impulse pipe			
水、水蒸汽、干气体 Water, steam, dry gas	7~9	10	13	13
湿气体 Wet gas	13	13	13	13
低、中粘度的油品 Low and medium viscosity oil products	13	19	25	25
脏液体或气体 Dirty liquid or gas	25	25	38	38

导压管应垂直或倾斜敷设，其倾斜度不得小于1:12；粘度较高的流体，其倾斜度还应增大，当差压信号传送距离大于30m时，导压管应分段倾斜，并在各最高点设置集气器（或排气阀），最低点设置沉降器（或排污阀）。

It should be laid vertically or inclined. The inclination should not be lower than 1:12. The liquid of higher viscosity, the inclination should increased accordingly. When differential pressure signal transfer distance is larger than 30m, pressure introducing tube should inclines by sections and gas collector (or exhaust valve) should be provided at each highest points and depressor (or drainage valve) should be provided at lowest points.

为了避免差压信号失真，正负压导压管应尽量靠近敷设，严寒地区导压管应加防冻设备。

To avoid signal distortion of differential pressure, positive-negative pressure introducing pipe should be laid as possibly nearby and frost precaution facilities should be provided for the severe cold region.

6. 节流件安装前，管道必须用高压蒸汽严格冲洗，防止运行时管内氧化物，焊渣等异物损坏节流件。

6. Prior to the installation of throttling element, pipes must be strictly washed with high pressure steam to avoid the throttling element being damaged by the foreign matters including oxide, welding slag during operation.

7. 节流件表面应用软纱擦净表面，不得用砂布或锉刀等工具损伤入口表面和锐口。

7. The soft gauze is used to clean the surface of throttling element and no tools such as abrasive cloth, rasp would damage the tap surface and sharp tap.

8. 节流件现场吊装时，严禁用铁丝，钢丝，吊钩穿入节流件喉部孔径，以防止节流件锐口损伤，影响测量精度。

8. When throttling element is suspended and installed at site, it is forbidden to use steel wire, iron wire, lifting hook to pierce the pore diameter of throttling element to prevent the damage of sharp tap of the throttling element to the extent influencing the measurement precision.

● 节流装置与差压变送器的连接方式：（参考差压变送器选择样本）。（本章节内容选自GB/T 2624-2006）

● The approach to connect throttling element and differential pressure transmitter (refer to the selection sample for differential pressure transmitter). (This chapter is selected from GB/T 2624-2006)

□ 订货须知

□ Order Information

订购节流装置、节流组件或节流件时，应填好规格单。

When ordering throttling devices, throttling components or throttling parts, fill in the specification sheet at first.

水、液体、蒸汽类节流装置规格单

表5

Specification sheet of water, liquid and steam throttling devices

Table 5

节流装置型号 Type of throttling device	□ (Φ ×) □ □ □ □ □ □ □ □		
位号 Type			
流体名称 Fluid name			
变送器型号 Transmitter model			
管道内径 Pipe inner diameter	mm	管道规格 Pipeline specification	Φ ×
最小流量 Minimum flow rate	kg/h	T/h	m ³ /h

常用流量 Commonly used flow	kg/h	T/h	m ³ /h
刻度流量 Calibration flow	kg/h	T/h	m ³ /h
绝对压力 Absolute pressure	MPa	表面压力 Surface pressure	MPa
操作温度 Operating temperature	℃		
差 压 Differential pressure	KPa	Pa	
流体密度 Fluid density	kg/m ³		
流体粘度 Fluid viscosity	Pa • s	mm ² /s	(CP)
安装方式 Installation mode	X) 水平 X) Horizontal	Y) 自上而下 Y) From top to bottom	Z) 自下而上 Z) From bottom to top
自备法兰标准 Standard of self-provided flange		PN	DN

气体类节流装置规格单

Specification sheet of gas throttling device

表6

Table 6

节流装置型号 Type of throttling device	(Φ ×)		
位 号 Type			
流体名称 Fluid name			
变送器型号 Transmitter model			
管道内径 Pipe inner diameter	mm	管道规格 Pipeline specification	Φ ×
最小流量 Minimum flow rate	m ³ /h	1. 在0℃、760mmHg条件下 (BM ³ /h) 1. At 0 ° C, 760mmHg (BM ³ / h)	
常用流量 Commonly used flow	m ³ /h	2. 在20℃、760mmHg条件下 (NM ³ /h) 2. At 20 ° C, 760mmHg (NM ³ / h)	
刻度流量 Calibration flow	m ³ /h	3. 在工作条件下 (M ³ /h) 3. Under working conditions (M ³ / h)	
绝对压力 Absolute pressure	MPa	表面压力 Surface pressure	MPa
操作温度 Operating temperature	℃		
差 压 Differential pressure	KPa	Pa	
相对湿度 Relative humidity		%	
气体成份 Gas composition	容积百分比% Volume percentage%	在工作状态下 在标准状态下 (0、20℃) 流体密度kg/m ³ In working condition In standard flow (0, 20 ° C) fluid density kg / m ³	流体粘度CS (CP) Fluid viscosity
安装方式 Installation mode	X) 水平 X) Horizontal	Y) 自上而下 Y) From top to bottom	Z) 自下而上 Z) From bottom to top
自备法兰标准 Standard of self-provided flange		PN	DN

● 填表主要事项:

● The main matters to fill the sheet

- a 规格单是与合同一起作为订货的依据, 数据必须正确无误, 单位一致, 不得涂改。
a The form of specification is the basis of goods order together with contract in which the data must be correct and not erred, unit is consistent and data obliteration is forbidden.
- b 测量水或蒸汽时, 流体密度和流体粘度可不填。
b When measuring water or steam, the fluid density and viscosity are allowed not to be filled.
- c 气体流量单位的基准应正确选择, 否则对流量测量的精度影响很大。
c The basis for the flow volume unit of gas should be correctly selected, otherwise the fluid measurement precision would be influenced significantly.
- d 混合气体容积的百分比之和应等于100%。
d The percentage aggregate of mixed gas volume should be equal to 100%.
- e 组件产品法兰均按本厂标准提供。
e The assembly's product flange should be provided according to the standard of our plant.
- f 如由本厂代配变送器, 变送器型号与差压两栏可由本厂代填。
f If transmitter is equipped by our plant, the two columns of the type and differential pressure of transmitter can be filled by our plant.

LGBK角接取压标准孔板节流装置

LGBK Corner-tap Standard Orifice Plate Throttling Set

角接取压标准孔板节流装置由标准孔板、夹持环取压装置，前后直管段组成的流量测量装置，用于电力、冶金、化学、石油等工业的流量计量部位。

Corner-tap standard orifice plate throttling set is composed of the standard orifice plate, carrier ring device of obtaining pressure and upstream and downstream straight pipe sections. It is a flow measuring device and is used to the industrial flow measurement parts, such as electricity, metallurgy, chemistry and petroleum.

□ 外形及安装尺寸

□ Outline and Installation Dimension



● 平焊法兰连接形式

● Flat welding flange connection type

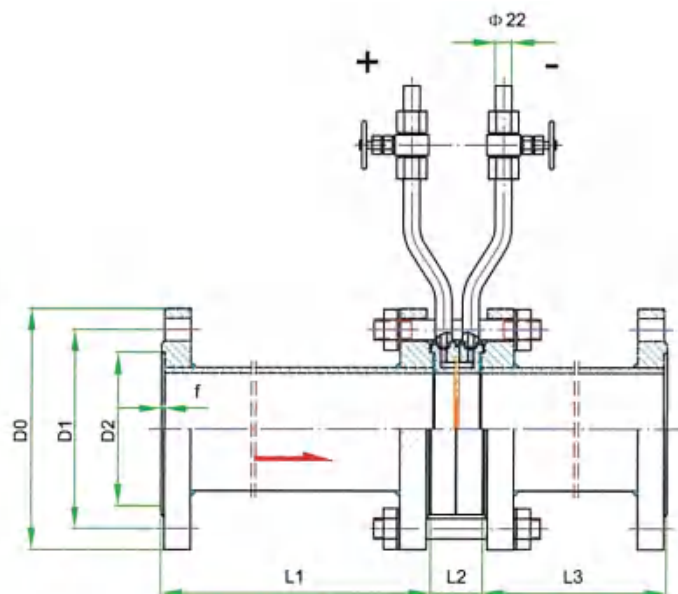
公称压力（PN2.5MPa）具体以用户需求确定

Nominal pressure (PN2.5MPa) Specifically determined by user requirements

单位：mm

Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	500	68	250	165	125	88	4	4	18
65	650	68	325	185	145	110	4	8	18
80	800	68	400	195	160	121	4	8	18
100	1000	68	500	230	190	150	4.5	8	23
125	1250	69	625	270	220	176	4.5	8	25
150	1500	69	750	300	250	204	4.5	8	25
175	1500	69	875	330	280	234	4.5	12	25
200	1500	69	1000	360	310	260	4.5	12	25
225	1500	69	1125	395	340	287	4.5	12	30
250	1500	69	1250	425	370	312	4.5	12	30
300	1500	72	1500	485	430	363	4.5	16	30
350	1500	74	1500	550	490	422	5	16	34
400	1500	74	1500	610	550	474	5	16	34



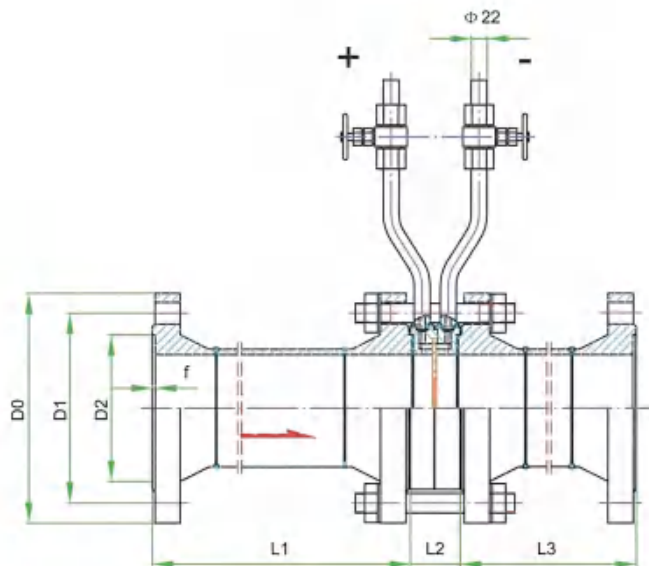
- 对焊法兰连接形式
- Butt welding flange connection type

公称压力 (PN2.5MPa) 具体以用户需求确定

Nominal pressure (PN2.5MPa) Specifically determined by user requirements

单位: mm
Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	500	68	250	165	125	88	4	4	18
65	650	68	325	185	145	110	4	8	18
80	800	68	400	195	160	121	4	8	18
100	1000	68	500	230	190	150	4.5	8	23
125	1250	69	625	270	220	176	4.5	8	25
150	1500	69	750	300	250	204	4.5	8	25
175	1500	69	875	330	280	234	4.5	12	25
200	1500	69	1000	360	310	260	4.5	12	25
225	1500	69	1125	395	340	287	4.5	12	30
250	1500	69	1250	425	370	312	4.5	12	30
300	1500	72	1500	485	430	363	4.5	16	30
350	1500	74	1500	550	490	422	5	16	34
400	1500	74	1500	610	550	473	5	16	34



公称压力 (PN4MPa) 具体以用户需求确定

Nominal pressure (PN4MPa) Specifically determined by user requirements

单位: mm

Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	500	68	250	165	125	88	4	4	18
65	650	68	325	185	145	110	4	8	18
80	800	68	400	195	160	121	4	8	18
100	1000	68	500	230	190	150	4.5	8	23
125	1250	69	625	270	220	176	4.5	8	25
150	1500	69	750	300	250	204	4.5	8	25
175	1500	69	875	350	295	234	4.5	12	30
200	1500	69	1000	375	320	260	4.5	12	30
225	1500	69	1125	415	355	287	4.5	12	34
250	1500	69	1250	445	385	312	4.5	12	34
300	1500	72	1500	510	450	363	4.5	16	34
350	1500	74	1500	570	510	422	5	16	34
400	1500	74	1500	655	585	474	5	16	41

公称压力 (PN6.4MPa) 具体以用户需求确定
Nominal pressure (PN6.4MPa) Specifically determined by user requirements

单位: mm
Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	500	68	250	175	135	88	4	4	23
65	650	68	325	200	160	110	4	8	23
80	800	68	400	210	170	121	4	8	23
100	1000	68	500	250	200	150	4.5	8	25
125	1250	69	625	295	240	176	4.5	8	30
150	1500	69	750	340	280	204	4.5	8	34
175	1500	69	875	370	310	234	4.5	12	34
200	1500	69	1000	405	345	260	4.5	12	34
225	1500	69	1125	430	370	287	4.5	12	34
250	1500	69	1250	470	400	312	4.5	12	41
300	1500	72	1500	530	460	363	4.5	16	41
350	1500	74	1500	595	525	422	5	16	41
400	1500	74	1500	670	585	473	5	16	48

LGBF法兰取压标准孔板节流装置

LGBF Flange-tap Standard Orifice Plate Throttling Set

法兰取压标准孔板节流装置由标准孔板及前后直管段组成的流量测量装置，主要用于石油、化学工业的流量计量部位。

Standard orifice plate throttling set with flange taps is a flow measuring device, composed of standard orifices and upstream and downstream straight pipe sections. It is mainly applied at the flow measurement parts, such as petroleum and chemical industry.

□ 外形及安装尺寸

□ Outline and Installation Dimension

● 平焊法兰连接形式

● Flat welding flange connection type

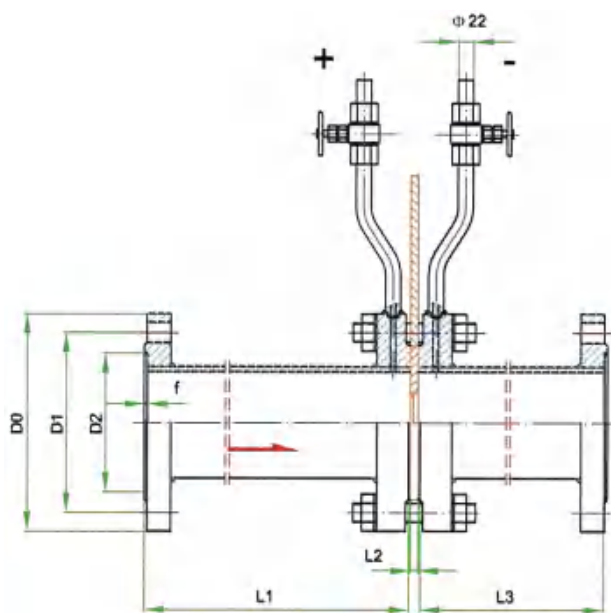
公称压力 (PN2.5MPa) 具体以用户需求确定

Nominal pressure (PN2.5MPa) Specifically determined by user requirements

单位: mm

Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	504	5	254	165	125	88	4	4	18
65	654	5	329	185	145	110	4	8	18
80	804	5	404	195	160	121	4	8	18
100	1005	6	505	230	192	150	4.5	8	23
125	1255	6	630	270	220	176	4.5	8	25
150	1505	6	755	300	250	204	4.5	8	25
175	1505	6	880	330	280	234	4.5	12	25
200	1505	6.5	1005	360	310	260	4.5	12	25
225	1505	8	1130	395	340	287	4.5	12	30
250	1505	8	1255	425	370	312	4.5	12	30
300	1505	8.5	1505	485	430	363	4.5	16	30
350	1505	10	1505	550	490	422	5	16	34
400	1505	11	1505	610	550	473	5	16	34



- 对焊法兰连接形式
- Butt welding flange connection type

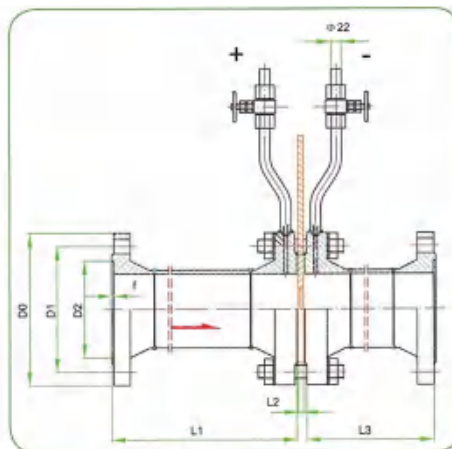
公称压力 (PN2.5MPa) 具体以用户需求确定

Nominal pressure (PN2.5MPa) Specifically determined by user requirements

单位: mm

Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	504	5	254	165	125	88	4	4	18
65	654	5	329	185	145	110	4	8	18
80	804	5	404	195	160	121	4	8	18
100	1005	6	505	230	192	150	4.5	8	23
125	1255	6	630	270	220	176	4.5	8	25
150	1505	6	755	300	250	204	4.5	8	25
175	1505	6	880	330	280	234	4.5	8	25
200	1505	6.5	1005	360	310	260	4.5	12	25
225	1505	8	1130	395	340	287	4.5	12	30
250	1505	8	1255	425	370	312	4.5	12	30
300	1505	8.5	1505	485	430	363	4.5	16	30
350	1505	10	1505	550	490	422	5	16	34
400	1505	11	1505	610	550	473	5	16	34



核级孔板
Nuclear orifice plate

公称压力 (PN4MPa) 具体以用户需求确定

Nominal pressure (PN4MPa) Specifically determined by user requirements

单位: mm

Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	504	5	254	165	125	88	4	4	18
65	654	5	329	185	145	110	4	8	18
80	804	5	404	195	160	121	4	8	18
100	1005	6	505	230	192	150	4.5	8	23
125	1255	6	630	270	220	176	4.5	8	25
150	1505	6	755	300	250	204	4.5	8	25
175	1505	6	880	350	295	234	4.5	12	30
200	1505	6.3	1005	375	320	260	4.5	12	30
225	1505	8	1130	415	355	287	4.5	12	34
250	1505	8	1255	445	385	312	4.5	12	34
300	1505	8.5	1505	510	450	363	4.5	16	34
350	1505	10	1505	570	510	422	5	16	34
400	1505	11	1505	655	585	473	5	16	41

LGBJ径距取压标准孔板节流装置

LGBJ Diameter-tap Standard Orifice Plate Throttling Set

径距取压标准孔板节流装置由标准孔板及前后直管段组成的流量测量装置，用于冶金、石油、化工工业的流量计量部位。

Diameter-tap standard orifice plate throttling set is a flow measuring device, composed of the standard orifice plate and the upstream and downstream straight pipe sections. It is applied at the flow measuring parts, such as metallurgy, petroleum and chemical industry.

□ 外形及安装尺寸

□ Outline and Installation Dimension

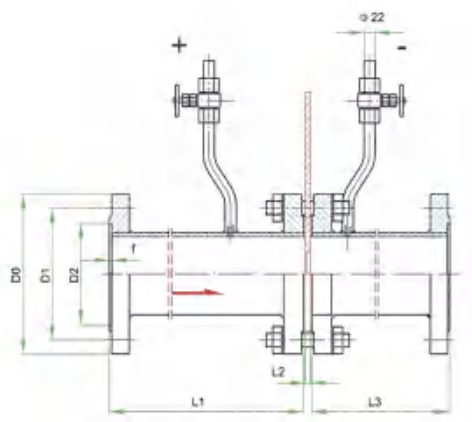
公称压力（PN2.5MPa）平焊法兰，具体以用户需求确定

Nominal pressure (PN2.5MPa) Flat welding flange, Specifically determined by user requirements

单位：mm

Unit: mm

公称直径 Nominal diameter	L ₁	L ₂	L ₃	D ₀	D ₁	D ₂	f	螺孔数 Screw number	螺孔直径 Screw diameter
50	504	5	254	165	125	88	4	4	18
65	654	5	329	185	145	110	4	8	18
80	804	5	404	195	160	121	4	8	18
100	1005	6	505	230	190	150	4.5	8	23
125	1255	6	630	270	220	176	4.5	8	25
150	1505	6	755	300	250	204	4.5	8	25
175	1505	6	880	330	280	234	4.5	12	25
200	1505	6.5	1005	360	310	260	4.5	12	25
225	1505	8	1130	395	340	287	4.5	12	30
250	1505	8	1255	425	370	312	4.5	12	30
300	1505	8.5	1505	485	430	363	4.5	16	30
350	1505	10	1505	550	490	422	5	16	34
400	1505	11	1505	610	550	473	5	16	34



LGBK夹持环（环室）取压标准孔板组件

LGBK Carrier-ring Standard Orifice Plate Package

夹持环取压标准孔板组件，它被广泛应用于电力、冶金、石油、化学、轻纺等工业的流量测量与流量控制检测系统中。

Carrier-ring standard orifice plate package is widely applied in the detecting system of flow measuring and flow control of the industries, such as electricity, metallurgy, chemistry and textile.

- ☐ 材料
- ☐ Material

孔板材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Orifice plate material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

夹持环材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Carrier-ring material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

法兰材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Flange material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

- ☐ 使用范围
- ☐ Scope of Application

- 平焊法兰
- Flat welding flange

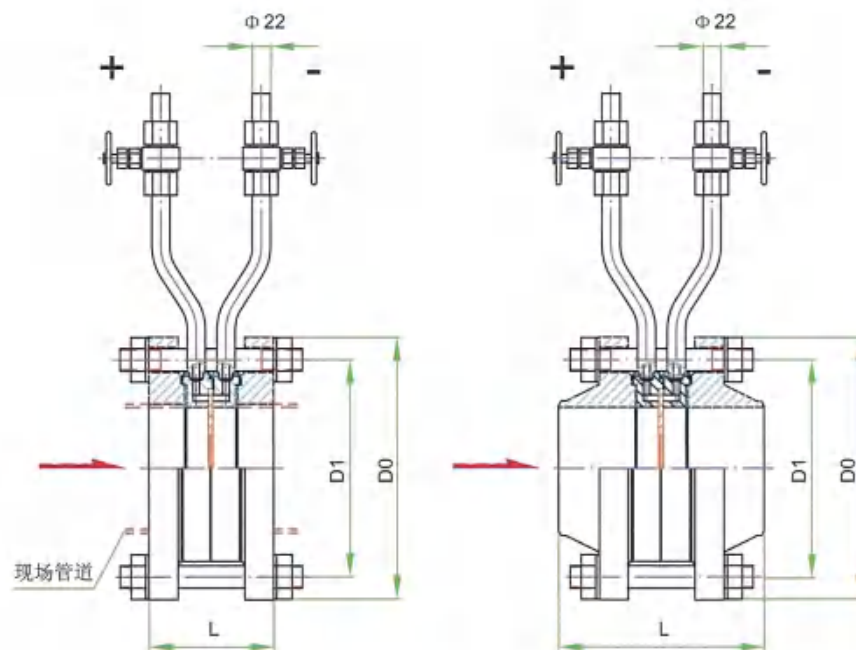
公称压力 Nominal pressure PN MPa	介质在下列温度时的最大工作压力 Maximum working pressure of medium at the following temperatures		
	200℃以下 Below 200℃	250℃以下 Below 250℃	300℃以下 Below 300℃
	P ₂₀	P ₂₅	P ₃₀
	MPa		
0.25	0.25	0.23	0.2
0.6	0.6	0.55	0.5
1	1	0.92	0.82
1.6	1.6	1.5	1.3
2.5	2.5	2.3	2

- 对焊法兰
- Butt welding flange

公称压力 Nominal pressure PN MPa	介质在下列温度时的最大工作压力 Maximum working pressure of medium at the following temperatures						
	200℃以下 Below 200℃	250℃以下 Below 250℃	300℃以下 Below 300℃	350℃以下 Below 350℃	400℃以下 Below 400℃	425℃以下 Below 425℃	450℃以下 Below 450℃
	P ₂₀	P ₂₅	P ₃₀	P ₃₅	P ₄₀	P ₄₂	P ₄₅
	MPa						
2.5	2.5	2.3	2.0	1.8	1.6	1.4	1.1
4.0	4.0	3.7	3.3	3.0	2.8	2.3	1.8
6.4	6.4	5.9	5.2	4.7	4.1	3.7	2.9

- 外形及安装尺寸
- Outline and Installation Dimension

- 平焊法兰连接形式
- Flat welding flange connecting type
- 对焊法兰连接形式
- Butt welding flange connecting type



单位: mm
Unit: mm

公称直径 Nominal diameter DN	PN2.5MPa平焊法兰 PN2.5MPa flat welding flange			
	D ₀	D ₁	L	螺 柱 Stud
(40)	150	110	117	4-M16×170
50	165	125	121	4-M16×170
65	185	145	121	8-M16×170
80	195	160	125	8-M16×170
100	230	190	131	8-M20×180
125	270	220	135	8-M22×200
150	300	250	135	12-M22×200
175	330	280	139	12-M22×200
200	360	310	139	12-M27×200
225	395	340	143	12-M27×200
250	425	370	143	12-M27×200
300	485	430	150	16-M27×220
350	550	490	164	16-M30×240
400	610	550	168	16-M30×240

- 对焊法兰
- Butt welding flange

单位: mm
Unit: mm

公称直径 Nominal diameter DN	PN2.5MPa				PN4MPa				PN6.4MPa			
	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud
(40)	150	110	165	4-M16×170	150	110	169	4-M16×170	165	125	209	4-M20×180
50	165	125	169	4-M16×170	165	125	169	4-M16×170	175	135	213	4-M20×180
65	185	145	177	8-M16×170	185	145	177	8-M16×170	200	160	223	8-M20×180
80	195	160	183	8-M16×170	195	160	189	8-M16×170	210	170	223	8-M20×180
100	230	190	199	8-M20×180	230	190	211	8-M20×180	250	200	235	8-M22×200
125	270	220	211	8-M22×200	270	220	211	8-M22×200	295	240	271	8-M27×220
150	300	250	219	8-M22×200	300	250	219	8-M22×200	340	280	295	8-M30×240
175	330	280	225	12-M22×200	350	295	251	12-M27×220	370	310	295	12-M30×240
200	360	310	235	12-M27×200	375	320	251	12-M27×220	405	345	307	12-M30×240
225	395	340	235	12-M27×200	415	355	271	12-M30×240	430	370	315	12-M30×240
250	425	370	245	12-M27×200	445	385	279	16-M30×240	470	400	319	16-M36×300
300	485	430	262	16-M27×220	510	450	310	16-M30×240	530	460	349	16-M36×300
350	550	490	276	16-M30×240	570	510	320	16-M30×260	595	525	388	16-M36×300
400	610	550	310	16-M30×240	655	585	364	16-M36×300	670	585	420	16-M42×300

LGBZ直钻孔取压标准孔板组件

LGBZ Vertical Drilling Hole - tap Standard Orifice Plate Package

直钻孔取压标准孔板属角接取压标准孔板，一般用于大口径管道的流量测量，流量控制检测系统中。

The vertical drilling hole-tap standard orifice plate is the corner-tap standard orifice plate. Generally, it is applied for the detection system of flow measurement of large-diameter pipeline and the flow control.

材料

Material

孔板材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

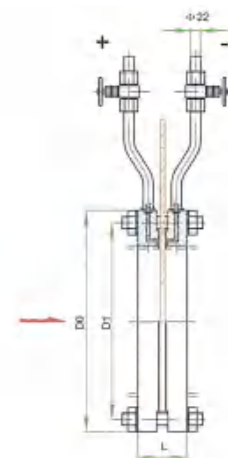
Orifice plate material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

法兰材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Flange material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

外形及安装尺寸

Outline and Installation Dimension



单位：mm

Unit: mm

公称直径 Nominal diameter DN	PN0.25MPa				PN0.6MPa				PN1MPa				PN1.6MPa				PN2.5MPa			
	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud
400	585	543	82	16-M20×150	585	543	82	16-M20×150	605	555	82	16-M22×160	625	565	94	16-M27×180	655	594	102	16-M30×200
450	635	593	82	16-M20×150	635	593	82	16-M20×150	655	605	82	20-M22×160	680	620	98	20-M27×180	705	644	110	20-M30×200
500	685	643	82	16-M20×150	685	643	82	16-M20×150	715	665	82	20-M22×160	740	694	110	20-M30×200	770	701	118	20-M36×220
600	795	745	84	20-M22×160	795	745	84	20-M22×160	820	765	86	20-M27×180	870	811	116	20-M36×220				
700	895	845	84	24-M22×160	895	845	84	24-M22×160												
800	1025	970	86	24-M27×180	1025	970	86	24-M27×180												
900	1125	1070	86	24-M27×180	1125	1070	86	24-M27×180												
1000	1225	1170	86	28-M27×180	1225	1170	88	28-M27×180												
1100	1325	1270	88	28-M27×180																
1200	1425	1370	88	32-M27×180																

注：表格中参数为定性产品，当DN>1200或表中未给定参数的规定，请面洽。

Note: The parameters in the table are qualitative products. If DN > 1200 or the parameters are not specified in the table, which can be negotiated face to face.

LGBF法兰取压标准孔板组件

LGBF Flange-tap Standard Orifice Plate Package

法兰取压标准孔板主要用于石油、化工的流量测量与流量控制检测系统中，上、下游取压口分别离孔板两端面的距离25.4mm处。

Flange-tap standard orifice plate is mainly applied in the detection system of flow measurement and flow control of petroleum and chemical industry. The upstream pressure tapings and downstream tapings are respectively 25.4mm away from the both ends of the orifice plate.

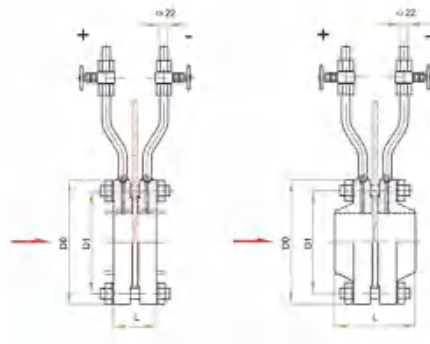
- ☐ 材料
- ☐ Material

孔板材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Orifice plate material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

法兰材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Flange material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)



单位：mm
Unit: mm

- ☐ 外形及安装尺寸
- ☐ Outline and Installation Dimension

- 平焊法兰
- Flat welding flange

公称直径 Nominal diameter DN	PN0.25MPa				PN0.6MPa			
	D ₀	D ₁	L	螺栓 Bolt	D ₀	D ₁	L	螺栓 Bolt
400	535	495	94	16-M20×120	535	495	94	16-M20×120
450	590	550	94	16-M20×120	590	550	94	16-M20×120
500	640	600	94	16-M20×120	640	600	94	16-M20×120
600	755	705	96	20-M22×120	755	705	96	20-M22×120
700	860	810	96	24-M22×120	860	810	96	24-M22×120
800	975	920	98	24-M27×130	975	920	98	24-M27×130
900	1075	1020	98	24-M27×130	1075	1020	98	24-M27×130
1000	1175	1120	98	28-M27×130	1175	1120	98	28-M27×130

单位: mm
Unit: mm

公称直径 Nominal diameter DN	PN1MPa				PN1.6MPa			
	D ₀	D ₁	L	螺栓 Bolt	D ₀	D ₁	L	螺栓 Bolt
400	565	515	94	16-M22×120	580	525	94	16-M27×130
450	615	565	94	20-M22×120	640	585	98	20-M27×130
500	670	620	94	20-M22×120	705	650	110	20-M30×160
600	780	725	96	20-M22×120	840	770	116	20-M36×180

- 平焊法兰
- Flat welding flange

单位: mm
Unit: mm

公称直径 Nominal diameter DN	PN2.5MPa			
	D ₀	D ₁	L	螺栓 Bolt
50	165	125	86	4-M16×120
65	185	145	86	8-M16×120
80	195	160	86	8-M16×120
100	230	190	86	8-M20×120
125	270	220	86	8-M22×120
150	300	250	86	8-M22×120
175	330	280	87	12-M22×120
200	360	310	87	12-M22×120
225	395	340	88	12-M27×130
250	425	370	88	12-M27×130
300	485	430	89	16-M27×130
350	550	490	90	16-M30×160
400	610	550	102	16-M30×160
450	660	600	106	20-M30×160
500	730	660	110	20-M36×180



- 对焊法兰
- Butt welding flange

单位: mm
Unit: mm

公称直径 Nominal diameter DN	PN2.5MPa				PN4MPa			
	D ₀	D ₁	L	螺栓 Bolt	D ₀	D ₁	L	螺栓 Bolt
50	165	125	142	4-M16×120	165	125	142	4-M16×120
65	185	145	146	8-M16×120	185	145	146	8-M16×120
80	195	160	152	8-M16×120	195	160	154	8-M16×120
100	230	190	162	8-M20×120	230	190	170	8-M20×120
125	270	220	166	8-M22×120	270	220	170	8-M22×120
150	300	250	170	8-M22×120	300	250	170	8-M22×120
175	330	280	177	12-M22×120	350	295	187	12-M27×130
200	360	310	187	12-M22×120	375	325	187	12-M27×130
225	395	340	187	12-M27×130	415	355	203	12-M30×160
250	425	370	187	12-M27×130	445	385	212	12-M30×160
300	485	430	200	16-M27×130	510	450	240	16-M30×160
350	550	490	200	16-M30×160	570	510	248	16-M30×160
400	610	550	240	16-M30×160	655	585	310	16-M36×180

注: 本产品中未列出规格参数, 均可面洽。

Note: Specifications and parameters are not listed in this product, which can be negotiated face to face.

LGBJ径距取压标准孔板组件

LGBJ Diameter - tap Standard Orifice Plate Package

径距取压标准孔板用于流量测量和流量控制系统中，其上游取压口离孔板上游端面1D（D为管道内径）处，下游取压口离孔板上游端面1/2D处。

Diameter-tap standard orifice plate is applied for the flow measurement and flow control system. Its upstream pressure tap is 1D (D - the inner diameter of the pipeline) away from the upstream end and the downstream pressure tap is 1/2D away from the upstream end of the orifice plate.

- ☐ 材料
- ☐ Material

孔板材料：304

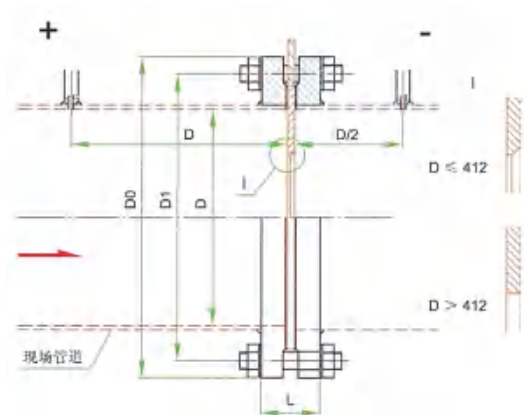
Orifice plate material: 304

法兰材料：碳钢

Flange material: carbon steel

注：引压短管、阀门自备，取压口现场钻孔。

Note: the short impulse pipe and valve should be prepared by clients, and the pressure tap can be drilled on site.



- ☐ 外形及安装尺寸
- ☐ Outline and Installation Dimension

单位：mm

Unit: mm

公称直径 Nominal diameter DN	PN0.25MPa				PN0.6MPa				PN1MPa				PN1.6MPa			
	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud
400	535	495	58	16-M20×130	535	495	70	16-M20×130	565	515	74	16-M22×150	580	525	90	16-M27×170
450	590	550	62	16-M20×130	590	550	70	16-M20×130	615	565	74	20-M22×150	640	585	98	20-M27×170
500	640	600	62	16-M20×130	640	600	74	16-M20×130	670	620	78	20-M22×150	705	650	110	20-M30×190
600	755	705	64	20-M22×150	755	705	76	20-M22×150	780	725	78	20-M22×150	840	770	116	20-M36×220
700	860	810	68	24-M22×150	860	810	80	24-M22×150								
800	975	820	70	24-M27×170	975	920	82	24-M27×170								
900	1075	1020	74	24-M27×170	1075	1020	86	24-M27×170								
1000	1175	1120	78	28-M27×170	1175	1120	90	28-M27×170								
1200	1375	1320	80	32-M27×170												

单位: mm

Unit: mm

公称直径 Nominal diameter DN	PN2.5MPa			
	D ₀	D ₁	L	螺栓 Bolt
50	160	125	54	4-M16×110
65	180	145	54	8-M16×110
80	195	160	58	8-M16×110
100	230	190	62	8-M20×120
125	270	220	66	8-M22×140
150	300	250	66	8-M22×140
175	330	280	71	12-M22×140
200	360	310	71	12-M22×140
225	395	340	75	12-M27×160
250	425	370	75	12-M27×160
300	485	430	80	16-M27×160
350	550	490	92	16-M30×200
400	610	550	102	16-M30×200
450	660	600	110	20-M30×200
500	730	660	118	20-M30×200

注: 最终节流件长度以设计图为准。

Note: The final throttle length is subject to design drawings.

LGBB八槽孔板组件

LGBB Eight-slot Orifice Plate Package

八槽孔板属角接取压孔板，主要用于电力工业高温、高压管道的水流量，蒸汽流量的流量测量和流量控制检测。

Eight-slot orifice plate is the corner-tap orifice plate. It is mainly applied to the water flow of high-temperature and high-pressure pipeline in the electricity industry, measurement of the steam flow and flow control.

八槽组件采用金属缠绕垫密封。

Slot assembly sealed with metal-wound gasket.

□ 材料

□ Material

孔板材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Orifice plate material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

齿形垫圈：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

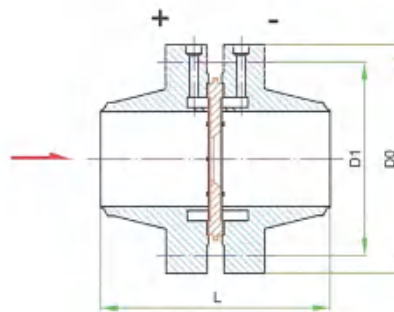
Lock washers: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

法兰材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Flange material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

仪表一次阀：用户自备，或另订。

Primary valve of instrument: provided by the client or ordered separately.



□ 外形及安装尺寸

单位: mm

□ Outline and Installation Dimension

Unit: mm

公称直径 Nominal diameter DN	适 用 条 件 Applicable conditions							
	P=7.6MPa t=175℃或P=3.9MPa t=450℃ P=7.6MPa t=175℃ or P=3.9MPa t=450℃				P=18.4MPa t=230℃或P=10MPa t=540℃ P=18.4MPa t=230℃ or P=10MPa t=540℃			
	D ₀	D ₁	L	螺 柱 Stud	D ₀	D ₁	L	螺 柱 Stud
50	195	145	248	4-M22×170				
65	220	170	328	8-M22×180	260	203	368	8-M27×230
80	230	180	378	8-M22×180	290	230	446	8-M30×250
100	265	210	448	8-M27×210	360	292	546	8-M36×300
125	310	250	284	8-M30×230	385	381	396	12-M36×320
150	350	290	316	12-M30×240	440	360	416	12-M42×340
175	380	320	332	12-M30×260	475	394	436	12-M42×340
200	430	360	350	12-M36×280	535	440	476	12-M48×380
225	470	400	392	12-M36×280	580	483	536	12-M52×400
250	500	430	400	12-M36×280	670	572	636	12-M52×420
300	585	500	450	16-M42×300				
350	665	560	480	16-M48×340				
400	715	620	500	16-M48×340				

注: 最终节流件长度以设计图为准。

Note: The final throttle length is subject to design drawings.

LGPB法兰喷嘴组件

LGPB Flanged Nozzle Assembly

法兰喷嘴组件属于ISA 1932标准喷嘴类型，它的压力损失比孔板小，主要用于电力工业主蒸汽流量测量及流量控制检测系统中。

Flanged nozzle assembly belongs to ISA 1932 standard nozzle type. Its pressure loss is smaller than that of the orifice plate. It is mainly applied to the measure of main steam flow and the detection system of flow control.

法兰喷嘴组件采用金属缠绕垫密封。

Flange nozzle assembly with metal-wound gasket seal

- ☐ 材料
- ☐ Material

喷嘴材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

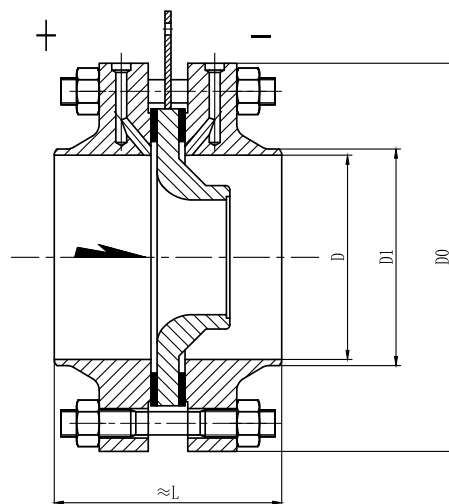
Nozzle: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

法兰材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Flange material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

仪表一次阀：用户自备，或另订。

Primary valve of instrument: provided by the client or ordered separately.



LGBH焊接孔板组件

LGBH Welded Orifice Plate Package

焊接孔板属角接取压孔板，主要用于电力工业高温、高压管道的水流量，蒸汽流量的测量和流量测量控制检测。

The welded orifice plate belongs to corner-tap orifice plate. It is mainly applied to the water flow of high-temperature and high-pressure pipeline in the electricity industry, the measurement of the steam flow and the control detection of flow measurement.

焊接孔板与焊接法兰焊在一起后，可防止介质泄漏。孔板焊接前管道必须用高压蒸汽冲洗，否则管道内杂物及氧化物会冲坏孔板平面及锐口。

Welded orifice plate and welded flange are welded together to prevent the leakage of medium. Before welding the orifice plate, the pipeline must be flushed by the high-pressure steam. Otherwise, sundries and oxidizing substances inside the pipeline will break the plane and acute part.

- ☐ 材料
- ☐ Material

法兰材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

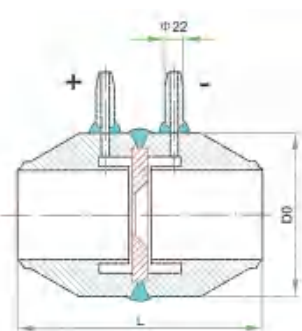
Flange material: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

孔板材料：碳钢（A05、20#、15crmo等）不锈钢（304、304L、316、321等）

Orifice plate: Carbon steel (A05, 20#, 15crmo, etc.) Stainless steel (304, 304L, 316, 321, etc.)

仪表阀门：用户自备，或另订。

Instrument valve: provided by the client or ordered separately.



- ☐ 外形及安装尺寸
- ☐ Outline and Installation Dimension

单位：mm

Unit: mm

公称直径 Nominal diameter DN	适 用 条 件 Applicable conditions					
	P=18.4MPa t=230℃		P=23MPa t=240℃		P=28MPa t=265℃	
	D ₀	L	D ₀	L	D ₀	L
45	115	282	126	282	129	282
50	132	282	141	282	145	282
65	146	302	155	302	161	302
80	173	302	174	302	180	302
100	203	302	198	302	207	322
125	237	382	251	382	258	382
150	264	382	280	382	288	382
175	293	402	307	402	310	382
200	330	402	327	402	341	402
225	366	442	355	442	368	442
250	408	502	417	502	417	502
275			440	502	450	502
300			465	502	475	502

注：本产品中的孔板改用喷嘴，则可作焊接喷嘴组件供货。（最终节流件长度以设计图为准）

Note: If the orifice plate in this product is changed to nozzle, it can be supplied as welding nozzle assembly. (The final throttle length is subject to design drawings)

LGPH焊接喷嘴组件 LGPH Welded Nozzle Package

焊接喷嘴属于ISA 1932标准喷嘴，它的压力损失比孔板小，主要用于电力工业主蒸汽流量测量及流量控制检测系统中。

Welded nozzles belong to ISA 1932 standard nozzles. Its pressure loss is smaller than that of the orifice plate. It is mainly used to measure the main steam flow of the electricity industry and the detection system of flow control.

焊接喷嘴与焊接法兰焊在一起后，可防止高压蒸汽泄漏。

Welded nozzles and welded flange are welded together, which can prevent the leakage of high-pressure steam.

喷嘴焊接前管道必须用高压蒸汽冲洗，否则管道内杂物及氧化物会损坏喷嘴入口曲面。

Before being welded, the pipeline must be flushed by high-temperature steam. Otherwise, sundries and oxide inside the pipeline can damage the hook face of the entrance of the nozzle.

☐ 材料 ☐ Material

喷嘴材料：304等

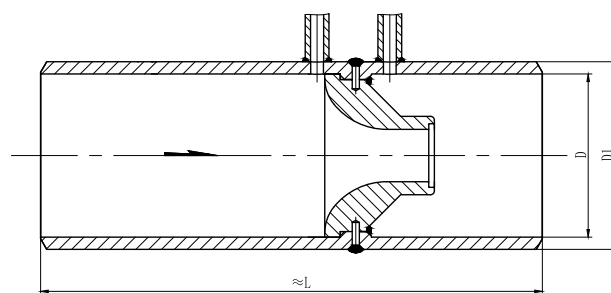
Nozzle material: 304,etc.

法兰材料：12Cr1MoV、10CrMo910等

Flange material: 12Cr1MoV, 10CrMo910,etc.

仪表阀门：用户自备，或另订。

Instrument valve: provided by the client or ordered separately.



☐ 外形及安装尺寸 ☐ Outline and Installation Dimension

单位：mm

Unit: mm

公称直径 Nominal diameter DN	适用条件 Applicable conditions					
	P=10MPa t=540℃		P=14MPa t=540℃		P=14MPa t=555℃	
	D ₀	L	D ₀	L	D ₀	L
175	288	402				
200	338	442				
225	401	502			358	502
250	401	502	413	502	413	502
275			413	502		
300					477	502

注：本产未列出规格参数，均可面洽。（最终节流件长度以设计图为准）

Note: Specifications and parameters are not listed in this product, which can be negotiated face to face.(The final throttle length is subject to design drawings)

LGPC长径喷嘴 LGPC Long-radius Nozzle

长径喷嘴主要用于电力工业，主蒸汽管道的流量测量及流量控制检测系统中。

Long-radius nozzle is mainly applied to the electricity industry, the flow measurement of the main steam pipeline and the detection system of the flow control.

长径喷嘴与管道直接焊接，可以防止高压蒸汽泄漏，它与其他标准节流装置相比，其精度较低。

Long-radius nozzles and the pipeline are welded directly, which can prevent the leakage of high-pressure steam. Compared with other standard throttling device, its precision is lower.

长径喷嘴安装前，管道必须先用高压蒸汽冲洗，然后再在安装部位上割下一段管子，管子坡口严格清理后，再将长径喷嘴焊上。

Before installing the long-radius nozzles, the pipeline must be flushed with the high-pressure steam. And then a section of pipeline is cut off on the place where it is installed. After strictly clearing the beveling of the pipeline, weld the long-radius nozzle.

- ☐ 材料
- ☐ Material

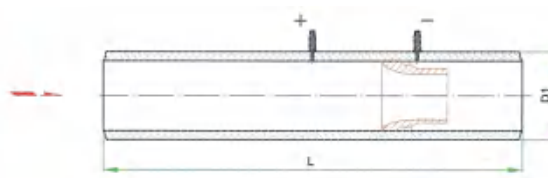
喷嘴材料：304等

Nozzle material: 304,etc

管道材料：20号钢、12Cr1MoV、10CrMo910等

Pipeline material: No.20 steel, 12Cr1MoV, 10CrMo910,etc

- ☐ 结构形式
- ☐ Structural Form



LGWP文丘里喷嘴 LGWP Venturi Nozzle

文丘里喷嘴的压力损失比较小，它的长度比文丘里管短。

The pressure loss of the venturi nozzle is smaller. Its length is shorter than that of the venturi tube.

文丘里喷嘴主要用于大口径、低静压，现场直管段距离很短的气体流量测量。

The venturi nozzle is mainly used for the gas flow measurement with large size, low static pressure and very short straight pipe at site.

☐ 材料及说明 ☐ Material and Description

喷嘴：铸铁

Nozzle: cast iron

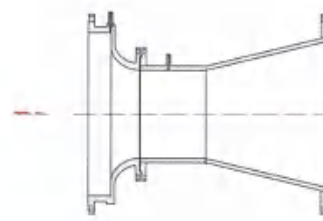
喉部：卷板，3号钢

Throat: rolled-plate, No.3 Steel

出口锥管：卷板，3号钢

Outlet cone: rolled-plate, No.3 steel

☐ 结构形式 ☐ Structural Form





LGWB卷板文丘里管

LGWB Rolled-plate Venturi Nozzle

LGWC粗铸文丘里管

LGWC Coarse Casting Venturi Tube

LGWJ机械加工文丘里管

LGWJ Mechanical Processing Venturi Tube

- ◆ 文丘里管的压力损失比较小。
- ◆ Pressure loss of the venturi tube is smaller.
- ◆ 粗铸文丘里管用于水厂的水流量测量。
- ◆ Coarse casting venturi tube is used to measure water flow of the water plant.
- ◆ 卷板文丘里管用于大口径管道的气体流量测量，也可以用于污水、液体流量的测量。如取压口采用双法兰变送器，可用于污水沉积物流体测量，沉积物随流体冲走，避免引压管道的堵塞。
- ◆ Rolled-plate venturi nozzle is used for the measurement of gas flow of large-diameter pipeline. It can also be used for the measurement of sewage and liquid flow. If the pressure tapping is the double - flange transmitter, it can be used to measure the fluid of sewage sediments. The sediments are flushed away along the fluid, which can avoid the blockage of pressure pipeline.



□ 材料

□ Material

● 粗铸文丘里管

● Coarse cast venturi tube

文丘里管：铸铁

Venturi tube: cast iron

喉部测量内圈：黄铜

Inner ring of throat measurement: brass

法兰标准：JB78-59 PN1

Flange standard: JB78-59 PN1

管道内径：

Inner diameter of pipe:

$\Phi 200$ 、 $\Phi 250$ 、 $\Phi 300$ 、 $\Phi 350$ 、 $\Phi 400$ 、

$\Phi 450$ 、 $\Phi 500$ 、 $\Phi 600$ 、 $\Phi 700$ 、 $\Phi 800$

长度：L由设计定，产品出厂计算书上写明。

Length: L is determined by the design and indicated on the calculation sheet of the product when leaving the factory.

● 卷板文丘里管

● Rolled-plate venturi tube

文丘里管筒体材料：3号钢

Venturi tube barrel material: No.3 steel

法兰材料：20号钢

Flange material: No.20 steel

法兰标准：JB81-59

Flange standard: JB81-59

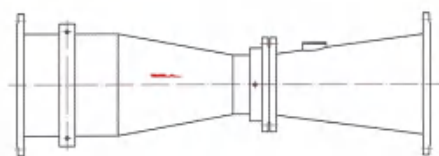
管道内径：D>350mm

Pipe inner diameter: D>350mm

长度：L由设计定，产品出厂计算书上写明。

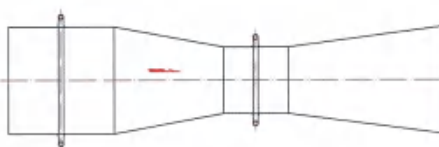
Length: L is determined by the design and indicated on the calculation sheet of the product when leaving the factory.

LGWC

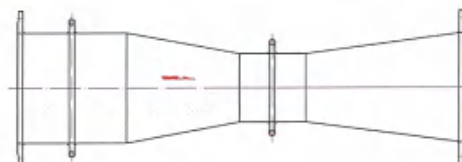


LGWB (不带法兰)

LGWB (No Flange)



LGWB



LGBT高压透镜孔板组件

LGBT High-pressure Lens Orifice Plate Package

高压透镜孔板主要用于石油、化工、高压管道的流量测量，流量控制检测中。

High-pressure lens orifice plate is mainly used for the flow measurement of petroleum, chemical industry and high-pressure pipeline and the detection of flow control.

- ☐ 材料
- ☐ Material

孔板材料：304等

Orifice plate material: 304,etc

透镜材料：35号钢等

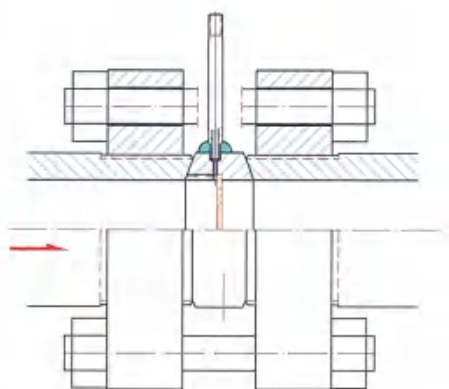
Optical lens material: No.35 Steel,etc

法兰材料：35号钢等

Flange material: No.35 steel,etc

仪表阀门：用户自备

Instrument valve: provided by the client



- ☐ 外形及安装尺寸
- ☐ Outline and Installation Dimension

公称压力PN32Mpa (法兰标准 H12-67)

单位：mm

Nominal pressure PN32Mpa (flange standard H12-67)

Unit: mm

公称直径DN Nominal diameter	D ₁	D ₀	L	H	螺栓 Bolt	管道螺纹M Pipeline thread M
32	95	135	110	135	4-M20×160-2a	M40×2-2a
40	115	155	124	140	6-M24×170-2a	M55×2-2a
50	140	195	140	150	6-M24×200-2a	M68×3-2a
65	170	225	160	160	6-M27×220-2a	M85×3-2a
80	200	260	180	170	6-M30×250-2a	M105×3-2a
100	235	300	220	203	8-M30×280-2a	M130×4-2a
125	255	300	226	208	8-M36×300-2a	M155×4-2a

高压透镜孔板组件出厂时，透镜垫与法兰之间用橡胶板保护，现场安装时需将橡胶板拆除。

When the high-pressure lens orifice assembly is delivered from the factory, the rubber plate can be used between the lens pad and the flange for protection, and the rubber plate shall be removed during site installation.

LGBQ角接取压圆缺孔板组件

LGBQ Corner-tap Segmental Orifice Plate Package

角接取压圆缺孔板主要用于脏污介质或有固体微粒的流体的流量的测量，它是一块具有扇形开孔的孔板，其入口边缘应锐利。

Corner-tap segmental orifice plate is mainly used for the flow measurement of dirty medium or the fluid containing solid particle. It is an orifice with the fan-shaped hole. Its entrance edge should be sharp.

□ 材料 □ Material

孔板材料：304等

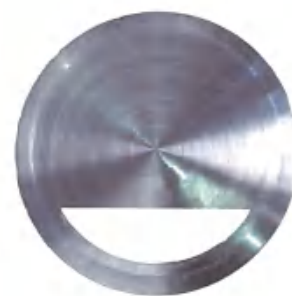
Orifice plate material: 304,etc

法兰材料：20号钢等Flange

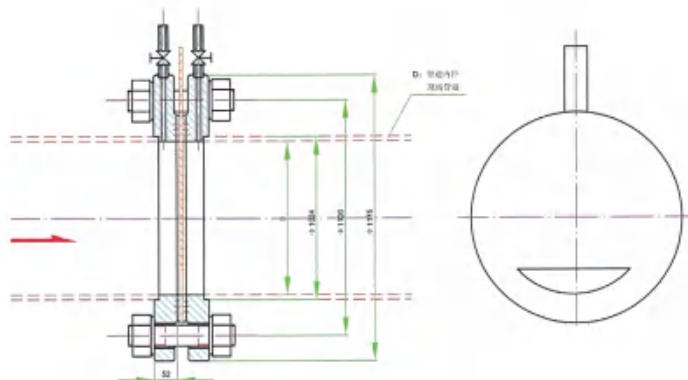
material: No.20 steel,etc

□ 外形及安装尺寸 □ Outline and Installation Dimension

公称直径 Nominal diameter DN	PN2.5MPa			
	D ₀	D ₁	L	螺 栓 Bolt
50	160	125	54	4-M16×110
65	180	145	54	8-M16×110
80	195	160	58	8-M16×110
100	230	190	62	8-M20×120
125	270	220	66	8-M22×140
150	300	250	66	8-M22×140
175	330	280	71	12-M22×140
200	360	310	71	12-M22×140
225	395	340	75	12-M27×160
250	425	370	75	12-M27×160
300	485	430	80	16-M27×160
350	550	490	92	16-M30×200
400	610	550	102	16-M30×200
450	660	600	110	20-M30×200
500	730	660	118	20-M30×200



Pipe inner diameter
Pipeline on site



单位: mm

Unit: mm

公称直径 Nominal diameter DN	PN0.25Mpa				PN0.6Mpa				PN1Mpa				PN1.6Mpa			
	D ₀	D ₁	L	螺 栓 Bolt	D ₀	D ₁	L	螺 栓 Bolt	D ₀	D ₁	L	螺 栓 Bolt	D	D ₁	L	螺 栓 Bolt
400	535	495	58	16-M20×130	535	495	70	16-M20×130	565	515	74	16-M22×150	580	525	90	16-M27×170
450	590	550	62	16-M20×130	590	550	70	16-M20×130	615	565	74	20-M22×150	640	585	98	20-M27×170
500	640	600	62	16-M20×130	640	600	74	16-M20×130	670	620	78	20-M22×150	705	650	110	20-M30×190
600	755	705	64	20-M22×150	755	705	76	20-M22×150	780	725	78	20-M27×150	840	770	116	20-M36×220
700	860	810	68	24-M22×150	860	810	80	24-M22×150								
800	975	920	70	24-M27×170	975	920	82	24-M27×170								
900	1075	1020	74	24-M27×170	1075	1020	86	24-M27×170								
1000	1175	1120	78	28-M27×170	1175	1120	90	28-M27×170								
1200	1375	1320	80	32-M27×170												

LGHZ整体式四分之一圆孔板组件

LGHZ Holistic Quarter Round Orifice Plate Package

LGHK夹持环式四分之一圆孔板组件

LGHK Carrier-ring Quarter Round Orifice Plate Package

四分之一圆孔板主要用于低雷诺数情况下的流量测量，流量控制检测，雷诺数范围 $200 \leq R_{eD} \leq 100000$ ，与双重孔板相比，它可以用于更低的雷诺数范围。

Quarter Round Orifice Plate is mainly used for the flow measurement and flow control detection under the case of low reynolds number, with the Reynolds number range of $200 \leq R_{eD} \leq 100000$. Compared with dual orifice plate, it can be used for lower reynolds number range.

四分之一圆孔板的轮廓有一个垂直于中心线的平面及一个四分之一圆弧的收缩段构成，出口边缘必须锐利。

The contour of the quarter round orifice plate is composed of a plane vertical to the center line and a quarter arc contraction section. The edge of the exit must be sharp.

□ 材料

□ Material

孔板材料：304

Orifice plate material: 304

法兰材料：20号钢

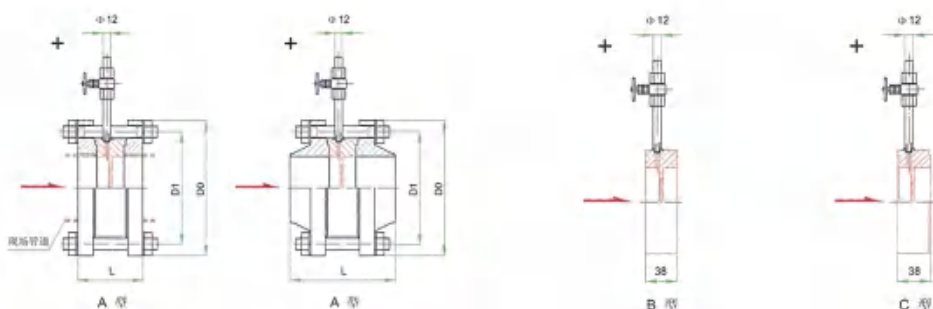
Flange material: No.20 steel

夹持环材料：20号钢（LGHK）

Carrier-ring material: No.20 steel (LGHK)

□ 外形及安装尺寸

□ Outline and Installation Dimension



● 夹持式

● Clamp type

夹持环式四分之一圆孔板的外形尺寸同夹持环式标准孔板LGBK的外形尺寸一致只是节流件改用四分之一圆孔板。四分之一圆孔板的廓形见图。

The outline dimension of the carrier-ring quarter round orifice plate is the same as that of the carrier-ring standard orifice plate LGBK, except that the throttling part uses the quarter round orifice plate instead. The profile of the quarter round orifice is shown in the figure.



● 整体式

● Integration

单位: mm

Unit: mm

公称直径 Nominal diameter DN	PN2.5MPa 平焊法兰 PN2.5MPa Flat welding flange				PN2.5, PN4MPa对焊法兰 PN2.5, PN4MPa Butt welding flange				PN6.4MPa对焊法兰 PN6.4MPa Butt welding flange			
	D ₀	D ₁	L	螺柱 Stud	D ₀	D ₁	L	螺柱 Stud	D ₀	D ₁	L	螺柱 Stud
25	120	85	76	4-M12 × 140	120	85	116	4-M12 × 140	135	100	156	4-M16 × 140
32	140	100	80	4-M16 × 140	140	100	130	4-M16 × 140	150	110	164	4-M20 × 160

LGBS角接取压双重孔板组件

LGBS Corner-tap Dual Orifice Plate Package

角接取压双重孔板用于低雷诺数情况下的流量测量，雷诺数范围为 $3000 \leq Re \leq 300000$ 。

Corner-tap dual orifice plate is used for the flow measurement under the low Reynolds number, with the Reynolds number range of $3000 \leq Re \leq 300000$.

它是由二块孔板组成，位于上游侧的孔板开孔直径较大，位于下游侧的孔板开孔直径较小。

It is composed of two pieces of orifice plates. The orifice plate on the upstream side has larger hole diameter and the one on the downstream side has smaller hole diameter.

材料 Material

孔板材料：304等

Orifice plate material: 304, etc

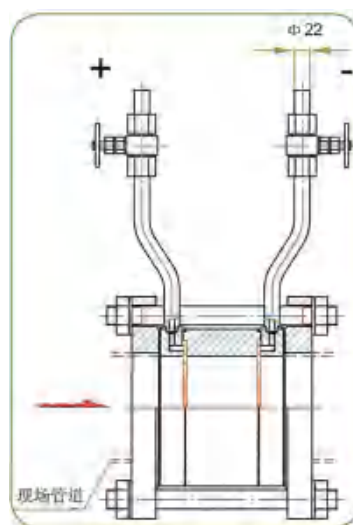
夹持环材料：20号钢等

Carrier-ring material: No.20 steel, etc

法兰材料：20号钢等

Flange material: No.20 steel, etc

外形及安装尺寸 Outline and Installation Dimension



Pipeline on site

单位：mm

Unit: mm

公称直径DN Nominal diameter	PN2.5MPa			
	D_0	D_1	L	螺柱 Stud
150	300	250	$72 + D/2$	8-M22 × 240
175	330	280	$72.5 + D/2$	12-M22 × 240
200	360	310	$72.5 + D/2$	12-M22 × 240
225	395	340	$73 + D/2$	12-M27 × 310
250	425	370	$73 + D/2$	12-M27 × 310
300	485	430	$73.5 + D/2$	16-M27 × 310

LGBTH一体化（内藏）孔板流量计

LGBTH Integrated (Internal) Orifice Plate Flowmeter

一体化(内藏)孔板流量计是将标准孔板与多参数差压变送器(或差压变送器、温度变送器及压力变送器)配套组成的高量程比差压流量装置,可测量气体、蒸汽、液体及天然气的流量,广泛应用于石油、化工、冶金、电力、供热、供水等领域的过程控制和测量。

Integrated (internal) orifice plate flowmeter is the differential pressure device with high-range ratio composed of standard orifice plate and multi-parameter differential pressure transmitter (or differential pressure transmitter, temperature transmitter and pressure transmitter). It can measure the flow of gas, steam, liquid and natural gas and is widely used for the process control and measurement of the fields, such as petroleum, chemical industry, metallurgy, electricity, heat supply and water supply.

□ 生产标准

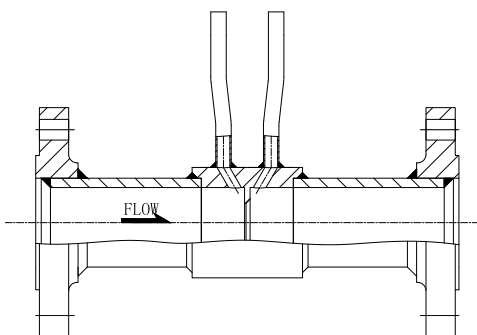
□ Production Standard

- 国家标准GB2624-2006<流量测量节流装置的设计安装和使用>
- National standard GB2624-2006 < design, installation and use of flow measurement throttling device >
- 国家标准ISO5167<国际标准组织规定的各种节流装置>
- International standard ISO5167 < various throttling devices specified by international standards organization >

□ 适用范围

□ Scope of Application

- 公称直径: $15\text{mm} \leq \text{DN} \leq 1200\text{mm}$
- Nominal diameter: $15\text{ mm} \leq \text{DN} \leq 1200\text{mm}$
- 公称压力: $\text{PN} \leq 10\text{MPa}$
- Nominal pressure: $\text{PN} \leq 10\text{MPa}$
- 工作温度: $-50^\circ\text{C} \leq t \leq 550^\circ\text{C}$
- Working temperature: $-50^\circ\text{C} \leq t \leq 550^\circ\text{C}$



LGBX限流孔板（多级限流）

LGBX Limited Flow Orifice Plate

(Multi-stage flow restriction)

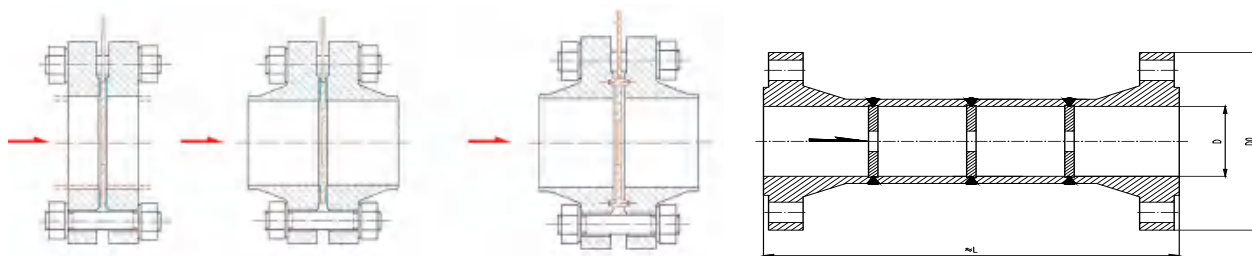
限流孔板是在工艺流程中，为了限制某种介质的流量时，而在介质管路中安装具有极小孔径的限流元件，它具有结构简单、安装方便、限流性能可靠的优点，而被广泛采用。根据用户要求可以单独供应限流件，也可以配套供应安装法兰，还可以供应前后直管段。

In order to limit the flow of medium, limited flow orifice plate is the limited flow elements with extremely small orifice diameter installed in the medium pipeline during the process flow. It has these advantages, such as simple structure, convenient installation and reliable limited flow performance, so it has been widely applied. According to clients' requirements, it can independently supply the limited flow components, or it can match to be supplied and installed onto the flange, and also can be supplied to the upstream and downstream straight pipe sections.

□ 主要技术参数

□ Main Technical Parameters

- 公称压力: 1.0~32MPa
- Nominal pressure: 1.0~32MPa
- 公称通径: $\Phi 10\sim 500\text{mm}$
- Nominal diameter: $\Phi 10\sim 500\text{mm}$
- 单片限流孔板LGBX-10~300
- Single throttling orifice plate LGBX-10~300
- 单级限流孔板LGBX-30/69~69/69
- Single stage throttling orifice plate LGBX-30/69~69/69
- 高温节流杆LGBX-15/69~29/69
- High temperature throttling rod LGBX-15/69~29/69
- 疏水管多级限流孔板LGBX-1/69~14/69
- Multi-stage throttling orifice plate of drain pipe LGBX-1/69~14/69
- 给水泵再循环多级节流孔板LGBX-1/31~31/31
- Feed pump recirculation multi-stage throttling orifice plate LGBX-1/31~31/31



LGHX环形孔板 LGHX Annular Orifice Plate

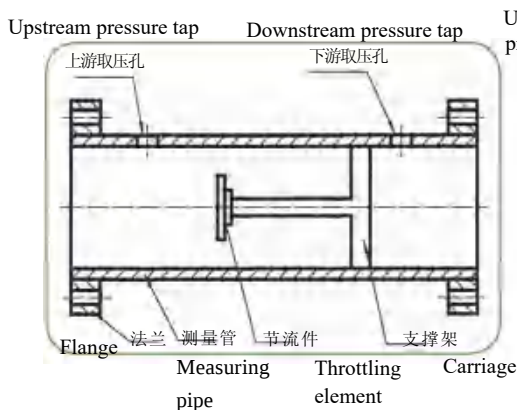
环形孔板主要由测量管及与测量管同轴的圆板节流件所组成，两者之间在节流件下游侧用支撑架连接，因此在测量管与圆板节流件之间形成了一个环形流通截面，称之为环形孔板，从根本上消除了常规孔板的滞流区和积存区，特别适用于测量煤气、废气、纸浆、矿浆、原油、污水、化工溶液等介质流量。

Annular orifice plate is mainly composed of measuring pipes and round plate throttling elements on the same axis with the measuring pipes. They are connected with the support frame at the downstream side of the throttling element. Therefore, an annular flow section is formed between the measuring pipes and round plate throttling elements, which is called annual orifice plate. It has radically eliminated the stagnant area and the deposition area. It is especially suitable to be used to measure the medium flow, such as gas, flue gas, paper pulp, ore pulp, crude oil, sewage and chemical solutions.

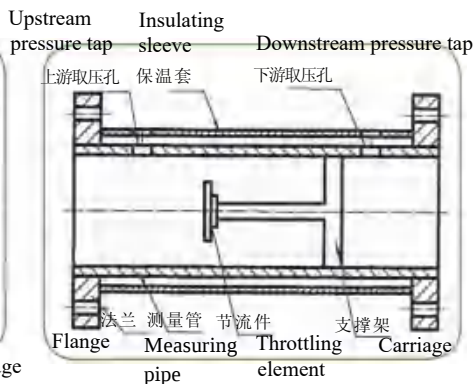


□ 供货范围 □ Scope of Supply

- 公称压力: 0.6~32MPa
- Nominal pressure: 0.6~32MPa
- 公称直径: $\Phi 40 \sim \Phi 3000$
- Nominal diameter: $\Phi 40 \sim \Phi 3000$



环形孔板
Annular orifice plate



保温形环形孔板40<Dn<600
Insulating annular orifice 40<Dn<600

LGSW-1000、2000双文丘里测速管

LGSW-1000/2000 Double-venturi Speed-measuring Pipe

双文丘里测速管是一种用于电厂的大口径烟气管道的流量测量，测量大口径管道流速测量的差压感受元件。配合差压变送器以及记录、显示等仪表就可以求得管内被测点处的瞬时流速值。通过调节仪表也可以对管内流速进行调节，其特点如下：

The double-venturi speed measuring pipe is a sensing element used by power factory to measure flow of big size flue gas pipeline and flow speed measurement of big caliber pipeline. Matching with ΔP pressure transmitter, recording, and displaying instrument, the instant flow speed value at the measured point inside the pipeline can be obtained. By regulating, the instrument may regulate the flow speed inside the pipeline. Its features are as follows:

◆ 与前面节流装置相比：

◆ Compared with the throttling set above

- 体积小。
- Volume is smaller.
- 永久性压力损失极小。
- Permanent pressure loss is very small.
- 结构简单，对检查、清洗、维修均很方便。
- Structure is simple. And it is convenient to check, cleanse, and maintain.

◆ 与皮托管、阿牛巴流量计、均速管流量计相比：

◆ Compared with pitot tube, annubar flowmeter, and velocity-averaging tube flowmeter

- 具有较大的差压信号。
- Differential pressure signal is bigger.
- 复现性稳定，适用于大口径管道，低静压、低压损的流速测量。
- Reproducibility is stable, and it is applicable to be used for flow speed measurement for big caliber pipeline, low static pressure, and low pressure loss.
- 双文丘里管道常用于大口径管道（烟道）的风速检测，亦可用于非圆行管道的流速测量。
- Double-venturi pipeline is often used for wind speed measurement of big caliber (flue pipe), and also can be used for flow speed measurement of non-circular pipe.
- LGSW-2000行双文丘里测速管还可用于含尘气体流速测量，如用于石灰窑风道、电厂烟道的流速测量。
- The LGSW-2000 double-venturi speed-measuring tube also can be used for measurement of flow speed of air containing dirt. For instance, it can be used for flow speed measurement of air passage of limeliln and flue pipe of power factory.



□ 工作原理
□ Operational Principle

在一个均匀的流场里，插入一个双文丘里测速管，当流体通过时，双文丘里测速管就产生一个差压值，流速越大时产生的静压力差越大。通过测量差压的方法就可以测得管内的流速。

Inserting a double-venturi speed-measuring tube into an even flow field. When the fluid passes, the double-venturi speed-measuring tube can produce a differential pressure value. The bigger the flow speed, the bigger the static pressure produced. By the method of measuring static pressure, the flow speed inside the pipeline can be measured.

流速的基本公式可按下式是计算：

The basic formula of flow speed can be calculated based on the formula below:

$$v = \alpha \times \sqrt{\frac{2g\Delta P}{\rho}}$$

式中：

In this formula:

- v—被测点被测流体流速 m/s
- v—the flow speed of the measured fluid at the measured point m/s
- g—重力加速度 g=9.81m/s²
- g—acceleration of gravity g=9.81m/s²
- ΔP—差压值 Pa
- ΔP—differential pressure value Pa
- ρ—被测流体的密度 kg/m³
- ρ—the density of the measured liquid kg/m³
- α—流量系数
- α—flow coefficient

若被测点的流速近似地等于平均流速时， $v = \bar{v}$ 则实际流量可按式表示：

If the flow at the measured point is closely equal to the average flow speed, the actual flow can be shown below:

$$Q = F \cdot \bar{v}$$

式中：

In this formula:

Q — 被测流体的体积流量

Q — volume flow of the measured fluid

F — 管道的有效截面积

F — effective sectional area of the pipeline

双文丘里测速管的输出的差压信号由导压管引出，可以和各种测量差压的二次仪表配套、显示、记录。

The differential pressure signal imported from the double-venturi speed-measuring tube is introduced by the connecting pipe. It can be matched with, displayed, and recorded by all kinds of secondary instrument matching which measures differential pressure.

□ 外形及安装尺寸

□ Outline and Installation Dimension

测量介质：气体

Measuring medium: gas

流速测量范围：

Flow measurement range:

型号 Type	流速 Flow velocity	对应最小差压值 Minimum differential pressure
LGSW-1000	>8m/s	175Pa
LGSW-2000	>5m/s	216Pa

注：当流速大于上述值时，可以直接选用低差压变送器，若流速低于上述值时，差压值较小，此时只能选用微差压仪表。

Note: If the flow rate is higher than the above value, the low differential pressure transmitter can be directly selected. If the flow rate is lower than the above value, the differential pressure value is smaller, and only the micro differential pressure instrument can be selected at this time.

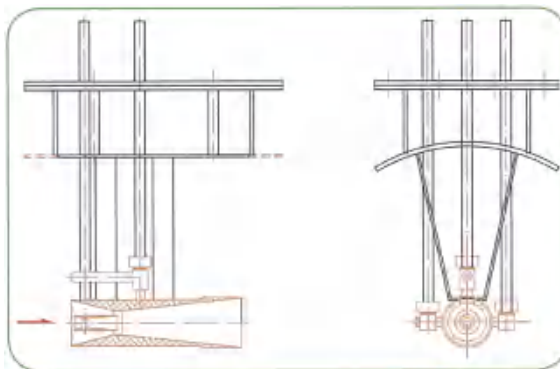
管径适用范围：LGSW-1000 300<D<700

Applicable scope of pipe diameter:

LGSW-2000 D<700

D:管道内径 (mm)

D:pipe inner diameter (mm)



□ 安装 □ Installation

● 安装部位:

● Installed position:

双文丘里测速管必须选择管截面上流体的流速大致形成典型的紊流速度场处, 因此双文丘里管前必须有10D直管段, 如遇到不同平面的二个弯头和阀门时, 则应有20D直管段(如流场均匀, 直管段可短一些)。

The velocity of the fluid on the cross-section of the double venturi velocimeter must be chosen to form a typical turbulent velocity. Therefore, 10D straight pipe section must be used in front of the double venturi. If there are two elbows and valves in different planes, 20D straight pipe section should be used (if the flow field is uniform, the straight pipe section can be shorter).

● 安装方向:

● Direction of installation:

垂直管道, 双文丘里测速管可以安装在同一截面的任一角度。

Vertical pipeline: double-venturi speed-measuring tube can be installed at any angle of the same section.

水平管道: 双文丘里测速管应从管道的上方插入管内。

Horizontal pipeline: double-venturi speed-measuring tube should be inserted into the pipe from the point which is above the pipeline.

● 流向:

● Direction of the flow:

双文丘里测速管在管道中应迎着流速方向安装, 安装时可以略微转动双文丘里测速管, 以产生最大差压值来判别。

The double-venturi speed-measuring tube should be installed facing the direction of the flow inside the pipeline. The double-venturi speed-measuring tube can be slightly turned in installation, so as the direction of the flow can be judged by the biggest differential value produced.

LGJY系列机翼测风装置

LGJY Measuring Device for Wind

- 供货范围
- Scope of Supply

公称压力: 0.04-1.6MPa

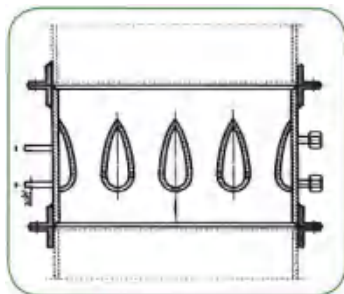
Nominal pressure: 0.04-1.6MPa

公称通径: $\Phi 300-\Phi 3000$

Nominal diameter: $\Phi 300-\Phi 3000$

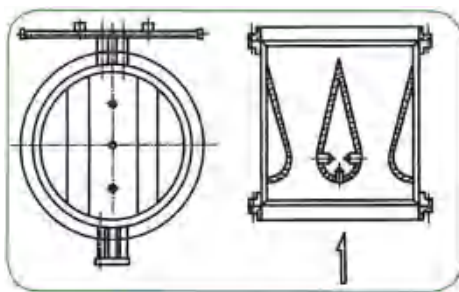
矩形: $600 \times 600-4000 \times 4000$

Rectangle: $600 \times 600-4000 \times 4000$



矩形管用机翼测风装置

Wing anemometer for rectangular tube



圆形管用机翼测风装置

Wing anemometer for circular tube

YC-WEBF超力巴均速管流量计

YC-WEBF Super Force Bar Mean Speed Tube Flowmeter



□ 概述

□ Introduction

在流量测量的过程中，由于被测介质的复杂，测量方法亦是多种多样，由此也就出现了各种基于不同测量原理的流量测量装置。按测量方法和结构来讲，可分为：差压式、浮子式、容积式、涡轮式、电磁式、涡街式、超声波式、热式；按安装方式来讲，可分为：插入式、封闭管道式、明渠式。使用最广，用量最大的，是差压式流量测量装置，约占总量的50%以上。采用美国Verabar公司的先进技术制造而成的YC-WEBF超力巴均速管流量计是根据差压式的工作原理，插入式的安装方法来组合设计的流量传感器。YC-WEBF超力巴均速管流量计与差压变送器和积算仪等二次仪表，构成高水平的差压流量测量系统。

In the process of flow measurement, due to the complexity of the measured medium, there are many kinds of measurement methods. As a result, there are various flow measurement devices based on different measurement principles. According to the measurement method and its structure, it can be divided into differential pressure, floater, volume, turbo, electromagnetic, vortex street, ultrasonic, and hot type. According to the means of installation, it can be divided into the inserting, closed pipe, and open canal type. The differential pressure type flow measurement installation has the widest use and biggest volume, which accounts for over 50% of the total volume. YC-WEBF super force bar mean speed tube flowmeter produced by American Verabar Company's advanced technology is a flow sensor designed by the inserting installation method based on the operational principle of differential pressure type. YC-WEBF super force bar mean speed tube flowmeter, differential pressure transmitter, integrator and other secondary instruments constitute a high-level differential pressure flow measurement system.

□ 工作原理

□ Operating Principle

YC-WEBF均速管流量计和孔板式等其它差压流量节流元件一样都遵循伯努利方程：

YC-WEBF super force bar mean speed tube flowmeter, orifice plate and other differential pressure flow throttling elements all follow Bernoulli equation.

$$Q_v = k \times C \times \sqrt{\Delta P}$$

$$Q_m = Q_v \times \rho$$

其中： Q_v =管道内的体积流量

In the equation, Q_v = volume flow in the pipe

Q_m =管道内的质量流量

Q_m =mass flow in the pipeline

K=流量系数

K=flow coefficient

C=流量常数（常数）

C=flow constant (constant)

ΔP =差压值

ΔP =differential pressure value

可见：C为常数，要确定 Q_v ，必须确定K和 ΔP

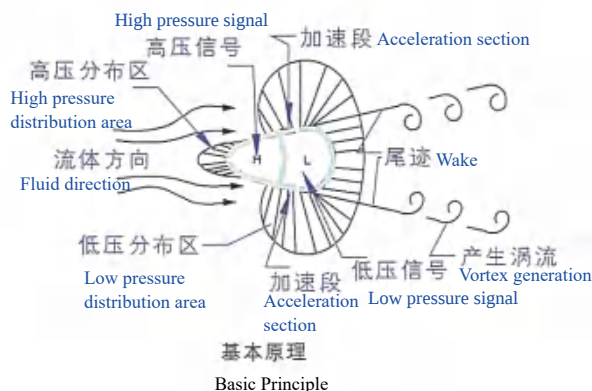
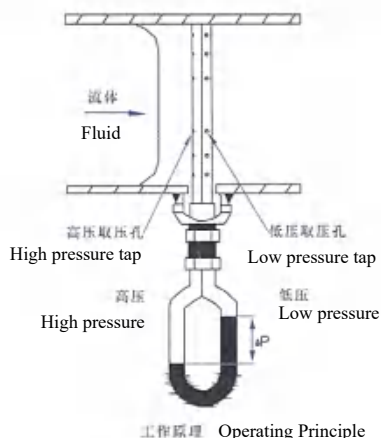
Thus, C is a constant. To make sure of Q_v , K and ΔP must be ensured first.

当流体流过流量传感器时，不仅在其前部产生一个高压分布区，高压分布区的压力高于管道的静压。而且流体流过流量传感器时速度加快，在流量传感器后部产生一个低压分布区，低压分布区的压力略低于管道的静压。

When the fluid flows through the flow sensor, a high-pressure distribution area is generated in the front of the flow sensor, but also the pressure in the high-pressure distribution area is higher than the static pressure of the pipeline. Moreover, the speed of fluid flowing through the flow sensor is accelerated, and a low-pressure distribution area is generated at the back of the flow sensor, and the pressure in the low-pressure distribution area is slightly lower than the static pressure of the pipeline.

流体从流量传感器流过后，在流量传感器后部产生部分真空，并且在流量传感器两侧出现漩涡。

After the fluid passes the flow sensor, partial vacuum is produced at the back of the flow sensor and whirlpool appears at both sides of the flow sensor.



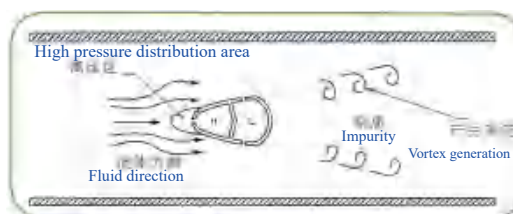
结构特点

Structural Feature

- 科学的截面开关，YC-WBEF水滴形截面开关所受到的牵引力最小，并使得流体与探头的分离点固定。
- Scientific section switch. The traction borne by the YC-WBEF water drop shape section switch is the smallest. It enables the fluid to be fixed with the separation point of the searching unit.
- 高强度结构。YC-WBEF超力巴均速管流量计采用特殊工艺加工而成的完整金属腔一体化结构，在高流速大管径情况时采用完全实心胚料开出高低取压腔，提高了探头整体强度，避免了其它探头的多片式结构或焊接式工艺导致的腔室间渗漏和降低了探头断裂的可能，保证了长期精度并有助于提高探头的量程上限。
- High strength structure. The YC-WBEF super force bar mean speed tube flowmeter has a complete metal cavity integration structure made by a special craftwork. In the case of high flow rate and large pipe diameter, the solid billet is used to cut out the high and low pressure chamber, which improves the overall strength of the probe, and avoids the cavity leakage caused by the multi-chip structure or welding process of other probes. Also, it reduces the possibility of probe fracture, ensures the long-term accuracy, and helps to improve the upper range limit of the probe.
- 低压取压孔位置。YC-WBEF超力巴均速管流量计低压孔取在传感器侧后两边、在流体分离点之前，既避免了低压孔受涡流影响，又避免了低压孔被堵，使低压信号更稳定、精确。同时对于特殊的流体条件，低压取压孔可非对称分布于流

量传感器侧后两边，提高了探头的强度，实现了本身抗堵能力。

- Position of low-pressure tap. The low-pressure tap of YC-WBEF super force bar mean speed tube flowmeter is taken at the back two sides of the sensor and before the fluid separation point, which avoids the influence of eddy current on the low-pressure hole, but also avoids the blockage of the low-pressure hole, making the low-pressure signal more stable and accurate. At the same time, for special fluid conditions, the low-pressure taps can be asymmetrical distributed on the back two sides of the flow sensor, which improves the strength of the probe and realizes its own anti clogging ability.
- 流量传感器迎流面表明粗糙处理和防淤槽。通过将流量传感器前部进行粗糙处理和加入导淤槽，使流量传感器两边始终保持紊流状态的边界层，相当于有了紊流发生器（STG）。粗糙表面的原理类似于光面经过均匀处理的高尔夫球的表面，由于受到较少的牵引力，因而可以运行一个更加精确稳定的轨道。YC-WBEF超力巴均速管流量计可测量流速的上限比其它流量传感器或节流元件至少提高了35%。
- The upstream surface of the flow sensor shows rough treatment and anti-silting groove. By roughening the front part of the flow sensor and adding it into the guide channel, the turbulent boundary layer on both sides of the flow sensor is always maintained, which is equivalent to the turbulence generator (STG). The principle of rough surface is similar to the surface of golf ball with even treatment of smooth surface. Due to less traction, it can run a more accurate and stable track. Compared with other flow sensors or throttling elements, the upper limit of flow rate measured by YC-WBEF super force bar mean speed tube flowmeter is increased by at least 35%.
- 多组取压孔。YC-WBEF超力巴均速管流量传感器通过分布于管道轴心的多组取压孔测得管道中流体的流速剖面，真实的反映流体平均流速。
- Multiple sets of pressure taps. YC-WBEF super force bar mean speed tube flowmeter measures the flow speed section of the fluid inside the pipeline by multiple sets of pressure taps distributed at the axle centre of the pipeline that truly reflects average flow speed of the fluid.
- 高精度流体系数。YC-WBEF 超力巴均速管流量计流体系数在相当大的一个范围内是常数，是线性的（K系数不象孔板或文丘里管那样随雷诺数变化而变化）。不受雷诺数、节流面积比影响。
- High precision fluid coefficient. The fluid coefficient of YC-WBEF super force bar mean speed tube flowmeter is a constant in a relatively bigger scope. Also, it is linear (K coefficient do not change with the change of Reynolds number like pore plate or venturi). It is not influenced by Reynolds and the throttling area.



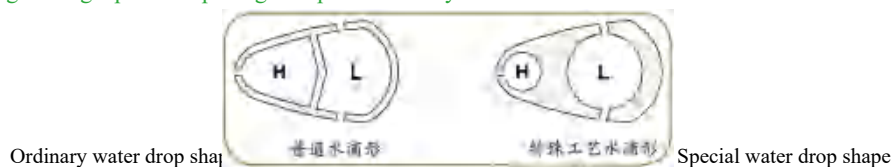
性能指标

Performance

- 可测量多种介质，应用范围广泛。适用于各种气体、蒸汽和液体。
- It can measure all kinds of media and its application scope is wide in all kinds of air, vapor, and liquid.
- 精度高、量程比大、重复性好。精度为 $\pm 0.5\%$ ，重复精度为 $\pm 0.1\%$ ，量程比大于10: 1。
- High precision, wide range ratio, great repetitiveness. Precision is $\pm 0.5\%$, repeatability precision is $\pm 0.1\%$, and its range ratio is bigger than 10:1.
- 流量传感器取压孔本质抗堵。流量传感器前部形成高压区，压力略高于管道静压，阻止了颗粒进入；低压取压孔位于流量传感器侧后两边，流体分离点和尾迹区的前部，不容易被流体流动形成的涡街力所带来的杂质所堵死。
- The pressure tap of flow sensor is essentially anti blocking. The high pressure area is formed in the front of the flow sensor, and the pressure is slightly higher than the static pressure of the pipeline, which prevents the particles from entering; the low-pressure tap is located in the back two sides of the flow sensor, and the front of the fluid separation point and the wake area, which is not easy to be

blocked by the impurities brought by the vortex force formed by the fluid flow.

- 测量信号稳定、波动小。
- The measurement signal is stable with little fluctuation.
- 管道永久压损小。孔板所产生的压损为其所测得差压值的60%，而YC-WBEF均速管流量计的永久压损仅为差压值的3%。
- The permanent pressure loss of pipeline is small. The pressure loss produced by orifice plate is 60% of the measured differential pressure value, while the permanent pressure loss of YC-WBEF super force bar mean speed tube flowmeter is only 3% of the differential pressure value.
- 独有高强度的探头形单片双腔结构。
- Unique high-strength probe shape single-chip double cavity structure.



- 安装费用低，基本免维护。YC-WBEF超力巴均速管流量计在安装过程中只需要进行简单的焊接，费用较低，而且无可移动部件，安装后基本免维护。
- The installation fee is low and almost the maintenance is not needed. When installing the YC-WBEF super force bar mean speed tube flowmeter, only simple welding is required. The expense is low and there is no movable part. The maintenance is almost not needed after installation.
- 可以在线安装和检修。对于部分无法停产安装的测点和极其肮脏的介质，使用在线安装型。可以在不停产的情况下安装测量和抽出探头进行清理。
- It can be installed and repaired online. For some measuring points and extremely dirty media that cannot be stopped for installation, online installation type can be used. The measurement and extraction probe can be installed and cleaned without stopping production.极大的流量量程比。YC-WBEF-S型管道连接型由经过特殊处理的本体和YC-FWBEF超力巴均速管流量计于一体，扩大流量量程比（65：1），无直管段要求，在低流速、直管段不足的情况可获得极高的测量精度（ $\pm 0.5\%$ ）。

Large flow range ratio. YC-WBEF-S pipeline connection type is composed of a specially treated body and YC-WBEF super force bar mean speed tube flowmeter, which can enlarge the flow range ratio (65:1) without the requirements of straight pipe section. It can obtain a very high measurement accuracy ($\pm 0.5\%$) in the case of low flow rate and insufficient straight pipe section.

YC-WEBF 超力巴均速管流量计

YC-WEBF Superbar averaging tube flowmeter

项目 Item	代码 Code	含义 Meanings
超力巴均速管流量计 Superbar averaging tube flowmeter	YC-WEBF	
A: 差压变送器类型选择 Differential pressure transmitter type selection	1 2 3	非智能型 Nonintelligent type 智能型 Intelligent type 智能温压测量与补偿运算型 Intelligent temperature and pressure measurement and compensation operation type
B: 结构形式 Structural form	1 2 3 4 5	91 小口径法兰安装型 Small-size flange mounting type 92 悬臂型 Cantilever type 93 不断流在线安装型 Continuous flow online installation type 94 高强度悬臂型 High strength cantilever type 95 高强度支撑型 High strength support type
C: 测量种类选择 Measurement type selection	1 2 3 4	流量测量 Flow measurement 流量压力测量 Flow pressure measurement 流量温度测量 Flow temperature measurement 流量压力温度测量 Flow pressure and temperature measurement
E: 反吹功能选择 Blowback function selection	1 2	不带反吹装置 Without blowback device 带反吹装置 With blowback device

F: 安装方式 Installation mode	3	卡套式 Clamping type
	4	法兰式 Flange type
G: 差压变送器安装方式 Installation mode of differential pressure transmitter	1	一体式（直接安装在威尔巴顶端） Integrated type (directly installed at the top of Wellbar)
	2	分体式（与均速管分离安装） Split type (installed separately from the averaging pipe)
H: 被测流体管道几何形状 Geometric shape of measured fluid pipeline	1	圆形管道 Circular pipeline
	2	矩形管道 Rectangular pipe
	3	正方形管道 Square pipe
	4	其他几何形状 Other geometric shapes
I: 取出方式选择 Selection of extraction method	1	断流取出型 Cut-out type
	2	不断流取出型 Continuous flow type
J: 防爆等级 Explosion proof grade	0	非防爆型 Non-explosion proof type
	1	本安防爆型 Intrinsically explosion-proof type
	2	隔离防爆型 Isolation explosion-proof type
K: 防腐选择 Anticorrosion selection	0	非防腐型 Non-anticorrosion type
	1	防腐型※ Anti-corrosion type ※
L: 操作温度范围 Operating temperature range	1	0~100℃
	2	100 ~ 300℃
	3	300 ~ 400℃
M: 操作压力范围 Operating pressure range	1	-0.1~1.6Mpa
	2	1.6 ~ 6.0Mpa
	3	6.0 ~ 10Mpa
D: 被测流体管道尺寸 Size of the measured fluid pipeline		管道外径×管壁厚度（mm） Outside diameter of pipeline × wall thickness (mm)

YC-WEB 威尔巴流量计

YC-WEB Wellbar Flowmeter

系统概述

Overview of The System

利用差压原理进行流量测量是当今世界上最可靠的流量测量方式之一，代表产品 - 孔板有着悠久的历史，人们对它的安装、使用和检修都非常熟悉。

Using differential pressure principle for flow measurement is one of the most reliable flow measurement methods in the world today. The representative product - orifice plate has a long history, and people are very familiar with its installation, use and maintenance.

流量测量系统由节流装置（差压发生器）差压变送器以及流量积算仪等二次仪表组成。

The flow measurement system consists of throttling device (differential pressure generator), differential pressure transmitter and secondary instruments such as flow totalizer.

进入九十年代随着电子技术的突飞猛进，变送器、积算仪等二次仪表的精度、灵敏度发生了质的变化，达到了极高的水平，但是，几十年来一次源的检测水平始终没有重大突破，成了制约差压式流量测量系统发展的瓶颈，使得高水平的下游仪表无法发挥出应有的高效率。

In the 1990s, with the rapid development of electronic technology, the accuracy and sensitivity of secondary instruments such as transmitters and totalizers have changed a lot, reaching a very high level. However, for decades, there has been no major breakthrough in the detection level of primary source, which has become the bottleneck restricting the development of differential pressure flow measurement system, making high-level downstream instruments unable to exert their due high efficiency.

目前，我们公司针对插入式差压式流量计的特点以及在实际工况下使用过程中遇到的一些难题，融合国际和国内插入式巴类流量计优点，经过累计大量的实验数据，自行研制开发推出的全新均速流量探 - 威尔巴，使得一次源的测量精度、重复性和可靠性达到一个崭新高度。

At present, according to the characteristics of plug-in differential pressure flowmeter and some problems encountered in the actual working conditions, our company combines the advantages of international and domestic plug-in flow meters, and through accumulating a large amount of experimental data, develops and launches a brand-new average-speed flow detector - Wellbar, which makes the measurement accuracy, repeatability and reliability of primary source reach a brand-new height.



图1
Figure 1

威尔巴探头、差压变送器加上积算仪等二次仪表，构成了当今世界最高水平的差压流量测量系统。

Wellbar probe, differential pressure transmitter, totalizer and other secondary instruments constitute the highest level differential pressure flow measurement system in the world today.

威尔巴均速流量探头的优点

Advantages of Wellbar Average Flow Probe

- ◆ 可测量多种介质，应用范围广泛
Measure a variety of media and has a wide range of applications
- ◆ 精度高、量程比大
High precision and large range ratio
- ◆ 探头取压孔本质防堵
Probe pressure tap hole is essentially anti-blocking
- ◆ 测量信号稳定、波动小
Stable measurement signal and small fluctuation
- ◆ 管道永久压损低
Low permanent pressure loss of pipeline
- ◆ 独有高强度的椭圆形单片双腔结构
Unique high-strength elliptical single-piece double-cavity structure
- ◆ 安装费用低，基本免维护
Low installation cost and basically maintenance-free
- ◆ 可以在线安装和检修
Installed and overhauled online



测量原理

Measurement Principle

YC-WEB 威尔巴探头是威尔巴流量计的传感部分，它将管道中某点的流体流速转变成为一个对应的差压信号。其采用新一代的专利设计结构，独有的测头形式具有测量压力损失小、污物不易堆积的性能；新螺纹杆装置可以对测管的插入位置进行精确调整，保证测量精度；密封室与球阀装置使得测管可以不断气安装检修。

YC-WEB Wellbar probe is the sensing part of Wellbar flowmeter, which converts the fluid velocity at a certain point in the pipeline into a corresponding differential pressure signal. It adopts a new generation of patented design structure, and its unique probe form has the performance of small pressure loss and difficult accumulation of dirt. The new threaded rod device can accurately adjust the insertion position of the measuring pipe to ensure the measurement accuracy; The sealing chamber and ball valve device enable the measuring pipe to be installed and overhauled without interruption.

YC-WEB 威尔巴流量计是根据动压转变静压原理工作的。测头迎流面的测孔测出流体的总压，测头后流面的孔测出流体的静压。根据伯努力方程可以得到测头处流速与差压有以下关系：

YC-WEB Wellbar flowmeter works according to the principle of dynamic pressure changing into static pressure. The total pressure of the fluid is measured by the hole on the upstream surface of the probe, and the static pressure of the fluid is measured by the hole on the downstream surface of the probe. According to Bernoulli's equation, we can get the following relationship between the flow velocity at the probe and the differential pressure:

$$V = K_v \sqrt{2 \Delta P / \rho}$$

V: 测头处流速, m/s

V: Velocity at the probe, m/s

ΔP : 威尔巴流量计测出的差压, Pa

ΔP : Differential pressure measured by Wellbar flowmeter, Pa

ρ : 被测介质密度, kg/m³

ρ : Density of measured medium, kg/m³

K_v : 威尔巴流量计系数

K_v : Wellbar flowmeter coefficient

YC-WEB 威尔巴流量计的差压，根据以下公式计算出流量：

The differential pressure of YC-WEB Wellbar flowmeter, and the flow rate is calculated according to the following formula:

$$Q = \alpha \gamma A V \times 3600$$

Q: 流体以及流量, m³/h

Q: Fluid and flow rate, m³/h

α : 流速分布系数

α : Velocity distribution coefficient

β : 阻塞系数

β : Blocking coefficient

γ : 截面修正系数

γ : Section correction coefficient

A: 管道公称截面积, m²

A: Nominal cross-sectional area of pipeline, m²

V: 测头处流速, m/s

V: Velocity at the probe, m/s

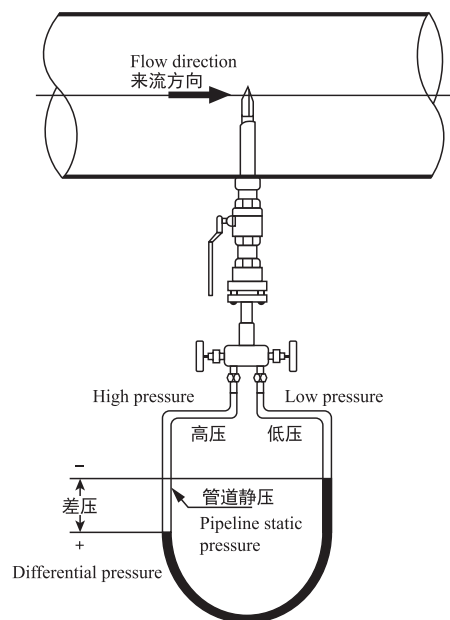


图2
Figure 2

YC-WEB 威尔巴测量系统的性能

Performance of YC-WEB Wilba Measurement System

测量精度: $\pm 1\% \pm 0.5\%$

Measurement accuracy: $\pm 1\% \pm 0.5\%$

重复精度: $\pm 0.1\%$

Repetition accuracy: $\pm 0.1\%$

适用压力: $0 \sim 40\text{Mpa}$

Applicable pressure: $0 \sim 40\text{Mpa}$

适用温度: $-20^{\circ}\text{C} \sim 550^{\circ}\text{C}$

Applicable temperature: $-20^{\circ}\text{C} \sim 550^{\circ}\text{C}$

测量上限: 取决于探头强度

Upper measurement limit: depends on the probe strength

测量下限: 取决于测量最小差压要求

Lower measurement limit: depends on the requirement of measuring minimum differential pressure

量程比: 大于 15: 1

Range ratio: greater than 15: 1

安装直管段: 最小前 2D 后 2D

Installation of straight pipe section: minimum upstream 2D and downstream 2D

适用管径: 38mm ~ 9000mm 圆管、方管

Applicable pipe diameter: 38mm ~ 9000mm round pipe and square pipe

适用介质: 满管、单向流动的、单相的气体、蒸汽和粘度不大于 $10 (\text{mPa} \cdot \text{S})$ 的液体。

Applicable medium: full pipe, unidirectional flowing, single-phase gas, steam and liquid with viscosity not more than $10 (\text{mPa} \cdot \text{S})$.

YC-WEB 威尔巴均速流量探头的设计特点

Design Characteristics of YC-WEB Wellbar Average Flow Probe

（一）早期的均速流量探头，在截面设计上忽视了临界流体的流动情况和空气动力学原理，所以其应用范围受到很大的限制。

The early average velocity flow probe neglected the flow of critical fluid and aerodynamic principle in cross-section design, so its application scope was greatly limited.

其它截面类型探头的限制因素：

Limitations of other cross-section probes:

- ◆ 取压孔易堵塞
Pressure tap hole is easy to block
- ◆ 精度不高
Accuracy is not high
- ◆ 信号波动大
Great signal fluctuates
- ◆ 受流体牵引力影响振动大
Vibrates greatly affected by fluid traction

圆形探头（图 3.1）的流体分离点不固定的，其结果使得流体系数K无法准确获得，测量精度为 $\pm 10.0 - 20.0\%$ 。

The fluid separation point of the circular probe (Figure 3.1) is not fixed, and the fluid coefficient K cannot be obtained accurately, and the measurement accuracy is $10.0 - 20.0\%$.

钻石形探头（图 3.2）有一个尖锐的固定分离点，会产生很大的流动牵引力，引起探头振动和信号噪声，并在探头尾部出现较强的部分真空，十探头低压取压空容易被堵塞。

Diamond-shaped probe (Figure 3.2) has a sharp fixed separation point, which will produce a large flow traction force, causing probe vibration and signal noise, and a strong partial vacuum will appear at the tail of the probe, so the low-pressure vacuum of the ten-probe is easy to be blocked.

空气动力形状探头（图 3.3）由于高压区范围小所以以其对流体迎角非常敏感，导致实际测量精度不可靠，测量误差大于 $\pm 10.0\%$ 。

Aerodynamic shape probe (Figure 3.3) is very sensitive to fluid angle of attack because of its small range in high pressure area due to its small range of high pressure, which leads to unreliable measurement accuracy and measurement error greater than 10.0% .

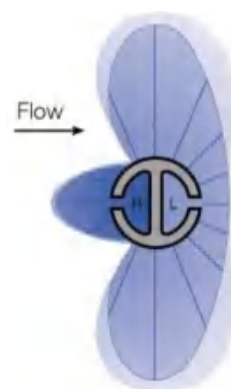


图3.1
Figure 3.1

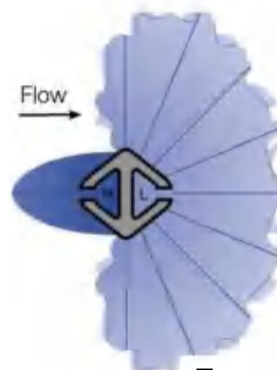


图3.2
Figure 3.2

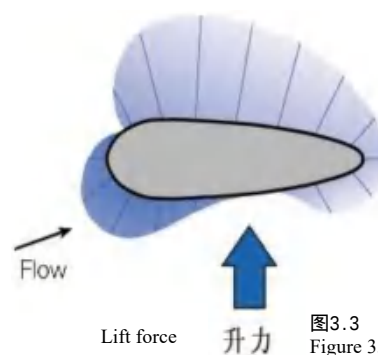


图3.3
Figure 3.3

威力巴探头的局限性

Limitations of Verabar Probe

威力巴探头（如图3.4）因正负取压孔非常小只有3毫米，煤气中含有大的颗粒及乳状物很容易堵塞取压孔。当引压管泄漏，探头高压平衡区遭到破坏，杂质中直径较小的颗粒就有可能进入取压孔。当管道处于停产时，由于分子的布朗运动，颗粒小的杂质有可能进入取压孔。系统频繁开停机，在高压区形成的瞬间，颗粒小的杂质有可能进入取压孔，日积月累，就有可能造成探头的堵塞。介质中含有大量的焦油、藻类生物，或者含有纤维状物质，也有可能造成探头的堵塞。

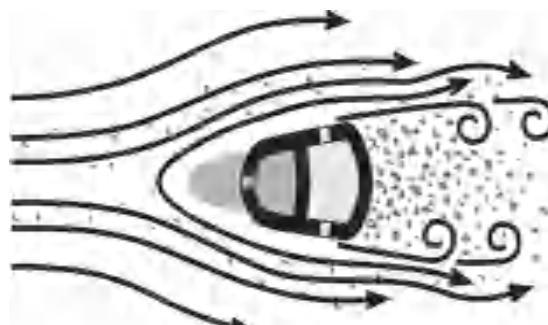


图3.4 Figure 3.4

Verabar probe (Figure 3.4) has a very small positive and negative pressure tap hole with only 3mm, and the gas contains large particles and emulsion, which can easily block the pressure tap hole. When the pressure lead pipe leaks, the high-pressure balance area of the probe is destroyed, and particles with smaller diameters among impurities may enter the pressure tap hole. When the pipeline is out of production, due to the Brownian motion of molecules, impurities with small particles may enter the pressure tap hole. The system is frequently started and shut down. At the moment when the high-pressure area is formed, small particles of impurities may enter the pressure tapping hole, which may block the probe over time. The medium contains a lot of tar, algae, or fibrous substances, which may also block the probe.

而 YC-WEB 威尔巴探头的独特设计彻底的摆脱了阿牛巴以往几种均速探头易堵塞、精度不高的特点，使得一次源的测量精度、重复性和可靠性达到一个崭新高度。

The unique design of YC-WEB Wellbar probe completely gets rid of the characteristics of blocking and low accuracy of several previous average-speed probes in Annubar, and makes the measurement accuracy, repeatability and reliability of primary source reach a brand-new height.

其主要特点：双孤型截面形状的探头能产生精确的压力分布，固定的流体分离点；探头的前部形成高压区，压力略高于管道静压，阻止了颗粒进入。

Its main features: the probe with double-solitary cross-section can produce accurate pressure distribution and fixed fluid separation point; The front of the probe forms a high-pressure area, and the pressure is slightly higher than the static pressure of the pipeline, which prevents particles from entering.

注意：在探头的高压取压孔处流体的速度是零，没有物体会进入取压孔内。内部一体化结构能避免信号渗漏，提高探头结构强度，保持长期高精度。

Note: The velocity of fluid at the high-pressure pressure tap hole of the probe is zero, and no object will enter the pressure tap hole. The integrated structure can avoid signal leakage, improve the structural strength of the probe and maintain long-term high precision.

如右图，刚开机时，流体在管道静压作用下，进入弯管，很快形成了压力平衡的状态。当压力平衡状态形成以后，流体在弯管进口处遇到高压，绕道而行，不再进入弯管中。

As shown in the figure on the right, when the machine is started, the fluid enters the elbow under the static pressure of the pipeline, and a state of pressure balance is quickly formed. When the pressure equilibrium state is formed, the fluid encounters high pressure at the inlet of the elbow, detours and does not enter the elbow any more.

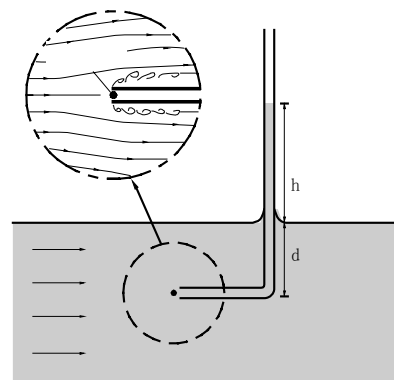


图3.5 Figure 3.5

YC-WEB 威尔巴传感器高、低取压孔实现本质防堵。

YC-WEB Wellbar sensor high and low pressure tapping holes realize essential anti blocking.

一般情况下，灰尘、沙子和颗粒在涡街力的作用下，集中在探头的后部。这就是为什么秋天的树叶总是在背风的房子后面的原因。威尔巴探头的独特防堵设计，再加上重力作用的自然下落，阻止了颗粒的进入，这种设计从本质上防止了堵塞并且能产生一个非常稳定的低压信号。（如图所示）

Generally, dust, sand and particles are concentrated at the back of the probe under the vortex force. That's why autumn leaves are always behind the leeward house. The unique anti-blocking design of Wellbar probe, coupled with the natural fall of gravity, prevents particles from entering. This design essentially prevents blocking and can generate a very stable low-pressure signal. (as shown in the figure)

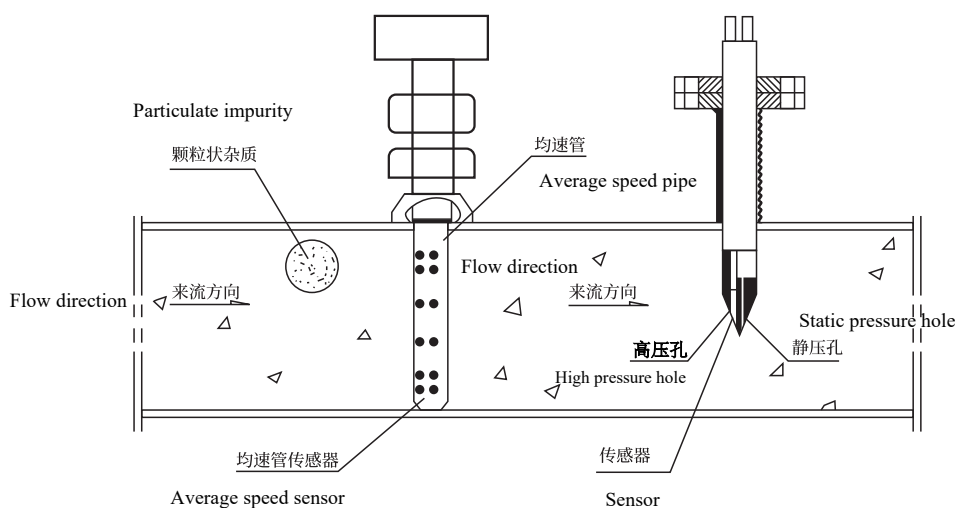


图3.6 Figure 3.6

连续工作的威尔巴从根本上杜绝了堵的可能，但是在以下情况下，仍要注意防堵：

The continuous work of Wellbar fundamentally eliminates the possibility of blocking, but in the following cases, attention should still be paid to blocking prevention:

1. 当引压管泄漏，探头高压平衡去遭到破坏，杂质中直径较小的颗粒就有可能进入取压孔。

When the pressure lead pipe leaks, the high-pressure balance of the probe will be destroyed, and particles with smaller diameter among impurities may enter the pressure tap hole.

2. 当管道处于停产时，由于分子的布朗运动，颗粒小的杂质有可能进入取压孔。

When the pipeline is shut down, due to the Brownian movement of molecules, impurities with small particles may enter the pressure tap hole.

3. 系统频繁开停机，在高压区形成的瞬间，颗粒小的杂质有可能进入取压孔，日积月累，就有可能造成探头的堵塞。

The system is frequently started and shut down. At the moment when the high-pressure zone is formed, impurities with small particles may enter the pressure tap hole, which may block the probe over time.

4. 介质中含有大量藻类生物，或者含有纤维状物质，也有可能造成探头的堵塞。

The medium contains a large number of algae or fibrous substances, which may also cause the blockage of the probe.

分类

Classification

我公司生产的YC-WEB系列一体化智能型威尔巴流量计。按用途可分为通用型和专用型两类。YC-WEB系列通用型一体化智能YC-WEB流量计有：小口径法兰安装型、悬臂型、高强度悬臂型。其结构型式与主要技术参数及应用范围见图1、图2、图3、图4。YC-WEB系列专用型一体化智能威尔巴流量计有：温度压力差压（流量）测量一体型、连续反吹型、不断流取出型。其结构型式与主要技术参数及应用范围见图5。以下就各种专用型一体化智能型威尔巴流量计作简要介绍。

YC-WEB series integrated intelligent Wellbar flowmeter produced by our company. According to the purpose, it can be divided into general and special type. YC-WEB series universal integrated intelligent YC-WEB flowmeter are: small-diameter flange mounting type, cantilever type and high-strength cantilever type. See Figure 1, Figure 2, Figure 3 and Figure 4 for its structure, main technical parameters and application scope. YC-WEB series of special-purpose integrated intelligent Wellbar flowmeter include: temperature, pressure and differential pressure (flow) measurement integrated type, continuous back-blowing type, and continuous flow taking-out type. Its structure, main technical parameters and application scope are shown in Figure 5. The following special-purpose integrated intelligent Wellbar flowmeter are briefly introduced.

1. 温度压力差压（流量）测量一体型，如图5所示。它是在通用型威尔巴流量计上，加装温度传感器、压力变送器构成。

The temperature and pressure differential pressure (flow) measurement integrated type, as shown in Figure 5. It is formed by adding a temperature sensor and a pressure transmitter to the general Wellbar flowmeter.

2. 连续反吹型如图4所示。它是在通用型威尔巴流量计上，加装连续反吹装置构成。

The continuous back blowing type is shown in Figure 4. It is formed by adding a continuous blowback device to the general Wellbar flowmeter.

3. 不断流取出型，如图5所示。它是在通用型威尔巴流量计上，加装不断流拆装装置构成。温压测量与补偿运算一体型。它是在威尔巴流量计上，加装具有温压补偿运算功能的智能差压变送器和温度传感器构成。其中，差压变送器具有差压测量、压力测量和温度测量及流量温压补偿运算。它适用于既需流量测量，又需温度或压力测量，或温度压力测量的高温高压液体，各种工况的气体 and 蒸汽测量。由此，可方便地在人工智能流量运算显示器中作被测介质流量的温压补偿。

The continuous flow type is shown in Figure 5. It is formed by adding a non-stop dismantling device to the general Wellbar flowmeter. Temperature and pressure measurement and compensation operation are integrated. It is formed by adding an intelligent differential pressure transmitter and a temperature sensor with the function of temperature and pressure compensation to the Wellbar flowmeter. Among them, the differential pressure transmitter has differential pressure, pressure, temperature and flow temperature and pressure correction operation. It is suitable for the measurement of high-temperature and high-pressure liquid, gas and steam under various working conditions, which requires both flow and temperature or pressure measurement. Therefore, the temperature and pressure compensation of the measured medium flow can be conveniently performed in the artificial intelligence flow calculation display.

最佳应用场合

The Best Application Occasions

通用型：适用于要求低阻损（低运行费用）、大管道、方形、矩形和其它异形管道流体流量测量。

General type: it is suitable for fluid flow measurement of large pipes, square pipes, rectangular pipes and other special-shaped pipes that require low resistance loss (low running cost).

如电厂锅炉引送风流量、除尘气体流量、冶金企业的高炉热风炉助燃空气流量等大型管道流量测量。

For example, the flow rate of boiler induced air in power plant, dedusting gas and combustion-supporting air in blast furnace hot-blast stove in metallurgical enterprises and other large-scale pipeline flows are measured.

温度压力差压（流量）测量一体型：适用于既需流量测量，又需温度或压力测量，或温度压力测量的高温高压液体，各种工况的气体 and 蒸汽流量测量。由此，可方便地在人工智能流量运算显示器中作被测介质流量的温压补偿。所以特别适用于单位之间的蒸汽流量和各种气体流量结算计量，锅炉蒸汽产量计量。

Temperature differential pressure (flow) measurement integrated type: it is suitable for measuring the flow of high-temperature and high-pressure liquid, gas and steam under various working conditions, which requires both flow measurement, temperature or pressure measurement or temperature and pressure measurement. Therefore, the temperature and pressure compensation of the measured medium flow can be conveniently performed in the

artificial intelligence flow calculation display. Therefore, it is especially suitable for the settlement measurement of steam flow and various gas flows between units and the measurement of boiler steam output.

连续反吹型：特别适用于高含尘气体的流量测量，如：转炉煤气、高炉煤气、焦炉煤气、发生炉煤气、烧结烟气、除尘气体以及过程气(汽)体等的流量测量和高含悬浮物液体的流量测量。

Continuous back blowing type: especially suitable for the flow measurement of high dust-laden gases, such as converter gas, blast furnace gas, coke oven gas, producer gas, sintering flue gas, dedusting gas, process gas (steam) and liquid with high suspended solids.

隔离型：适用于高温高黏度和高腐蚀性液体的测量和易结晶、易堵塞、易腐蚀的气(汽)体的流量测量。

Isolation type: it is suitable for the measurement of high temperature, high viscosity and high corrosive liquid and the flow measurement of gas (steam) which is easy to crystallize, block and corrode.

不断流取出型：在生产过程进行中，当均速管流量计被堵塞时可在线拆除清洗和安装，而不中断被测流体输送，所以适用于连续反吹型均速管流量计适用的所有场合。

Continuous flow-out type: during the production process, when the averaging pipe flowmeter is blocked, it can be dismantled, cleaned and installed online without interrupting the transmission of the measured fluid, so it is suitable for all occasions where the continuous back-blowing averaging pipe flowmeter is applicable.

我公司有完善的均速管流量计生产设备和先进的检查、测试、试验和标定装置。其中高精度现代化的流量仪表标定装置，除标定我公司生产的流量仪表外，还承接各单位的各种流量仪表的检修与标定工作。

Our company has perfect production equipment and advanced inspection, testing and calibration devices for averaging pipe flowmeter. Among them, the high-precision modern flow meter calibration device not only calibrates the flow meters produced by our company, but also undertakes the maintenance and calibration of various flow meters from different companies.

结构型式及应用范围

Structure Type and Application Scope

91 型 - 小口径法兰安装型一体化威尔巴流量计

91 Type - Small-diameter flange-mounted integrated Wellbar flowmeter

工作压力: $\leq 6\text{Mpa}$

Working pressure: $\leq 6\text{Mpa}$

工作温度: $\leq 315^{\circ}\text{C}$

Operating temperature: $\leq 315^{\circ}\text{C}$

公称通径: 15 ~ 100mm

Nominal diameter: 15 ~ 100mm

适用范围: 高温、高压、高流速、低压损液体、气体和蒸汽以及低含尘气体和含悬浮物少的液体的流量测量。

Scope of application: Flow measurement of high temperature, high pressure, high flow rate, low pressure loss liquid, gas and steam, low dust gas and liquid with little suspended matter.

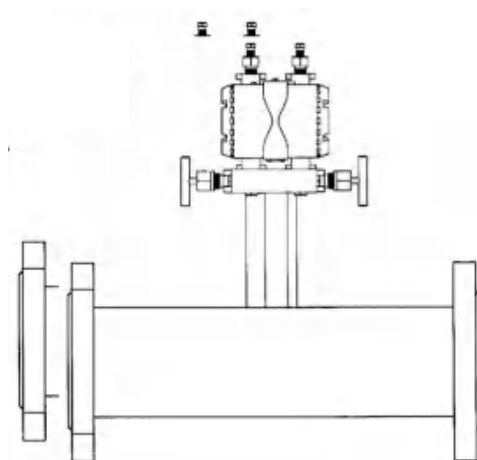


图3.7 Figure 3.7

92 型 - 悬臂型一体化威尔巴流量计 92 Type - Cantilever integrated Wellbar flowmeter

安装方式：卡套安装、法兰安装

Installation method: clamp sleeve and flange installation

卡套安装：

Clamping sleeve installation:

工作压力：≤1.6Mpa；工作温度：≤100℃

Working pressure: ≤ 1.6Mpa; Working temperature: ≤100℃

法兰安装：

Flange installation:

工作压力：≤40Mpa；工作温度：≤560℃

Working pressure: ≤ 40Mpa; Operating temperature: ≤560℃

公称通径：100 ~ 600mm

Nominal diameter: 100 ~ 600mm

检测杆直径：28mm

Measuring rod diameter: 28mm

安装座开孔直径：38mm

Opening diameter of mounting seat: 38mm

适用范围：高温、高压、高流速、低压损液体、气体和蒸汽以及低含尘气体和含悬浮物少的液体的流量测量。

Scope of application: Flow measurement of high temperature, high pressure, high flow rate, low pressure loss liquid, gas and steam, low dust gas and liquid with little suspended matter.

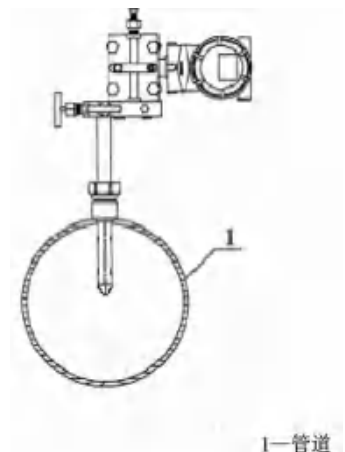


图4.1 Figure 4.1 1 - Pipeline

温度压力流量测量一体化威尔巴流量计

Temperature and flow measurement integrated Wellbar flowmeter

构成：它由 91 型、92 型、等通用型均速管流量传感器改装而成。它是在通用型均速管流量变换器上，加装温度传感器、压力变送器构成。

Composition: It is modified from 91 type, 92 type, and other general averaging pipe flow sensors. It is formed by adding a temperature sensor and a pressure transmitter to a general type flow converter with an averaging pipe.

特点：温度、压力和流量等三参数测量一体化。

Features: The measurement of three parameters, temperature, pressure and flow, is integrated.

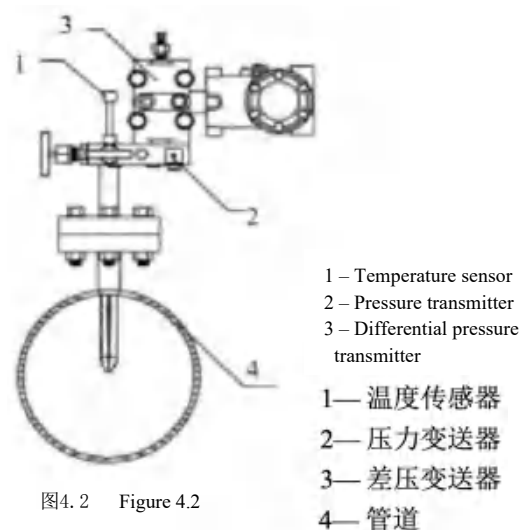


图4.2 Figure 4.2

1 - Temperature sensor
2 - Pressure transmitter
3 - Differential pressure transmitter

1—温度传感器
2—压力变送器
3—差压变送器
4—管道

适用范围：适用于既需流量测量，又需温度或压力测量，或温度压力测量的高温高压液体，各种工况的气体 and 蒸汽测量。由此，可方便地在人工智能流量运算显示器中作被测介质流量的温压补偿。

Scope of application: It is applicable to the measurement of high-temperature and high-pressure liquid, gas and steam under various working conditions, which requires both flow measurement and temperature or pressure measurement, or temperature and pressure measurement. Therefore, the temperature and pressure compensation of the measured medium flow can be conveniently performed in the artificial intelligence flow calculation display.

连续反吹型一体化威尔巴流量计

Continuous blowing integrated Wellbar flowmeter

构成：它由威尔巴流量传感器改装而成。它是在通用型均速管流量变换器上，加装连续反吹装置构成。

Composition: It is modified from Wellbar flow sensor. It is formed by adding a continuous back-blowing device to a general type flow converter with averaging pipes.

特点：消除了引压管路堵塞，保证了系统长期稳定可靠地运行，确保了测量精度。

Features: It eliminates the blockage of the pressure-leading pipeline, ensures the long-term stable and reliable operation of the system, and also ensures the measurement accuracy.

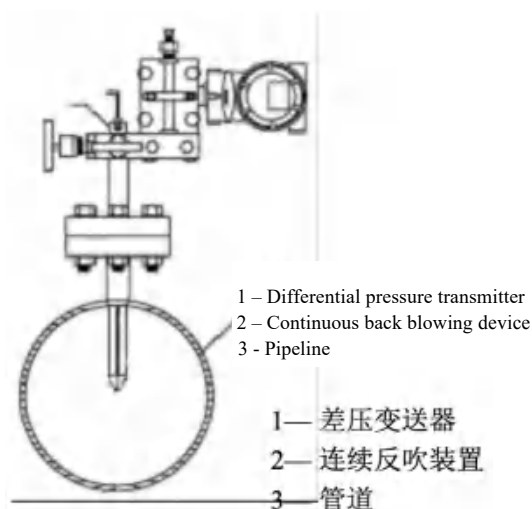


图4.3 Figure 4.3

适用范围：用于转炉煤气、高炉煤气、焦炉煤气、发生炉煤气烧结烟气、除尘气体以及过程气（汽）体等高含尘气体的测量和高含悬浮物液体的测量。

Scope of application: It is used for the measurement of converter gas, blast furnace gas, coke furnace gas, producer gas, sintering flue gas, dedusting gas, process gas (steam) and other high dust-containing gases and the measurement of liquid with high suspended solids.

不断流取出型一体化威尔巴流量计

Continuous flow-out integrated Wellbar flowmeter

93 型构成：威尔巴流量计改装而成。它是在均速管流量计上加装不断流拆装装置构成。

93 Type composition: the Wellbar flowmeter is modified. It is formed by adding a non-stop dismantling device to the flowmeter of the averaging pipe.

特点：可在生产过程进行中，取出检修和安装。

Features: It can be taken out for maintenance and installation during the production process.

适用范围：适用于含尘气体含泥沙或悬浮物的液体的流量测量。

Scope of application: It is applicable to the flow measurement of dusty gas and liquid containing sediment or suspended solids.

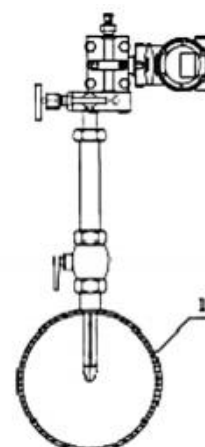


图5.1 Figure 5.1

1—管道
1 - Pipeline

温压测量与补偿运算一体型威尔巴流量计

Temperature and pressure measurement and compensation operation integrated Wellbar flowmeter

构成：它是在威尔巴流量传感器上，加装具有温度压力差压测量与温压补偿运算功能的智能差压变送器和温度传感器构成。

Composition: It is composed of adding an intelligent differential pressure transmitter and a temperature sensor with the functions of temperature and pressure differential pressure measurement and temperature and pressure compensation calculation to the Wellbar flow sensor.

特点：集温度传感器、压力变送器、均速管流量传感器、差压变送器和三阀组于一体。它具有温度压力和流量测量与显示功能，以及温压补偿运算和通讯功能。

Features: It integrates temperature sensor, pressure transmitter, flow sensor of equalizing pipe, differential pressure transmitter and 3 valves manifold. It has the functions of temperature, pressure and flow measurement and display, temperature and pressure compensation calculation and communication.

适用范围：适用于既需流量测量，又需温度或压力测量以及温度压力测量的高温高压液体、各种工况的气体和蒸汽测量。由此，可方便地在人工智能流量运算显示器中作被测介质流量的温压补偿。

Scope of application: It is applicable to the measurement of high-temperature and high-pressure liquid, gas and steam under various working conditions, which requires both flow measurement, temperature or pressure

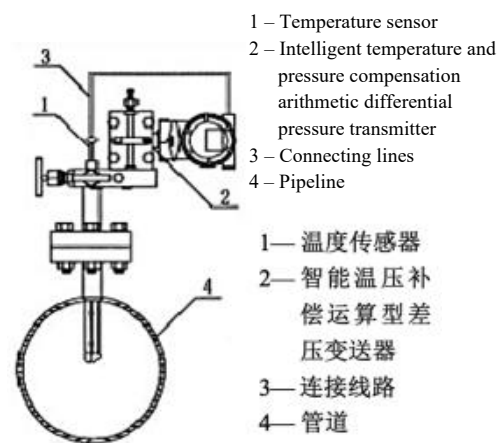


图5.2 Figure 5.2

1 - Temperature sensor
2 - Intelligent temperature and pressure compensation arithmetic differential pressure transmitter
3 - Connecting lines
4 - Pipeline
1—温度传感器
2—智能温压补偿运算型差压变送器
3—连接线路
4—管道

measurement and temperature and pressure measurement. Therefore, the temperature and pressure compensation of the measured medium flow can be conveniently performed in the artificial intelligence flow calculation display.

YC-WEB 威尔巴流量计仪表选型

YC-WEB Wellbar Flowmeter Instrument Selection

项目 Item	代码 Code	含义 Meanings
威尔巴流量计 Wellbar flowmeter	YC-WEB	
A: 差压变送器类型选择 Differential pressure transmitter type selection	1 2 3	非智能型 Nonintelligent type 智能型 Intelligent type 智能温压测量与补偿运算型 Intelligent temperature and pressure measurement and compensation operation type
B: 结构形式 Structural form	1 2 3 4 5	91 小口径法兰安装型 Small-size flange mounting type 92 悬臂型 Cantilever type 93 不断流在线安装型 Continuous flow online installation type 94 高强度悬臂型 High strength cantilever type 95 高强度支撑型 High strength support type
C: 测量种类选择 Measurement type selection	1 2 3 4	流量测量 Flow measurement 流量压力测量 Flow pressure measurement 流量温度测量 Flow temperature measurement 流量压力温度测量 Flow pressure and temperature measurement
E: 反吹功能选择 Blowback function selection	1 2	不带反吹装置 Without blowback device 带反吹装置 With blowback device
F: 安装方式 Installation mode	1	卡套式

	2	Clamping type 法兰式 Flange type
G: 差压变送器安装方式 Installation mode of differential pressure transmitter	1	一体式（直接安装在威尔巴顶端） Integrated type (directly installed at the top of Wellbar)
	2	分体式（与均速管分离安装） Split type (installed separately from the averaging pipe)
H: 被测流体管道几何形状 Geometric shape of measured fluid pipeline	1	圆形管道 Circular pipeline
	2	矩形管道 Rectangular pipe
	3	正方形管道 Square pipe
	4	其他几何形状 Other geometric shapes
I: 取出方式选择 Selection of extraction method	1	断流取出型 Cut-out type
	2	不断流取出型 Continuous flow type
J: 防爆等级 Explosion proof grade	0	非防爆型 Non-explosion proof type
	1	本安防爆型 Intrinsically explosion-proof type
	2	隔离防爆型 Isolation explosion-proof type
K: 防腐选择 Anticorrosion selection	0	非防腐型 Non-anticorrosion type
	1	防腐型※ Anti-corrosion type ※
L: 操作温度范围 Operating temperature range	1	0~100°C
	2	100 ~ 300°C
	3	300 ~ 450°C
	4	450 ~ 560°C
M: 操作压力范围 Operating pressure range	1	-0.1~ 1.6Mpa
	2	1.6 ~ 6.0Mpa
	3	6.0 ~ 25Mpa
	4	25 ~ 40Mpa
D: 被测流体管道尺寸 Size of the measured fluid pipeline		管道外径×管壁厚度（mm） Outside diameter of pipeline × wall thickness (mm)

安装注意事项

Precautions for Installation

[1] 首先介绍威尔巴流量计的安装要求。

Firstly, the installation requirements of Wellbar flowmeter are introduced.

这种流量计可以安装在管道的任何平面上（水平、垂直和倾斜等），在安装中需考虑测量介质对引压管线的影响。

This flowmeter can be installed on any plane of the pipeline (horizontal, vertical and inclined, etc.), and the influence of the measuring medium on the pressure pipeline should be considered during installation.

1) 测液体的流量。对于垂直管道，流量计可安装在管道水平面，沿周围 360° 的任何位置上。而对于水平管道，流量计的引压接头必须位于管道中心线以下，如图 6.1 所示。

Measure the flow of liquid. For vertical pipelines, the flowmeter can be installed at any position along the 360° around the horizontal plane of the pipeline. For horizontal pipelines, the pressure tap of the flowmeter must be located below the centerline of the pipeline, as shown in Figure 6.1.

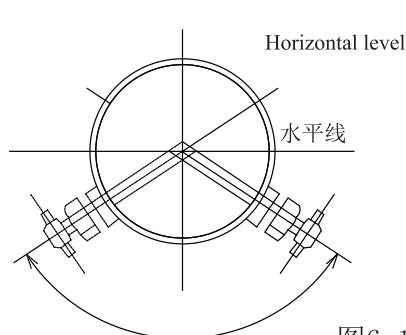


图6.1

Figure 6.1

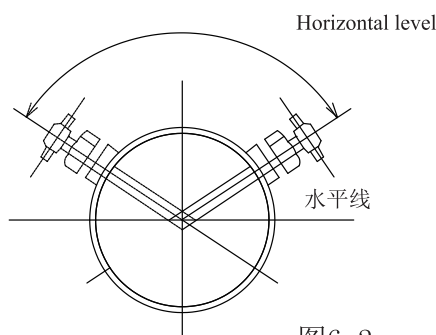


图6.2

Figure 6.2

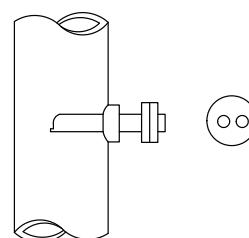


图6.3

Figure 6.3

2) 测气体的流量。对于垂直管道，流量计可安装在管道水平面，沿周围 360° 的任何位置上。而对于水平管道，流量计的引压接头必须位于管道中心线以上，如图 6.2 所示。

Measure the gas flow. For vertical pipelines, the flowmeter can be installed at any position along the 360° around the horizontal plane of the pipeline. For horizontal pipelines, the pressure connection of flowmeter must be located above the center line of the pipeline, as shown in Figure 6.2.

3) 测蒸汽的流量。对于垂直管道，流量计可安装在沿管道周围的水平面上，应注意两个正负压引压接头应处于同一个水平面上，如图 6.3 所示。

Measure the flow of steam. For vertical pipelines, the flowmeter can be installed on the horizontal plane around the pipeline, and it should be noted that the two positive and negative pressure taps should be on the same horizontal plane, as shown in Figure 6.3.

传感器与差压计（差压变送器）

Sensor and differential pressure gauge (differential pressure transmitter)

下面以 YC-WEB 的安装为例介绍安装步骤。

Take the installation of YC-WEB as an example to introduce the installation steps.

在管道上焊一个直径为 45mm，长为 100mm 的短管（见图 6.4）。短管的轴线应垂直于管道轴线。

Weld a short pipe with a diameter of 45mm and a length of 100mm on the pipeline (see Figure 6.4). The axis of the pipe shall be perpendicular to the pipeline axis.

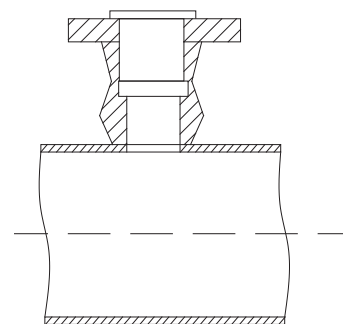


图6.4 Figure 6.4

将法兰安装座颈部对准短管，调整其位置使其法兰上的流向箭头指向流体流动方向，并使其轴线垂直于管道轴线。把法兰安装座焊在短管上。

Align the neck of flange mounting seat with the short pipe, and adjust its position so that the flow arrow on the flange points to the direction of fluid flow, and its axis is perpendicular to the pipeline axis. Weld the flange mounting seat on the short pipe.

与同类产品相比较

Compared with Similar Products

YC-WEB 威尔巴和孔板相比能保持长期的高精度。威尔巴长期精度高。

Compared with orifice plate, YC-WEB Wellbar can keep high precision for a long time. Wellbar has high long-term accuracy.

◆ 不受磨损、杂质和油脂的影响。
Not affected by abrasion, impurities and grease.

◆ 没有可以活动的部件。
No movable parts.

◆ 一体化结构避免了高低腔室之间的信号渗漏。
The integrated structure avoids signal leakage between high and low chambers.

◆ 孔板长期精度差。
Long-term accuracy difference of orifice plate.

◆ 孔板使用时间一长，精度会急剧下降，需要进行定期检测和清洗。
The accuracy of the orifice plate will drop sharply as it is used for a long time, so it needs to be tested and cleaned regularly.

◆ 导致孔板精度下降的部分因素参看右图。

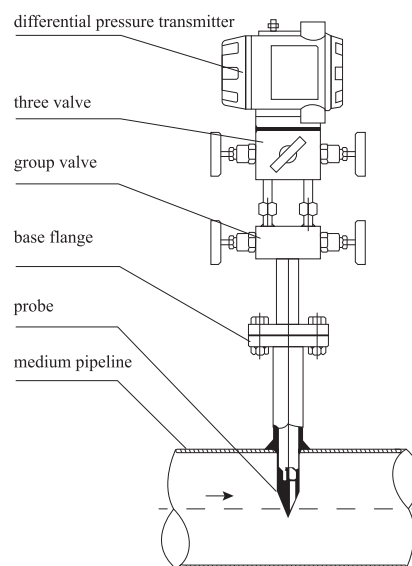


图7.1 Figure 7.1

See the figure on the right for some factors that cause the accuracy of orifice plate to decrease.

孔板测试结果

Orifice plate test results

美国 Fiorida Gas Transmisson Company 进行了一项实验，测量各种因数对孔板所导致的精度损失。

(图 7.2)

Fiorida Gas Transmisson Company of the United States conducted an experiment to measure the precision loss caused by various factors on orifice plates. (Figure 7.2)

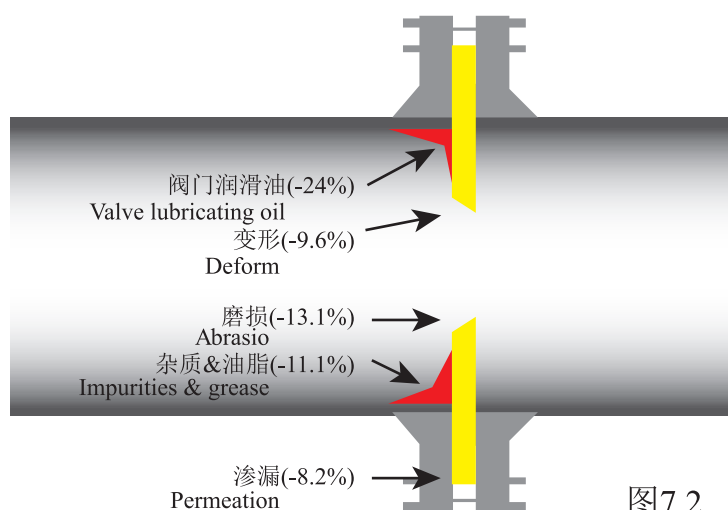


图7.2
Figure7.2

Some test results are as follows:

条件 Conditions	Error (%) 误差 (%)
边缘磨损: Edge abrasion:	
0.254mm	-2.2
0.508mm	-4.5
1.27mm	-13.1
杂质和油脂沉淀 Impurities and grease deposits	-11.1
两边的阀门润滑油 Valve lubricating oil on both sides	-24.0
垫片周围的渗漏 Leakage around gasket	-8.2
边缘变形 Edge deformation	-9.6

YC-WEB 威尔巴和孔板相比节省了大量的安装费用。

Compared with orifice plate, YC-WEB Wellbar saves a lot of installation cost.

威尔巴在安装过程中，只需要进行简单的焊接，焊接的工作量从几厘米到十几厘米不等，基本上与管道直径的大小无关。相比孔板需要一个 2 倍管道圆周的焊接所需的费用小的多。

During the installation process of Wellbar, only simple welding is needed, and the welding workload ranges from several centimeters to more than ten centimeters, which basically has nothing to do with the diameter of the pipeline. Compared with the orifice plate, the cost of welding which requires twice the circumference of the pipe is much smaller.

例如，在 DN250 的管道上安装威尔巴，只需进行 4.5cm 的焊接；同样的管道，安装孔板则需要进行 160cm 的焊接，相比之下威尔巴至少节约 60% 的安装费用。下图显示的为威尔巴和孔板的安装费用比较，不难看出管径越大，威尔巴在安装上节约的费用越多。(图 7.3、7.4)

For example, to install Wellbar on the pipe of DN250, only 4.5cm welding is required; For the same pipeline, 160cm welding is required to install the orifice plate, compared with Wellbar, which saves at least 60% of the installation cost. The figure below shows the comparison of installation costs between Wellbar and orifice plate. It is not difficult to see that the larger the pipe diameter, the more cost Wellbar will save in installation. (Figures 7.3 and 7.4)

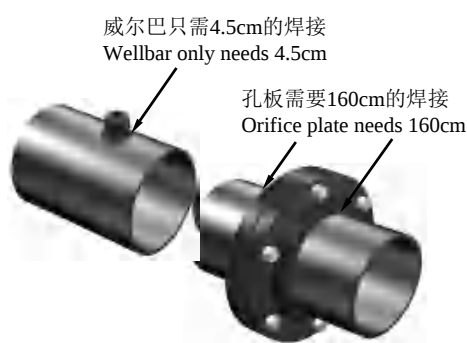
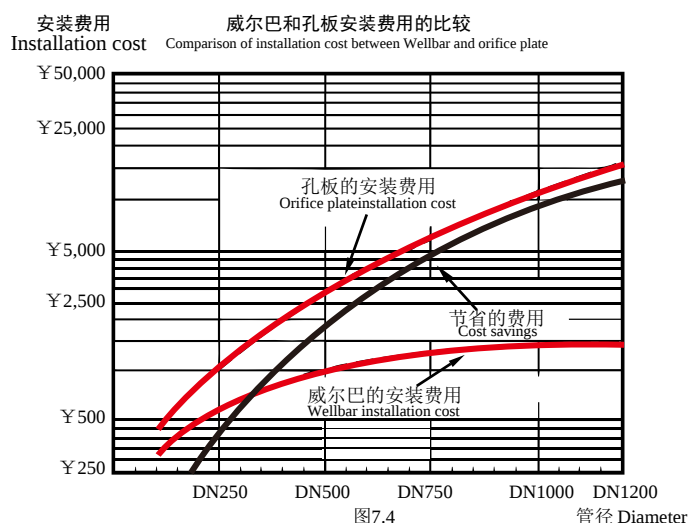


图7.3
Figure 7.3



YC-WEB 威尔巴和孔板相比节省了大量的运行费用。

Compared with orifice plate, YC-WEB Wellbar saves a lot of running cost.

同孔板相比威尔巴的长期运行费用非常低，投入运行一年所节省的电费就可以收回采购成本。

Compared with orifice plate, the long-term running cost of Wellbar is very low, and the electricity cost saved after one year's operation can recover the purchasing cost.

威尔巴采用非收缩节流设计，比孔板的永久压损至少低了 95% 以上，是一种高效、节能的均速流量探头。下面图表显示了在不同的管径下，不同的介质测量中，威尔巴比孔板每运行一年所节省的电费以及所减小的额外功率开销。(图 7.5、7.6)

Wellbar adopts non-contraction throttling design, which is at least 95% lower than the permanent pressure loss of orifice plate. It is an efficient and energy-saving average flow probe. The following figure shows the electricity cost saved and the extra power cost reduced by Wellbar orifice plate every year in different pipe diameters and different media measurements. (Figures 7.5 and 7.6)

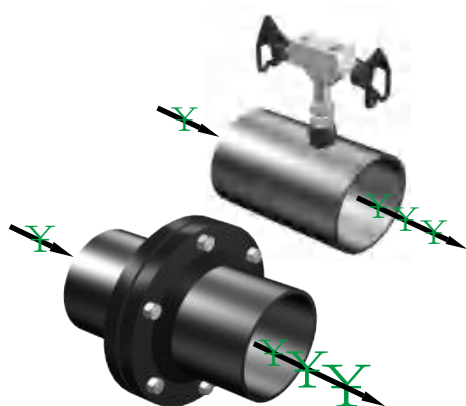


图 7.5
Figure 7.5

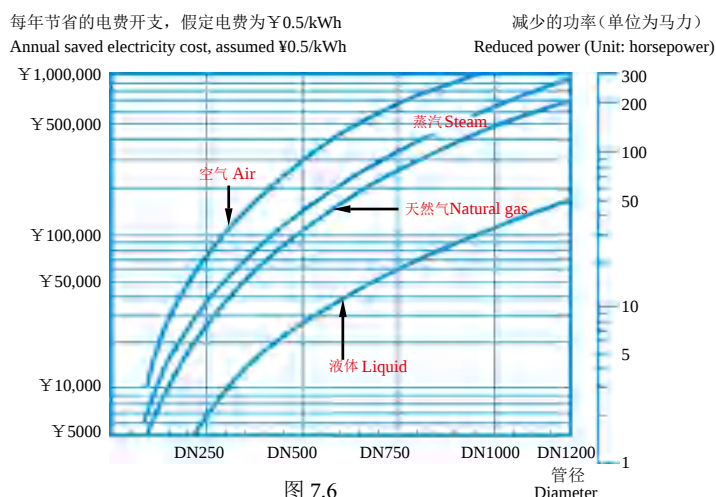


图 7.6
Figure 7.6

YC-WEB 威尔巴与孔板压损比较

Comparison of pressure loss between YC-WEB Wellbar and orifice plate

节流式流量计是一种典型的差压式流量计，是目前工业生产中用来测量气体、液体和蒸汽流量最常用的一种流量计。

Throttle flowmeter is a typical differential pressure flowmeter, which is the most commonly used flowmeter to measure the flow of gas, liquid and steam in industrial production.

其测量的理论基础是：在充满流体的管道中，固定放置一个流通面积小于管道截面积的阻力件（节流件），则管道内流体在通过该节流件时就会造成局部收缩，在收缩处流速增加，静压力降低，因此，在节流件前后将产生一定的压力差。对于一定形状和尺寸的节流件，一定的测压位置和前后直管段、一定的流体参数情况下，节流件前后的差压 ΔP 与流量 Q 之间关系符合伯努利方程。

The theoretical basis of the measurement is that when a resistance piece (throttle element) with a flow area smaller than the cross-sectional area of the pipe is fixedly placed in a pipe filled with fluid, the fluid in the pipe will cause local contraction when passing through the throttle element, and the flow rate will increase and the static pressure will decrease at the contraction place, so a certain pressure difference will be generated at the upstream and downstream of the throttle element. For a certain shape and size of throttle element, a certain pressure measuring position, upstream and downstream straight pipe sections, and certain fluid parameters, the relationship between the upstream and downstream of the throttle element differential pressure ΔP and the flow rate Q accords with Bernoulli equation.

这种流量计不可避免会在管道中产生永久压损，以孔板为例，其流体压力损失的在主要原因是孔板前后涡流的形成以及流体的沿程摩擦，它使得流体具有的总机械能的一部分不可逆转地变成了热能，消失在流体内部。人们采用了喷嘴、文丘里管等节流件，以尽量减少节流件前后的涡流区，进而减少流体的压力损失。

This kind of flowmeter will inevitably produce permanent pressure loss in the pipeline. Taking the orifice plate as an example, the main reason of the fluid pressure loss is the formation of vortex upstream and downstream of the orifice plate and the friction of the fluid along the way, which makes a part of the total mechanical energy of the fluid irreversibly become heat energy and disappear into the fluid. Throttles, such as nozzles and venturi tubes, are used to minimize the vortex area upstream and downstream of the throttles, thus reducing the pressure loss of the fluid.

威尔巴流量计采用了双孤型设计，使得其不仅使流量测量保持了高精度、高强度和大量量程比，还使得管道压损大大降低。

Wellbar flowmeter adopts double-isolated design, which not only keeps high accuracy, high strength and large range ratio for flow measurement, but also greatly reduces the pressure loss of pipeline.

威尔巴和孔板的压损比较；

Comparison of pressure loss between Wellbar and orifice plate;

孔板压损的经验公式：

Empirical formula of pressure loss of orifice plate:

当 $\beta=0.6$ 时， $PPLo=0.6 \times \Delta P$

When $\beta=0.6$, $PPLo=0.6 \times \Delta P$

当 $\beta=0.7$ 时， $PPLo=0.5 \times \Delta P$

When $\beta=0.7$, $PPLo=0.5 \times \Delta P$

其中：

Among them:

β - 孔板的孔径比

β - Diameter ratio of orifice plate

ΔP - 孔板产生的差压

ΔP - Differential pressure generated by orifice plate

PPLo - 孔板产生的压损

PPLo - Pressure loss caused by orifice plate

标准喷嘴压损大约为： $PPLn=0.28 \times \Delta P \sim 0.33 \times \Delta P$

The standard nozzle pressure loss is about: $PPLn = 0.28 \times \Delta P \sim 0.33 \times \Delta P$

通过实验可以得出，威尔巴的压损大约为 $PPLv=0.03 \times \Delta P$

According to the experiment, the pressure loss of Wellbar is about $PPLv = 0.03 \times \Delta P$

由于威尔巴的差压 ΔP 与孔板的差压 ΔP 小一个数量级，而压损的比例又小了一个数量级，所以威尔巴的压损和孔板的压损相比微乎其微的。

Due to Wellbar's differential pressure ΔP differential pressure with orifice ΔP is one order of magnitude smaller, and the proportion of pressure loss is one order of magnitude smaller, so the pressure loss of Wellbar is very small compared with that of orifice plate.

下面我们将压力损失的表达式写出来：

The expression of pressure loss below:

节流件压损带来的功率损失，其计算表达式为：

The calculation expression of power loss caused by throttling pressure loss is:

$$H_p = Q \times PPL$$

其中：Q - 流体体积流量 PPL - 节流件产生的压损

Where: Q - Fluid volume flow PPL - Pressure loss caused by throttling element

假设为了弥补节流件带来的不可恢复的压损，我们在其后增加一台压力泵，该泵的效率假定为 η 。

Suppose that in order to make up for the unrecoverable pressure loss caused by the throttle piece, we add a pressure pump afterwards, and the efficiency of this pump is assumed to be η .

$$\text{则: } H_p = Q \times PPL \div \eta$$

$$\text{Then: } H_p = Q \times PPL \div \eta$$

其中：Q - 流体体积流量， AM^3/S

In which: Q - Fluid volume flow rate, AM^3/S

PPL - 节流件产生的压损 Kpa

PPL - Pressure loss Kpa caused by throttle element

η - 电动机效率 无量纲常数

η - Motor efficiency Dimensionless constant

H_p - 功率损失 KW

H_p - power loss KW

举例说明 1：以气体测量为例

Example 1: Gas measurement

假设一测点，测量介质为空气，管径为 $\phi 377 \times 5\text{mm}$ ，压力为 7KpaG，温度为 450°C，密度为 $1.293\text{Kg}/\text{NM}^3$ ，流量为 $2970\text{NM}^3/\text{H}$ 时，威尔巴所产生的差压为 0.202Kpa。威尔巴所产生的压损：

$$PPL = 0.03 \times 0.202 = 6.060 \times \text{换算成工况流量 } Q_0 = 2.403\text{M}^3/\text{S} \quad (723.15\text{K}, 108.32\text{KpaA})$$

Assuming a measuring point, the measuring medium is air, pipe diameter is $\phi 377 \times 5\text{mm}$, pressure is 7KpaG, temperature is 450°C, density is $1.293\text{Kg}/\text{NM}^3$, and the flow rate is $2970\text{NM}^3/\text{H}$, the differential pressure produced by Wellbar is 0.202Kpa. Pressure loss caused by Wellbar: $PPL = 0.03 \times 0.202 = 6.060 \times$ Converted into working condition flow $Q_0 = 2.403\text{M}^3/\text{S} \quad (723.15\text{K}, 108.32\text{KpaA})$

假设电动机效率 $\eta=0.8$

Assume the motor efficiency $\eta=0.8$

则：威尔巴损失的功率为 $H\eta=2.043 \times 6.060 \times 10^{-3} \div 0.8=0.015(\text{KW})$

Then: the power loss by Wellbar is $H\eta = 2.043 \times 6.060 \times 10^{-3} \div 0.8 = 0.015 (\text{KW})$

假如一年运行 365 天，每天运行 24 小时，每度电电费为 0.8 元，那么一年威尔巴的能耗换算成电费：

If it runs 365 days a year, 24 hours a day, and the electricity cost per kilowatt-hour is 0.8 yuan, then the energy consumption of Wellbar in a year is converted into electricity cost:

$\text{¥/年} = 365 \times 24 \times 0.015 \times 0.8 = 105 \text{ ¥/年}$

$\text{¥/year} = 365 \times 24 \times 0.015 \times 0.8 = 105 \text{ ¥/year}$

假设另一相同测点使用孔板测量，同样条件下孔板的压差为 1Kpa，孔板的 $\beta = 0.7$ ，孔板所产生的压损：
 $\text{PPLo}=0.5 \times 1=0.5 \text{ Kpa}$ 。

Assuming that another same measuring point is measured by orifice plate, under the same conditions, the pressure difference of orifice plate is 1Kpa, orifice plate $\beta = 0.7$, and the pressure loss caused by orifice plate is $\text{PPLo} = 0.5 \times 1 = 0.5 \text{ kPa}$.

根据上述公式，孔板损失的功率为：

According to the above formula, the power loss by orifice plate is:

$\text{Hp}=2.043 \times 0.5 \div 0.8=1.277(\text{KW})$

一年运行 365 天，每天运行 24 小时，每度电电费为 0.8 元，那么孔板一年的能耗换算成电费： $\text{¥/年} = 365 \times 24 \times 1.277 \times 0.8 = 8949 \text{ ¥/年}$ 。

It runs 365 days a year, 24 hours a day, and the electricity cost per kilowatt-hour is 0.8 yuan, so the annual energy consumption of orifice plate is converted into electricity cost: $\text{¥/year} = 365 \times 24 \times 1.277 \times 0.8 = 8,949 \text{ ¥/year}$.

每运行一年，威尔巴比孔板节省的运行费用为： $8949-105=8844 \text{ ¥/年}$

For each year of operation, the cost saved by Wellbar orifice is: $8949-105 = 8844 \text{ ¥/year}$.

假设举例说明二：以液体测量为例

Example 2: Liquid measurement

假设一测点，其测量介质为水，管径为 $\phi 273 \times 8 \text{ mm}$ ，压力为 440KPaG，温度为 33°C，密度为 $1.0 \times 10^3 \text{ KG/NM}^3$ ，流量为 400T/H 时威尔巴所产生的差压为 4.070Kpa。

Assuming a measuring point, the measuring medium is water, diameter of which is $\phi 273 \times 8 \text{ mm}$, pressure is 440KPaG, temperature is 33°C, density is $1.0 \times 10^3 \text{ KG/NM}^3$, and the flow rate is 400T/H, the differential pressure produced by Wellbar is 4.070Kpa.

根据上述公式，功率损失： $\text{Hp}=Q \times \text{PPL} \div \eta$

According to the above formula, power loss: $\text{Hp}=Q \times \text{PPL} \div \eta$

因温度、压力对液体的体积影响不大，水的密度为 $1.0 \times 10^3 \text{ KG/NM}^3$ ，所以可认为工况下（440KpaG, 33°C）介质体积流量为：

As temperature and pressure have little influence on the volume of liquid, and the density of water is $1.0 \times 10^3 \text{ KG/NM}^3$, it can be considered that the volume flow rate of medium under working condition (440KpaG, 33°C) is:

因为：体积流量=质量流量/介质密度

Since volume flow rate = mass flow rate / medium density

所以： $Q=400\text{M}^3/\text{H}=0.111 \text{ M}^3/\text{S}$ (440KpaG, 33°C)

So $Q=400\text{M}^3/\text{H}=0.111 \text{ M}^3/\text{S}$ (440KpaG, 33°C)

假设电动机效率为 $\eta=0.8$

Suppose the motor efficiency is $\eta=0.8$.

则：威尔巴损失的功率为 $H_p=0.111 \times 0.122 \div 0.8=0.017(\text{KW})$

Then: the power loss by Wellbar is $H_p=0.111 \times 0.122 \div 0.8=0.017(\text{KW})$

假如一年运行 365 天，每天运行 24 小时，每度电电费为 0.8 元，那么一年威尔巴的能耗换算成电费：

If it runs 365 days a year, 24 hours a day, and the electricity cost per kilowatt-hour is 0.8 yuan, then the energy consumption of Wellbar in a year is converted into electricity cost:

$\text{¥/年}=365 \times 24 \times 0.017 \times 0.8=119 \text{ ¥/年}$

$\text{¥/year}=365 \times 24 \times 0.017 \times 0.8=119 \text{ ¥/year}$

假设另一相同测点使用孔板测量，同样条件下孔板的压差为 20Kpa，孔板的 $\beta=0.7$ ，孔板产生的压损：

$\text{PPLo} = 0.5 \times 20 \times = 10.0 \text{ Kpa}$

Assuming that another same measuring point is measured by orifice plate, under the same conditions, the pressure difference of orifice plate is 20Kpa, orifice plate $\beta=0.7$, and the pressure loss caused by orifice plate is $\text{PPLo} = 0.5 \times 20 \times = 10.0\text{kpa}$.

根据上述公式，孔板损失的功率为：

According to the above formula, the power loss by orifice plate is:

$H_p=0.111 \times 10.0 \div 0.8=1.389(\text{KW})$

一年运行 365 天，每天运行 24 小时，每度电电费为 0.8 元，那么孔板一年的能耗换算成电费：¥/年

$=365 \times 24 \times 1.389 \times 0.8=9,734 \text{ ¥/年}$

It runs 365 days a year, 24 hours a day, and the electricity cost per kilowatt-hour is 0.8 yuan, so the annual energy consumption of orifice plate is converted into electricity cost: $\text{¥/year} = 365 \times 24 \times 1.389 \times 0.8=9,734 \text{ ¥/ year}$.

每运行一年，威尔巴比孔板节省的运行费用为：

For each year of operation, the operation cost saved by Wellbar orifice is:

$9734-119=9615 \text{ ¥/年}$

$934-119 = 9615 \text{ ¥/year}$

举例说明三：以蒸汽测量为例

Example 3: Steam measurement

假设一测点，其测量介质为过热蒸汽，管径为 $\phi 325 \times 13\text{mm}$ ，压力为 3900 KpaG，温度为 450°C，在此温度、压力下其蒸汽密度为 12.511 KG/NM³，介质流量为 50T/H 时威尔巴所产生的差压为 5.600KPa。

Assume that the measuring medium of a measuring point is superheated steam, with a diameter of $\phi 325 \times 13\text{mm}$, a pressure of 3900KpaG and a temperature of 450°C. Under this temperature and pressure, the steam density is 12.511 KG/NM³, and the differential pressure produced by Wellbar is 5.600KPa when the medium flow rate is 50T/H.

威尔巴所产生的压损： $\text{PPL}_v = 0.03 \times \Delta P = 0.03 \times 5600 = 0.618\text{Kpa}$

Pressure loss caused by Wellbar: $\text{PPL}_v = 0.03 \times \Delta P = 0.03 \times 5600 = 0.618\text{ Kpa}$

根据上述公式，功率损失： $H\Delta p = Q \times \text{PPL} \div \eta$

According to the above formula, power loss: $H\Delta p = Q \times \text{PPL} \div \eta$

因工况下过热蒸汽的密度为 12.511 KG/NM³，所以工况下（3900KpaG，450°C）介质体积流量为：

The density of superheated steam under working condition is 12.511 KG/NM³, so the volume flow rate of medium under working condition (3900KpaG, 450°C) is:

体积流量=质量流量/介质密度

Volume flow = mass flow / medium density

$Q = 3996.6\text{M}^3/\text{S}$ (3900KpaG, 450°C)

假设电动机效率 $\eta = 0.8$

Assume the motor efficiency $\eta = 0.8$

则：威尔巴损失的功率为 $H_p = 1.110 \times 0.168 \div 0.8 = 0.233(\text{KW})$

Then: the power lost by Wellbar is $H_p = 1.110 \times 0.168 \div 0.8 = 0.233(\text{KW})$

假如一年运行 365 天，每天运行 24 小时，每度电电费为 0.8 元，那么一年威尔巴的能耗换算成电费：

If it runs 365 days a year, 24 hours a day, and the electricity cost per kilowatt-hour is 0.8 yuan, then the energy consumption of Wellbar in a year is converted into electricity cost:

$\text{¥/年} = 365 \times 24 \times 0.233 \times 0.8 = 1633\text{¥/年}$

$\text{¥/year} = 365 \times 24 \times 0.233 \times 0.8 = 1633\text{¥/year}$

假设另一相同测点使用孔板测量，同样条件下孔板的压差为 30Kpa，孔板的 $\beta = 0.7$ ，孔板所产生的压损：

$\text{PPL}_o = 0.5 \times 30 = 15.0\text{ Kpa}$

Assuming that another same measuring point is measured by orifice plate, under the same conditions, the pressure difference of orifice plate is 30Kpa, orifice plate $\beta = 0.7$, and the pressure loss caused by orifice plate is

$\text{PPL}_o = 0.5 \times 30 = 15.0\text{ Kpa}$.

根据上述公式，孔板损失的功率为：

According to the above formula, the power loss by orifice plate is:

$$H_p = 1.111 \times 15.0 \div 0.8 = 20.813 (\text{KW})$$

一年运行 365 天，每天运行 24 小时，每度电电费为 0.8 元，那么孔板一年的能耗换算成电费：

If it runs 365 days a year, 24 hours a day, the electricity cost per kilowatt-hour is 0.8 yuan, so the energy consumption of orifice plate in a year is converted into electricity cost:

$$\text{¥/年} = 365 \times 24 \times 20.813 \times 0.8 = 145,858 \text{ ¥/年}$$

$$\text{¥/year} = 365 \times 24 \times 20.813 \times 0.8 = 145,858 \text{ ¥/year.}$$

每运行一年，威尔巴比孔板节省的运行费用为：145,858 - 1,633 = 144,225 ¥/年

For each year of operation, the operation cost saved by Wellbar orifice is: 145,858 - 1633 = 144,225 ¥/year.

由以上可以看出，使用威尔巴流量探头与使用孔板相比，每年为了弥补节流件带来的不可恢复的压损所耗费的财力是微乎其微的，其经济效益非常明显，间接的社会效益也十分显著。

It can be seen from the above that compared with orifice plate, the annual financial cost of using Wellbar orifice plate to make up for the unrecoverable pressure loss caused by throttle piece is very small, and its economic benefits are very obvious, as well as its indirect social benefits.

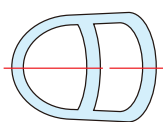
流量特征杜比一览表

Flow Characteristics Dolby List

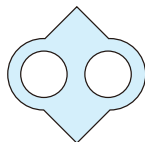
名称 Name	托巴流量计 Toba flowmeter	阿牛巴流量计 Annubar flowmeter	阿里巴流量计 Ariba flowmeter	迪尔巴流量计 Dilba flowmeter	德尔塔巴流量计 Delta bar flowmeter	毕托巴流量计 Bitoba flowmeter	威尔巴流量计 Wellbar flowmeter
探头类型 Probe type	圆形 Circular	菱形 Diamond	椭圆形 Ellipse	弹头型 Bullet shape	双龟型 Double turtle type	对称型 Symmetry type	对称型 Symmetry type
输出差压信号 Output differential pressure signal	有噪音 Noise	有脉动噪音 Pulse noise	未知 Unknown	稳定无脉动 Stable without pulsation	稳定无脉动 Stable without pulsation	稳定无脉动 Stable without pulsation	稳定无脉动 Stable without pulsation
测量方式 Measurement method	管道均速 Pipeline average speed	管道均速 Pipeline average speed	管道均速 Pipeline average speed	管道均速 Pipeline average speed	管道均速 Pipeline average speed	中心流速 Center velocity	中心流速 Center velocity
结构形式 Structural style	插入式 Plug-in type	插入式 Plug-in type	插入式 Plug-in type	插入式 Plug-in type	插入式 Plug-in type	插入式 Plug-in type	插入式 Plug-in type

防堵性能 Anti-blocking performance	易堵 Easy blocking	易堵 Easy blocking	易堵 Easy blocking	易堵 Easy blocking	易堵 Easy blocking	不易堵 Not easy to block	不易堵 Not easy to block
差压 Differential pressure	小 Small	小 Small	小 Small	大 Big	大 Big	小 Small	大 Big
取压位置 Pressure taking position	背部 Backside	背部 Backside	背部和侧面 Back and sides	背部和侧面 Back and sides	背部 Backside	中心对称型 Centrally symmetric	中心对称型 Centrally symmetric
测量精度 Measurement accuracy	±5-10%	±2.0	±1.0	±1.0	±1.0	±1.0	±1.0
内部结构形式 Internal structural form	三片式结构 Three-piece structure	三片式结构 Three-piece structure	两片式结构 Two-piece structure	单片一体化结构 Monolithic integrated structure	单片一体化结构 Monolithic integrated structure	单片一体化结构 Monolithic integrated structure	单片一体化结构 Monolithic integrated structure
渗透状况 Leakage condition	高低腔室渗透 High and low chamber leakage	高低腔室渗透 High and low chamber leakage	高低腔室渗透 High and low chamber leakage	防渗透 Impermeability	防渗透 Impermeability	无渗透 No penetration	无渗透 No penetration
流体测试数据 Fluid test data	无 No	无 No	无 No	有 Yes	有 Yes	有 Yes	有 Yes
量程比 Range ratio	1:10	1:10	1:10	1:15	1:15	1:30	1:30
含杂质 Impurity	----	-----	-----	----	-----	可 Yes	可 Yes
结垢影响 Scale effect	大 Big	大 Big	大 Big	大 Big	大 Big	微 Tiny	微 Tiny
粘附影响 Adhesion effect	大 Big	大 Big	大 Big	大 Big	大 Big	微 Tiny	微 Tiny
故障率 Fault rate	高 High	高 High	高 High	高 High	高 High	低 Low	低 Low
低速 Low speed	难 Hard	难 Hard	难 Hard	难 Hard	难 Hard	可 Yes	可 Yes
防腐 Anticorrosion	-----	-----	-----	-----	-----	可 Yes	可 Yes

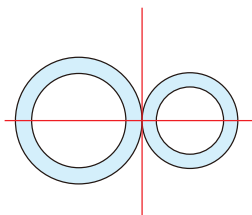
生产单位 Manufacturer				上海力尔巴 Shanghai Lilba	深圳万讯 Shenzhen Wanxun	辽宁毕托巴 Liaoning Bitoba	上海仪昌 Shanghai Yichang
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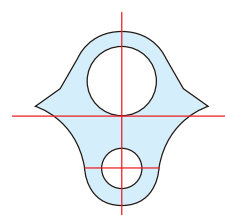
威力巴
Verabar



德尔塔巴
Deltaba



毕托巴
Bitoba



威尔巴
Wellbar

威尔巴流量计常见问题解答

Answers to frequently asked questions of Wellbar flowmeter

- ### 1. 威尔巴流量计的系统结构。

System structure of Wellbar flowmeter.

- ## 2. 差压变送器的选型与流量探头的关系。

Relationship between selection of differential pressure transmitter and flow probe.

- ### 3. 我们的威尔巴探头读数偏大/小，可能是什么原因引起的呢？

The reading of the Wellbar probe is too big/too small. What may be the cause?

1 威尔巴流量计的系统结构

System structure of Wellbar flowmeter

1.1 流量探头与流量计是不同的概念。流量探头属于整个流量测量系统的一次源部分，它包括传感器、套管和仪表接头。详细结构如图所示。流量计是指整个流量测量系统，它包括威尔巴流量探头，差压变送器、积算仪等二次仪表，以及阀门，引压管等连接附件。如图所示。

Flow probe and flowmeter are different concepts. The flow probe belongs to the primary source part of the whole flow measurement system, which includes sensors, sleeves and instrument connectors. The detailed structure is shown in the figure. Flowmeter refers to the whole flow measurement system, which includes Wellbar flow probe, differential pressure transmitter, totalizer and other

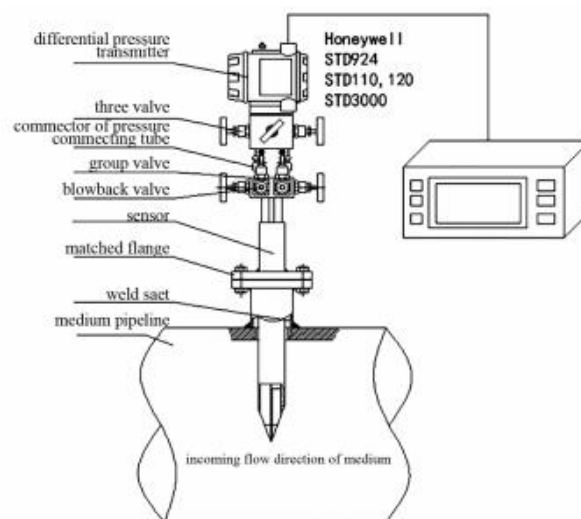


图8.1 Figure 8.1

secondary instruments, as well as connecting accessories such as valves and pressure pipes. As shown in the figure.

1.2 威尔巴流量计的供货范围包括威尔巴流量探头焊接座。对于不同型号的威尔巴流量探头，还应包括接头与焊接座之间的各种连接部件或密封装置。

The scope of supply of Wellbar flowmeter includes the welding seat of Wellbar flow probe. For different types of Wellbar flow probes, various connecting parts or sealing devices between the connector and the welding seat should also be included.

1.3 图中的差压变送器、三阀组、引压接头、引压管以及针阀为选购部分。用户可自行购买，也可委托我公司选购。

The differential pressure transmitter, three valve manifold, impulse connector, impulse pipe and needle valve in the figure are optional parts. Users can buy it by themselves or entrust our company to buy it.

2 差压变送器的选型与流量探头的关系？

What is the relationship between the differential pressure transmitter and flow probe selection?

2.1 用户在选择差压变送器时要注意流量探头与变送器间的匹配。首先，为了确保测量的精度，用户要提供测点的准确流体条件。我们会根据用户提供的流体条件进行严格的计算并提供该测点的差压计算书。

Users should pay attention to the matching between the flow probe and the transmitter when selecting the differential pressure transmitter. First of all, in order to ensure the accuracy of measurement, users should provide accurate fluid conditions of measuring points. We will make strict calculation according to the fluid conditions provided by users and provide the differential pressure calculation of the measuring point.

2.2 用户可根据我们计算出的最大差压（对应计算书上差压上限）来选择差压变送器的量程，使最大差压在变送器程范围之内。同时要特别注意管道的静压在差压变送器的静压范围内。

Users can choose the range of differential pressure transmitter according to the maximum differential pressure calculated by us (corresponding to the upper limit of differential pressure in the calculation sheet), so that the maximum differential pressure is within the transmitter range. At the same time, pay special attention to the static pressure of the pipeline within the static pressure range of the differential pressure transmitter.

2.3 威尔巴流量探头可以与市面上绝大多数品牌的差压变送器配合使用，如 EJA，罗斯蒙特，霍尼威尔等。

Wellbar flow probe can be used with most brands of differential pressure transmitters on the market, such as EJA, Rosemount, Honeywell, etc.

2.4 一般在流量探头的接头和差压变送器之间通过三阀组和引压管连接。在这整个连接系统中一定要注意接头和引压管的密封性，即使是很细微的渗漏也会对探头的正常使用产生负面的影响。如果用户想了解详细情形或是还有其它技术问题，请与我公司的技术部联系。

Generally, the connection between the connector of the flow probe and the differential pressure transmitter is made through three valve groups and pressure lead pipes. In the whole connection system, we must pay attention to the tightness of the joint and the pressure lead pipe. Even the slight leakage will have a negative impact on the

normal use of the probe. If users want to know the details or have other technical problems, please contact our technical department.

3. 我们的威尔巴探头读数偏大/小，可能是什么原因引起的呢？

The reading of our Wellbar probe is too large/too small. What may be the cause?

导致测量不准的原因是多方面的，用户可按以下步骤检查：

There are many reasons for inaccurate measurement. Users can check according to the following steps:

3.1 第一步，仔细确认管道参数和提供的流体条件参数无误。当前实际运行参数与最初设计参数是否有变动？

The first step is to carefully confirm that the pipeline parameters and the supplied fluid condition parameters are correct. Are there any changes between the actual operating parameters and the original design parameters?

3.2 第二步，检查二次仪表的设定。二次仪表的设定是最容易出错的地方，我们必须注意以下一些细节问题：

Step two is to check the setting of secondary instrument. The setting of the secondary instrument is the most error-prone, and we must pay attention to the following details:

3.2.1 变送器调表情况如何？是否按正确的计算书设置？

How is the transmitter meter adjustment? Is it set according to the correct calculation?

3.2.2 变送器是什么型号？量程选择是否合适？

What model is the transmitter? Is the range selected properly?

3.2.3 变送器是否开方？主要确认整个测量系统只开了一次方。

Is the transmitter square? Make sure that the whole measuring system is squared once.

3.2.4 积算仪或 DCS 系统中是否正确的设置威尔巴的流量计算公式？

Is the flow calculation formula of Wellbar correctly set in the totalizer or DCS system?

3.2.5 有否加温压补偿？温压补偿的设置是否正确？温压补偿测点的安装位置如何？如果离威尔巴测点太远，可能会带来更大的误差。

Is there any compensation for heating and pressure? Is the temperature and pressure compensation set correctly? What is the installation position of temperature and pressure compensation measuring points? If it is too far from the measuring point of Wellbar, it may bring greater error.

3.2.6 引压管是否正确安装？有否泄漏？

Is the pressure lead pipe installed correctly? Is there any leakage?

3.3 第三步，安装威尔巴的过程是否正确。

Step three is to confirm whether the installation process of Wellbar is correct.

3.3.1 威尔巴是否正确安装了？（各种威尔巴探头的详细安装请见安装说明。）

Is Wellbar installed correctly? (Please refer to the installation instructions for the detailed installation of various Wellbar probes.)

3.3.2 探头的安装方向是否正确？

Is the installation direction of the probe correct?

3.3.3 威尔巴所选的安装位置是否合适？前面是否有弯头或蝶阀等阻流件？

Is the installation position selected by Wellbar appropriate? Is there an elbow or butterfly valve in front of it?

3.3.4 管道开孔大小是否规范？开孔过大会造成非常大的潜在误差。

Is the opening size of the pipeline standardized? If the hole is too large, it will cause a very large potential error.

3.3.5 探头有否插到中心？若未插到中心，相当于偏离测量点，流量会偏小。

Is the probe inserted into the center? If it is not, it means deviate from the measuring point, and the flow rate will be small.

如果对以上各步骤的确认有疑问或按以上各步骤检查后仍不能查处原因，请与我公司的技术部联系。

If there is any doubt about the confirmation of the above steps or the problems cannot be solved after checking according to the above steps, please contact the technical department of our company.

YC-WF楔型流量计 YC-WF Wedge Flowmeter



□ 原理 □ Principle

楔型流量计与双法兰差压变送器的配套使用，克服因导压管路附件的影响，可广泛应用于易结晶、易冻结、粘稠、脏污、腐蚀等苛刻要求的流体测量。

The matching use of wedge flowmeter and dual-flange differential pressure transmitter can overcome the influence from the pressure transportation accessories, which can be widely used in fluid measurements that are easy to crystallize, freeze, sticky, dirty, corrosion and other demanding requirements.

楔型流量计基本原理与其它节流装置相同，其结构是在管道内设置楔形体对流体进行节流的，根据能量守恒和流量连续性原理，得出流量计算基本方程。当介质通过楔形体时在其前后产生差压 ΔP ，经过差压变送器转换后的标准信号送至流量积算仪或数据控制系统（DCS），得到对应的流量值。选择不同的楔形比（H/D）即可对不同的流量范围进行测量。

The basic principle of wedge flowmeter is the same as that of other throttle devices, whose structure is to set the wedge body to throttle the fluid in the pipe, and the basic equation of flow calculation is developed according to the principle of energy conservation and flow continuity. When the medium passes through the wedge body, it produces differential pressure ΔP before or after the process, and the standard signal after the differential pressure transmitter conversion is sent to the flow instrument or data control system (DCS) to get the corresponding flow value. Different wedge ratios (H/D) can be selected to measure different flow ranges.

流量计算基本方程为：

The basic equation for flow calculation:

$$Q_v = \frac{C \cdot \varepsilon}{\sqrt{1-m^2}} \cdot m \cdot \frac{\pi}{4} D^2 \cdot \sqrt{\frac{2 \cdot \Delta p}{\rho}}$$

Q_v —体积流量， m^3/s

Q_v —Volume flow, m^3/s

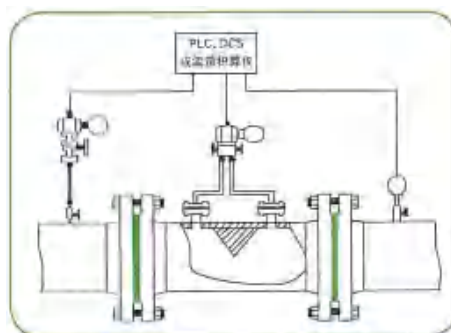
C —流出系数

C —Discharge coefficient

$$M\text{—截面比, } m = \frac{S_1}{\frac{\pi}{4} D^2}$$

$$M\text{—ratio of cross section, } m = \frac{S_1}{\frac{\pi}{4} D^2}$$

PLC, DCS or flow totalizer



S_1 —弓形流通面积, D为测量管内径, 单位: m

S_1 —Arcuate circulation area, D—Inner diameter of measuring pipe, unit: m

ε —气体可膨胀性系数

ε —Gas expansibility coefficient

ΔP —楔形块前后的差压, Pa

ΔP —Differential pressure before and after the wedge, Pa

ρ —被测介质密度, kg/m^3

ρ —Measured medium density, kg/m^3

□ 技术参数

□ Technical Parameters

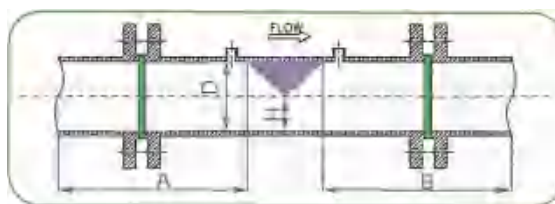
- 精确度: $\pm 0.5\%PF$
- Accuracy: $\pm 0.5\%PF$
- 重复性: 0.2%
- Repeatability: 0.2%
- 量程比: 可达10: 1
- Range ratio: up to 10:1
- 直管段要求: 精确度要求1%时, 一般上游5D, 下游2D
- Straight pipe segment requirements: accuracy is required 1%, general upstream 5D, downstream 2D
- 公称直径: 15~1200mm
- Nominal diameter: 15 ~ 1200mm
- 楔形比H/D: 0.2、0.3、0.4、0.5
- Wedge ratio H/D: 0.2, 0.3, 0.4, 0.5
- 公称压力: $\leq 16.0\text{MPa}$
- Nominal pressure: $\leq 16.0\text{MPa}$
- 介质温度: $< 500^\circ\text{C}$
- Medium temperature: $< 500^\circ\text{C}$
- 对于黏度大流量、同黏度小流量流体均可适用;
- Applicable for the viscosity of large flow as well as the same viscosity of small flow fluid;
- 压力损失较低与文丘里管相似, 但结构比其紧凑;
- The lower pressure loss is similar to the Venturi tube, while its structure is more compact;
- 特殊的楔形节流件无可动部件, 选用特殊材质有效抵抗磨蚀, 保证了长期稳定地免维护运行;
- No movable parts for special wedge throttle elements. By using special materials, it can resist abrasive effectively so as to ensure the long-term stability and maintenance-free operation;
- 可测双向流动流量的差压式仪表;
- Differential pressure meter that can measure the bidirection flow;
- 具有自清洁能力, 脏污、杂质可顺利流向下流;
- With self-cleaning ability, the dirt and impurities can flow smoothly downstream.
- 双法兰式取压避免了标准节流装置由于导压管路细小, 而引起的堵塞和导压附件经常地维护。
- Double flange pressure extraction avoids the clogging and frequency maintenance of attachments resulting from the small size of pressure line.

□ 安装 □ Installation

楔形流量计安装所需直管段

Straight pipe section should be used for wedge flowmeter installation

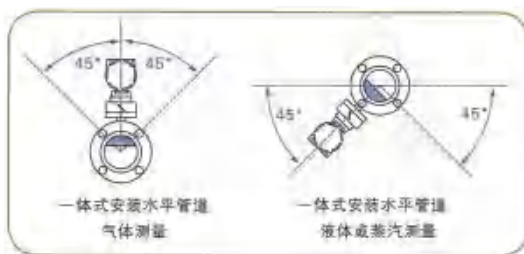
楔形比 Wedge ratio	90° 弯头后 After a 90° elbow		T形三通 T 3-way		调节阀 Regulating valve	
H/D	A	B	A	B	A	B
0.2	6D	3D	6D	3D	10D	5D
0.3	8D	4D	8D	4D	11D	5D
0.4	12D	6D	12D	6D	14D	7D
0.5	14D	7D	14D	7D	16D	8D



□ 安装位置 □ Installation Position

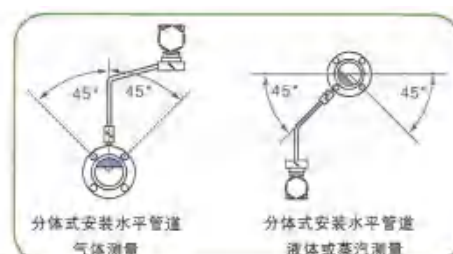
水平管道

Horizontal Pipe



Gas measurement of
integrated installation
horizontal pipe

Liquid or steam
measurement of
integrated installation
horizontal pipe

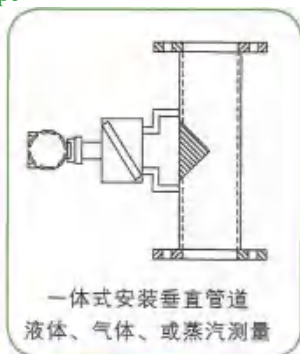


Gas measurement of
separated installation
horizontal pipe

Liquid or steam
measurement of
separated installation
horizontal pipe

垂直管道

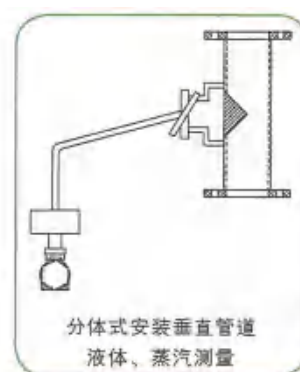
Vertical pipe



Liquid, gas or steam measurement of
integrated installation vertical pipe

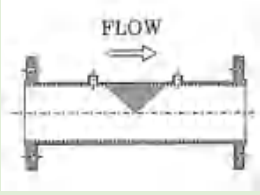
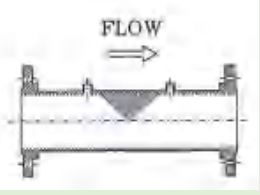
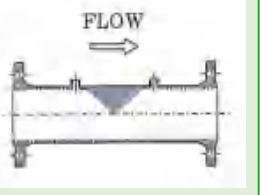
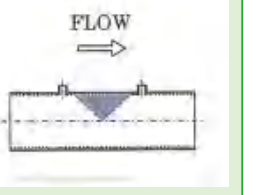


Gas measurement of separated
installation vertical pipe

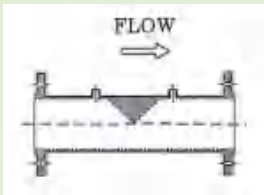
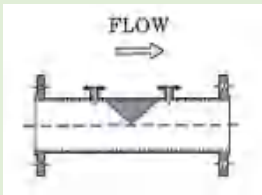
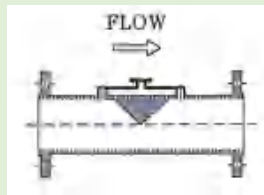
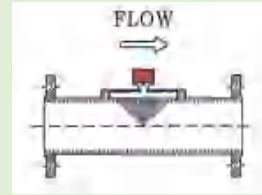


Liquid and steam measurement of
separated installation vertical pipe

□ 型号说明
□ Product Description

型号 Type	YC-WF-01	YC-WF-02	YC-WF-03	YC-WF-04
图示 Diagram				
连接方式 Connection way	管道式板式平焊法兰连接型 PL flange connection type with pipe	管道式带颈平焊法兰连接型 Plate flange with neck connection type with pipe	管道式带颈对焊法兰型 Welding neck flange type with pipe	管道式焊接连接型 Welding connection type with pipe
公称通径 Nominal diameter (DN)	15~1000mm或更大 15-1000mm or bigger	15~1000mm或更大 15-1000mm or bigger	15~1000mm或更大 15-1000mm or bigger	15~1000mm或更大 15-1000mm or bigger
标准等级 Standard grade	ANSI150 (PN0.25~2.5)	ANSI150~ANSI300 (PN0.25~5.0)	ANSI150~ANSI2500 (PN0.25~42.0)	ANSI150~ANSI2500 (PN0.25~42.0)
精度 Accuracy	一般为±0.5% Generally ±0.5% 可选±0.2% Optionally ±0.2%	一般为±0.5% Generally ±0.5% 可选±0.2% Optionally ±0.2%	一般为±0.5% Generally ±0.5% 可选±0.2% Optionally ±0.2%	一般为±0.5% Generally ±0.5% 可选±0.2% Optionally ±0.2%
重复性 Repeatability	一般为±0.1% Generally ±0.1% 可选±0.05% Optionally ±0.05%	一般为±0.1% Generally ±0.1% 可选±0.05% Optionally ±0.05%	一般为±0.1% Generally ±0.1% 可选±0.05% Optionally ±0.05%	一般为±0.1% Generally ±0.1% 可选±0.05% Optionally ±0.05%
量程比 Range ratio	大于10: 1 More than 10:1	大于10: 1 More than 10:1	大于10: 1 More than 10:1	大于10: 1 More than 10:1
标准楔形比 Standard Wedge ratio	0.2~0.5	0.2~0.5	0.2~0.5	0.2~0.5
压力损失 Pressure loss	差压值的20%，随楔形比变化而变化 20% of differential pressure, varying with wedge ratio	差压值的20%，随楔形比变化而变化 20% of differential pressure, varying with wedge ratio	差压值的20%，随楔形比变化而变化 20% of differential pressure, varying with wedge ratio	差压值的20%，随楔形比变化而变化 20% of differential pressure, varying with wedge ratio
安装要求 Installation requirements	最少前6D后3D At least upstream 6D downstream 3D	最少前6D后3D At least upstream 6D downstream 3D	最少前6D后3D At least upstream 6D downstream 3D	最少前6D后3D At least upstream 6D downstream 3D
适用范围 Application scope	适用于管道中空气、液体、蒸汽的测量 Applicable to the measurement of air, liquid, and steam in pipes	适用于管道中空气、液体、蒸汽的测量 Applicable to the measurement of air, liquid, and steam in pipes	适用于管道中空气、液体、蒸汽的测量 Applicable to the measurement of air, liquid, and steam in pipes	适用于管道中空气、液体、蒸汽的测量 Applicable to the measurement of air, liquid, and steam in pipes

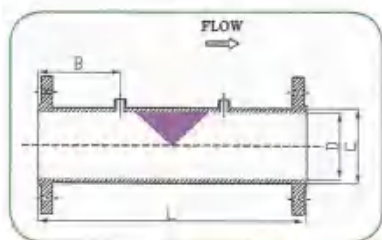
□ 取压方式
□ Taps Mode

名称 Name	1/2" 锥螺纹 1/2" taper thread	法兰取压 Flange tap	一体化取压 Integration tap	高温一体化取压 High temperature integration tap
图示 Diagram				
适用范围 Application scope	各种温度、压力不高，应用于气体、液体、蒸汽 Max.ANSI2500 All kinds of temperature and not too high pressure, applied to gas, liquid and steam Max.ANSI2500	高温、高压、高粘度，应用于气体、液体、蒸汽 Max.ANSI2500 High temperature, high pressure, and high viscosity, applied to gas, liquid and steam Max.ANSI2500	温度小于100℃、压力小于5MPa，其应用于气体、液体、蒸汽 Max.ANSI300 Temperature less than 100℃, pressure less than 5MPa, applied to gas, liquid and steam Max.ANSI300	高温小于350℃，压力小于5MPa，应用于气体、液体、蒸汽 Max.ANSI300 High temperature less than 350℃, pressure less than 5MPa, applied to gas, liquid and steam Max.ANSI300

□ 尺寸表
□ Dimension Table

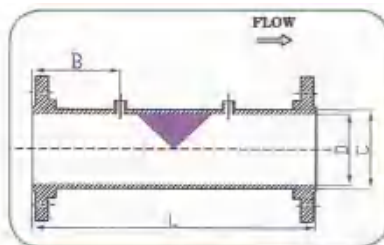
板式平焊法兰 YC-WF-01

PL flange YC-WF-01



带颈平焊法兰 YC-WF-02

Plate flange with neck YC-WF-02

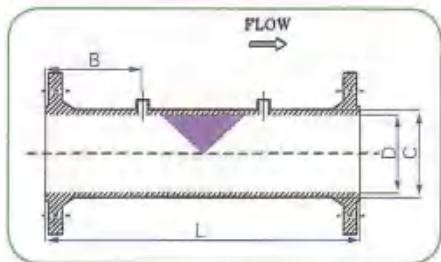


公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	30	15	22	6
20	150	30	20	26	7
25	150	30	25	32	7
32	150	30	32	38	7
40	150	30	40	48	7
50	200	35	50	57	9
65	200	35	65	77	11
80	200	35	80	96	16
100	250	50	100	116	20
125	250	35	125	141	31
150	300	50	150	166	44
200	350	50	200	216	56
250	400	50	250	266	106
300	500	75	300	316	125
350	500	50	350	366	163
400	600	75	400	416	188
450	600	50	450	466	263
500	700	75	500	516	275
600	800	75	600	616	313
700	900	75	700	720	438
800	1000	75	800	820	563
900	1100	75	900	920	688
1000	1200	75	1000	1020	824

公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	30	15	22	7
20	150	30	20	26	8
25	150	30	25	32	8
32	150	30	32	38	8
40	150	30	40	48	8
50	200	35	50	57	10
65	200	35	65	77	12
80	200	35	80	96	18
100	250	50	100	116	22
125	250	35	125	141	35
150	300	50	150	166	49
200	350	50	200	216	63
250	400	50	250	266	118
300	500	75	300	316	139
350	500	50	350	366	181
400	600	75	400	416	208
450	600	50	450	466	292
500	700	75	500	516	306
600	800	75	600	616	347
700	900	75	700	720	486
800	1000	75	800	820	625
900	1100	75	900	920	764
1000	1200	75	1000	1020	915

带颈对焊法兰YC-WF-03

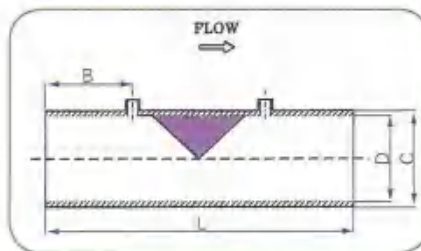
Welding neck flange YC-WF-03



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	30	15	22	8
20	150	30	20	26	9
25	150	30	25	32	9
32	150	30	32	38	9
40	150	30	40	48	9
50	200	35	50	57	11
65	200	35	65	77	14
80	200	35	80	96	20
100	250	50	100	116	25
125	250	35	125	141	39
150	300	50	150	166	55
200	350	50	200	216	70
250	400	50	250	266	133
300	500	75	300	316	156
350	500	50	350	366	203
400	600	75	400	416	234
450	600	50	450	466	328
500	700	75	500	516	344
600	800	75	600	616	391
700	900	75	700	720	547
800	1000	75	800	820	703
900	1100	75	900	920	859
1000	1200	75	1000	1020	1029

管道直焊YC-WF-04

Pipe direct-welding YC-WF-04



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	30	15	22	5
20	150	30	20	26	6
25	150	30	25	32	6
32	150	30	32	38	6
40	150	30	40	48	6
50	200	35	50	57	8
65	200	35	65	77	10
80	200	35	80	96	14
100	250	50	100	116	18
125	250	35	125	141	28
150	300	50	150	166	39
200	350	50	200	216	51
250	400	50	250	266	96
300	500	75	300	316	113
350	500	50	350	366	146
400	600	75	400	416	167
450	600	50	450	466	236
500	700	75	500	516	248
600	800	75	600	616	281
700	900	75	700	720	394
800	1000	75	800	820	506
900	1100	75	900	920	619
1000	1200	75	1000	1020	741

□ 选型表
□ Product Type Table

型号 Type		说明 Description
YC-WF		楔形流量计 Wedge flowmeter
管道外径/壁厚 Outside diameter of the pipe/wall thickness		×××/××
连接方式 Connection way	01	板式平焊法兰 (PL) PL flange (PL)
	02	带颈平焊法兰 (SO) Plate flange with neck (SO)
	03	带颈对焊法兰 (WN) Welding neck flange (WN)
	04	带管道直焊式 Pipe direct-welding
测量管材质 Material of measuring pipe	1	316不锈钢 316 stainless steel
	2	304不锈钢 304 stainless steel
	3	碳钢 Carbon steel
	4	特殊材质 Special material
楔形块材质 Material of wedge	CS	碳钢 Carbon steel
	SL	316不锈钢 316 stainless steel
	SS	304不锈钢 304 stainless steel
	T	特殊材质 Special material
法兰标准 Flange standard	GB	国标 National standard
	AS	美标 American standard
	HG	化工部标准 Standards for Ministry of chemical industry
	JB	机械部标准 Standards of the Ministry of machinery
	ES	其他标准, 请注明 If other standards, please indicate that
法兰压力等级 Flange pressure rating	2.5~420	0.25~42MPa (对应GB、HG、JB) 0.25 ~ 42MPa (corresponding to GB, HG, JB)
	150~2500	ANSI150~2500 (对应AS) ANSI150 ~2500 (corresponding to AS)
法兰密封面 Face of flange	1	平面 (FF) Flat surface (FF)
	2	凸面 (RF) Convex surface (RF)
	3	凹凸面 (MFM) Concave convex surface (MFM)
	4	其他 (RJ/TG等) Others (RJ/TG, ect)
取压口 Taps	1	1/2"螺纹 1/2"taper thread
	2	法兰取压 Flange tap
	3	一体化取压 Integration tap
	4	高温一体化取压 High temperature integration tap
	S	特殊要求 Special requirement

YC-PH 多孔孔板（平衡）

YC-PH Balanced Flow Sensor（Balance）



□ 概述

□ Introduction

YC-PH 多孔孔板(平衡)对传统节流装置进行了极大的改进, 具有平衡整流的显著特性。多孔孔板(平衡)有多个函数孔径, 能最大限度地使流场平衡整流成理想流体, 从而将差压式流量传感器的优势更好地发挥。多孔孔板(平衡)几乎适用于所有流体测量, 是流体测量技术的一场革新, 目前多孔孔板(平衡)已广泛应用到石油、化工、冶金、电力、天然气、水处理等行业。

YC-PH Balanced Flow Sensor (Balance) has greatly improved traditional throttle devices and has significant characteristics of balancing rectification. The Balanced Flow Sensor (Balance) has several function apertures, which maximize the balance of the flow field into the ideal fluid, hence taking the advantages of differential flow sensors. Balanced Flow Sensor (Balance) is suitable for almost all fluid measurements, which is an innovation of fluid measurement technology. Now, the Balanced Flow Sensor (Balance) has been widely applied to petroleum, chemical, metallurgy, electricity power, natural gas, water treatment and other industries.

YC-PH应用于各种混合气体(如瓦斯、沼气、煤气等)、各种低温气体(如LNG、液氮、液氩、液氢、液氯、液化乙烯、液化石油等)、气液两相介质(如湿气)、浆料、多相水流、震动水流、电磁干扰介质和双向流。

YC-PH is used in a variety of mixed gases (e.g. mash gas, biogas, coal gas, etc.), low-temperature gases (e.g. LNG, liquid nitrogen, liquid argon, liquid hydrogen, liquid chlorine, liquefied ethylene, liquefied petroleum, etc.), two-phase media (e.g. moisture), slurry, multiphase water flow, vibration flow, electromagnetic interference medium and bidirectional flow.

□ 工作原理

□ Operational Principle

与其他差压式流量传感器一样, 都是基于密封管道中的能量转换原理: 在理想流体的情况下管道中的流量与差压的平方根成正比; 用测出差压值根据伯努利方程即可计算出管道中的流量。多孔孔板(平衡)是一个多孔的圆盘节流整流器, 安装在管道的截面上, 每个孔的尺寸和分布是基于特殊的分工和测试数据而定制的, 称为函数孔。当流体穿过圆盘的函数孔时, 流体将被平衡整流, 涡流被最小化, 形成近似理想流体, 通过取压装置, 可获得稳定的差压信号, 根据伯努利方程计算出体积流量、质量流量。

Like other differential pressure flow sensors, it is based on the principle of energy conversion in sealed pipes: in the ideal fluid case, the flow in the pipe is proportional to the square root of differential pressure, and the flow in the pipe can be calculated based on the Bernoulli

equation through using the measurement of travel pressure values. The Balanced Flow Sensor (Balance) is a porous disc throttle rectifier mounted on the section of the pipe, and the size and distribution of each hole is customized based on special division of labor and test data, called a function hole. When the fluid passes through the function hole of the disk, the flow will be balanced, the vortex is minimized to form an approximate ideal fluid. By using taps, a stable differential pressure signal can be obtained, and the volume flow and mass flow are calculated according to the Bernoulli equation.

伯努利方程:

Bernoulli equation:

$$Q_v = k \times C \times \sqrt{\Delta P}$$

$$Q_m = Q_v \times \rho$$

其中: Q_v =管道内的体积流量

In this equation, Q_v =volume flow in pipe

Q_m =管道内的质量流量

Q_m =mass flow in the pipeline

K=流量系数

K=flow coefficient

C=流量常数 (常数)

C=flow constant (constant)

ΔP =差压值

ΔP =differential pressure value

可见: C为常数, 要确定 Q_v , 必须确定K和 ΔP

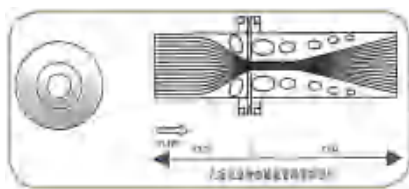
Thus, C is constant, to make sure of Q_v , K and ΔP must be ensured first

□ 结构特点

□ Structural Features

标准节流装置, 由于只有一个孔, 孔两边的死区产生大量的涡流消耗流体的动能, 会导致很大的永久压力损失; 随机和杂乱涡流所形成的噪声引起取压点信号波动, 使测量线性度和重复性降低; 一个孔的结构, 需要很长的直管段来整理流场和恢复压力。

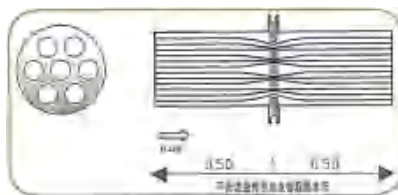
Since standard throttle device only has one hole, the blind spot on both sides of the hole produces a large amount of vortex consumption of fluid kinetic energy, which will lead to a large permanent pressure loss; noise from random and cluttered vortex can cause the fluctuated pressure point signals, reducing measurement linearity and repeatability; the structure of a hole requires a longer straight pipe length to order the flow distribution and restore the pressure.



Longer requirement of orifice flow sensor's straight length

YC-PH 多孔孔板 (平衡) 相关的测试证明: 多孔孔板 (平衡) 通过多孔圆盘节流整流器, 能巧妙实现流体平衡测量, 明显减少涡流的形成、降低死区效应、减少流体动能的损失、降低涡流带来的取压点信号波动。

The related tests on YC-PH Balanced Flow Sensor (Balance) rove that by the porous disc throttle rectifier,the fluid balance measurement can be achieved by Balanced Flow Sensor (Balance). Thus, it can reduce the vortex and blind spot effect si gnificantly, as well as the reduction of the loss of fluid kinetic energy and the vortex brought about by the pressure point signal fluctuations.



Shorter requirement of balanced flow sensor's straight pipe section

性能指标 Performance

- 精度高、重复性好、双向流。多孔孔板（平衡）具有对称多孔结构特点，能对流场进行平衡，降低了涡流、振动和信号噪声，流场稳定性大大提高，使测量精度比孔板提升了5~10倍，重复性提高了54%，为0.15%，从其综合性能来看，平衡流量传感器属于高精度流量计行列，由于前后对称的结构设计，故可测量双向流。
- High precision and good repeatability with bidirectional flow. The balanced flow sensor(balanced) has symmetrical porous structure, and it can balance the flow field as well as reduce the effect of vortex, vibration and signal noise. Therefore, the stability of the flow field is greatly improved, the measurement accuracy increases 5~10 times than the taps, and the repeatability is increased by 54%, that is 0.15%. In terms of its comprehensive performance, the balanced flow sensor is the high-precision flowmeter due to its symmetrical structure design in the front and back, so that the two-way flow can be measurable.
- 高精度。一般 $\pm 0.50\%$ 、特殊可达 $\pm 0.30\%$ 。
- High precision. Generally $\pm 0.50\%$, up to $\pm 0.30\%$ in special conditions.
- 重复性。做成于 $\pm 0.20\%$ 、特殊可达 $\pm 0.15\%$ 。
- Repeatability. Generally $\pm 0.20\%$, up to $\pm 0.15\%$ in special conditions.
- 直管段要求低。多孔孔板（平衡）由于流场稳定，且压力恢复比孔板快两倍，大大缩短了对直管段的要求，从而省去了大量直管段，尤其是特殊昂贵的材料的管道。最小直管段可以小至前0.5D、后0.5D。
- Low requirements of straight pipe section. Due to the stable flow field of the balanced flow sensor, and the pressure recovery is twice as fast as the taps, it has greatly reduced the requirements for the straight pipe length and eliminate the need for more pipe segments, especially the special pipes and expensive materials. The minimum straight pipe length can be as small as the upstream 0.5D and the downstream 0.5D.
- 减少永久压力损失。多孔对称的平衡设计，减少了紊流剪切力和涡流的形成，降低了动能的损失，在同样的测量工况下，压力恢复比标准孔板快2倍，永久压力损失是标准孔板的1/3，从而节省了相当大的运行能量成本，是一种节能型仪表，值得大量推广。
- Reduces permanent pressure loss. The balanced design of porous symmetry reduces the formation of turbulence shear and vortex as well as the loss of kinetic energy. Under the same measurement conditions, the pressure recovery is 2 times faster than the standard plate, the permanent pressure loss is 1/3 of the standard plate. The considerable operating energy costs can be saved, so this is an energy-saving instrument and deserve to promote.
- 流量测量范围宽。使其流速可以从最小到音速；其最小雷诺数可低于200，最大雷诺灵敏大于 10^7 ， β 值可选0.20~0.90。
- Wide range of flow measurement. Its flow rate can be lower as the speed of sound; its minimum Reynolds number can be less than 200; the maximum Reynolds sensitivity is greater than 10^7 , the β value can be close from 0.20~0.90.
- 长期稳定性好。由于其紊流剪切力的明显减小，大幅度降低了介质与节流件直接的摩擦，其 β 值长期保护不变，整个仪表无可动部件，因此可以长期保护稳定性，流动噪声是标准孔板的1/15。
- Long-term stability. Due to its obvious reduction of turbulence shear force, the direct friction between the medium and the throttle is greatly reduced, and its β value long-term protection keep unchanged. The entire instrument is non-movable parts, so it can protect stability for a long time. The flow noise is 1/15 of the standard plate.
- 可直接替换孔板。其与孔板具有相同的使用方法和外形，因此可以直接进行替换，不需要任何配管的变化和相关仪表的更改，很适合全厂能源计量改造中将孔板改为多孔孔板（平衡）。
- Orifice plate can be replaced directly. It has the same use method and shape as the plate, so it can be replaced directly. Without

any changes of pipe and related instrument, it can apply to change the orifice plate into a balanced flow sensor(balanced) in energy metering transformation in the plant.

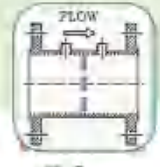
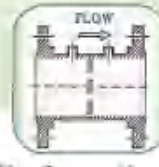
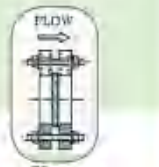
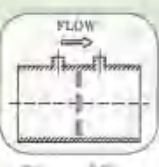
- 耐脏污不易堵。多孔对称的平衡设计，减少了紊流剪切力和涡流的形成，从而大大降低了滞留死区的形成，保证脏污介质顺利通过多个孔，减小了流体孔被堵塞的机会。
- Stain resistance and not block feature. The balanced design of porous symmetry reduces the formation of turbulence shear and eddy currents, thus greatly reducing the formation of the deadlocked dead zone and ensuring that the dirty media passes through multiple holes, so that it can reduce the chance of the fluid hole being blocked.
- 可测高温高压介质。与孔板等节流装置一样，工作温度压力取决于管道和法兰的材质和等级，工作温度可达850℃，工作压力可达42MPa。
- Measurable high temperature and high-pressure media. Like throttle devices of the orifice plates, the operating temperature pressure depends on the material and grade of the pipe and flange. The operating temperature can reach 850℃ and pressure can reach 42MPa.

□ 型号说明

□ Product Types Description

连接方式

Connection way

型号 Type	YC-PH-A	YC-PH-B	YC-PH-C	YC-PH-D	YC-PH-E
图示 Diagram					
连接方式 Connection way	板式平焊法兰 PL flange	带颈平焊法兰 Plate flange with neck	带颈对焊法兰 Welding neck flange	对夹式 Clamp	管道直焊式 Pipe welding
管道通径 Nominal diameter	15~1000mm或更大 15-1000mm or bigger	15~1000mm或更大 15-1000mm or bigger	15~1000mm或更大 15-1000mm or bigger	15~1000mm	15~1000mm或更大 15-1000mm or bigger
介质 Media	气体、液体、蒸汽 Gas, liquid, steam	气体、液体、蒸汽 Gas, liquid, steam	气体、液体、蒸汽 Gas, liquid, steam	气体、液体、蒸汽 Gas, liquid, steam	气体、液体、蒸汽 Gas, liquid, steam
压力等级 Pressure rating	ANSI150 (PN0.25~PN2.5)	ANSI150~ANSI300 (PN0.25~PN5.0)	ANSI150~ANSI2500 (PN0.25~PN42)	ANSI150 (PN0.25~PN2.5)	ANSI150~ANSI2500 (PN0.25~PN42)
精度 Accuracy	一般±0.50%、特殊可达±0.30%				
重复性 Repeatability	Generally ±0.5%, up to ±0.30% in special condition 优于±0.20%、特殊可达±0.15%				
量程比 Range ratio	Better than ±0.20%, up to ±0.15% in special condition 通常10: 1, 可达30: 1				
传感器材质 Material of sensor	碳钢、304不锈钢、316不锈钢、特殊材质 Carbon steel, 304 stainless steel, 316 stainless steel, special material				
β 值 Value of β	0.20~0.90				
压力损失 Pressure loss	10%左右的差压值 About 10% of differential pressure value				
直管段要求 Requirement of straight pipe section	前0.5D后0.5D Upstream 0.5D downstream 0.5D				
取压方式 Pressure extraction mode	法兰、螺纹、焊接、一体化取压、高温一体化取压、特殊方式取压 Flange, thread, welding, integrated pressure tapping, high temperature integrated pressure tapping, special way tapping				

取压方式

Pressure tap mode

名称 Name	1/2"锥螺纹 1/2"taper thread	法兰取压 Flange tap	一体化取压 Integration tap	高温一体化模块 High temperature integration tap
图示 Diagram				
适用范围 Application range	各种温度、压力不高，应用于气体、液体、蒸汽 Max.ANSI2500 All kinds of temperature and not too high pressure, applied to gas, liquid and steam Max.ANSI2500	高温、高压、高粘度，应用于气体、液体、蒸汽 Max.ANSI2500 High temperature, high pressure, and high viscosity, applied to gas, liquid and steam Max.ANSI2500	温度小于100℃、压力小于5MPa，其应用于气体、液体、蒸汽 Max.ANSI300 Temperature is less than 100℃, pressure is less than 5MPa, applied to gas, liquid and steam Max.ANSI300	高温小于350℃，压力小于5MPa，其应用于气体、液体、蒸汽 Max.ANSI300 High temperature is less than 350℃, pressure is less than 5MPa, applied to gas, liquid and steam Max.ANSI300

YC-PHS加速平衡流量计

YC-PHS Acceleration Balance Flowmeter

□ 特点

□ Features

是由加速管与平衡器二位合一科学组合而成的全新流量测量装置。

A new flow measurement device is a combination of the acceleration tube and the balancer.

YC-PHS是为了解决现场低流速、宽量程、直管段不足或无直管段，测量精度要求高且稳定的难度，而研究、设计、开发出的具有全新理念的新一代差压式流量测量技术。

YC-PHS is a new generation of differential pressure flow measurement technology, which is researched, designed and developed in order to solve the difficulties of low flow rate, wide range, insufficient straight pipe section or no straight pipe section, and high and stable measurement accuracy.

传统方法是改变工艺管道的内径，也就是缩径处理，人为提高流体的流速以便达到流量计的测量要求。这样处理的缺陷在于，缩径处理后流体的流场急剧变化，通常需要10D甚至20D以上的距离，流体才能达到有效测量所需的紊流状态。要缩短紊流状态的距离，通常采用加装整流器的方法，但是传统的整流器都是在整流器后至少3倍以上的距离才能有效测量，再加上整流器本身的长度，实际的距离并没有减少多少。

The traditional method is to change the internal diameter of the process pipe, that is, the reduction of run-off treatment, and to improve the flow rate of the fluid by person in order to meet the measurement requirements of the flowmeter. The defect is that the flow field of the fluid after the reduction process changes dramatically, which usually requires a length of 10D or more than 20D so that the fluid can reach the flow of turbulence required for effective measurement. To shorten the length of turbulence flow, it is often to install a rectifier. However, the traditional rectifier is at least 3 times of the length after the rectifier to be effectively measured. Adding the length of the rectifier itself, the actual distance has not been reduced so much.

□ 结构

□ Structure

收缩式流态校正管段廓形是对称的。它有入口圆筒（含膨胀节）、入口收缩段、圆筒形喉部和逐渐放大的扩散段所组成。其中，管段的入口处的圆筒和收缩段起到了提高流速的作用，并将不规则的复杂流态在圆筒形喉部迅速整理成线性的流线剖面，使流体收缩，由此克服了流速偏低，量程宽和上游直管段不足或无直管段而造成的无法测量或测量不准确的现场难题；出口处是一段逐渐放大的扩散段，此扩散段的作用使加速后的压力损失降到了最小。

The calibration section of contraction flow segment profile is symmetrical. It has an inlet cylinder (including expansion section), an inlet contraction section, a cylinder-shaped larynx and a gradually enlarged diffusion section. Among them, the cylinder and contraction section at the entrance of the pipe can increase the flow rate. The irregular and complex flow in the cylinder-shaped throat can organize into a linear flow surface quickly. It overcomes the problems of low flow rate, wide measuring range, insufficient upstream straight pipe or no straight pipe, which lead to the field problems of unable to measure or inaccurate measurement; the outlet is a gradually enlarged diffusion section, which can minimize the pressure loss after acceleration.

首先，在加速管部分，针对不同工艺条件采用加速角度处理，使流体在提高流速的同时初步调节流场，以减少后部所需直管段距离。

First of all, in accelerating pipe, the acceleration angle is adopted according to different process conditions, so that the flow field can be adjusted initially while the flow velocity is increased, which can also reduce the distance of the straight pipe section required at the back.

其次，在喉部段合适的位置上设有平衡器。该平衡器是一个多孔径平衡紊流器，每个孔的尺寸和分布是基于现场工艺参数定制的，称为平衡孔。当流体穿过平衡孔时，流体将被平衡器整流，形成近似有效测量的紊流流场状态，YC-PHS无需后续直

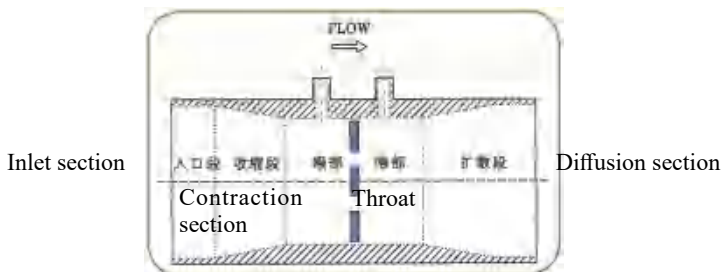
管段即可精确测量，通过平衡器的前后来取得差压值。

Secondly, a balancer is arranged at a suitable position of the throat section. The balancer is a multi-aperture balanced turbulence device, and the size and distribution of each hole is customized based on the field process parameters, which is called balance hole. When the fluid passes through the balance hole, the fluid will be rectified by the balancer to form a turbulent flow field of approximate effective measurement. YC-PHS can be accurately measured without subsequent straight pipe section, and the differential pressure value can be obtained through the front and back of the balancer.

□ 性能

□ Performance

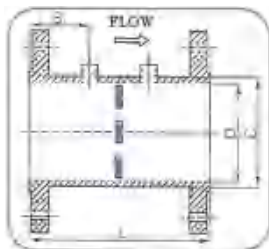
- 精度高: $\pm 0.5\%$
- High accuracy: $\pm 0.5\%$
- 重复性好: $\pm 0.2\%$
- Good repeatability: $\pm 0.2\%$
- 量程比大: 可达50: 1
- Wide range ratio: up to 50:1
- 可测管径宽: 15~1000mm或更大
- The measurable diameter of pipe: 15 ~ 1000mm or more
- 可测介质广: 单项气体、蒸汽以及液体
- A wide range of measurable media: single gases, steam and liquids
- 可测更低和更高的流速
- Lower and higher flow rates can be measured
- 无需直管段要求
- No straight pipe section required
- 测量多相双向流
- Multiphase bidirectional flow can measure
- 平衡器为板式节流整流器，其长度与其它传统整流器相比可以忽略不计。
- The balancer is a plate throttle rectifier with a negligible length compared to other traditional rectifiers.
- 平衡器为多孔结构可分散流体阻力，有效的减小了涡流的形成和紊流摩擦，从而降低永久压力损失。
- The balancer has porous structure that disperses fluid resistance, effectively reducing the formation of the vortex and turbulence friction, thereby reducing the permanent pressure loss.
- 平衡器多孔对称的设计，减小了紊流剪切力和涡流的形成，从而大大降低了滞留死区的形成，保证脏污介质顺利通过多个孔，减少了流体孔被堵塞的机会，达到长期使用的目的。
- The multi hole symmetrical design of balancer reduces the formation of turbulent shear force and eddy current, which greatly reduces the formation of stagnant blind spot, ensures the smooth passage of dirty media through multiple holes, reduces the chance of fluid holes being blocked, and achieves the purpose of long-term use.



□ 尺寸表 □ Dimension Table

板式平焊法兰 YC-PH-A

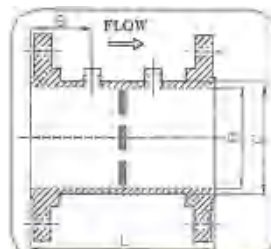
PL flange YC-PH-A



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	48	15	55	6
20	150	48	20	55	7
25	150	48	25	55	7
32	150	48	32	55	7
40	150	48	40	80	7
50	200	73	50	80	9
65	200	73	65	95	11
80	200	73	80	110	16
100	250	98	100	130	20
125	250	98	125	155	28
150	300	123	150	180	39
200	350	148	200	230	50
250	400	173	250	270	94
300	500	223	300	320	111
350	500	223	350	370	144
400	600	273	400	420	167
450	600	273	450	470	233
500	600	273	500	520	244
600	600	273	600	620	278
700	700	323	700	720	389
800	800	373	800	820	500
900	900	423	900	920	611
1000	1000	473	1000	1020	778

带颈平焊法兰 YC-PH-B

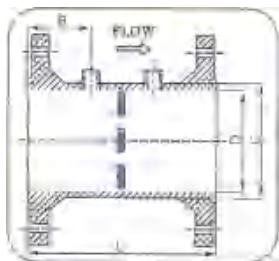
Plate flange with neck YC-PH-B



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	48	15	55	7
20	150	48	20	55	8
25	150	48	25	55	8
32	150	48	32	55	8
40	150	48	40	80	8
50	200	73	50	80	10
65	200	73	65	95	12
80	200	73	80	110	18
100	250	98	100	130	22
125	250	98	125	155	31
150	300	123	150	180	43
200	350	148	200	230	56
250	400	173	250	270	105
300	500	223	300	320	123
350	500	223	350	370	160
400	600	273	400	420	185
450	600	273	450	470	259
500	600	273	500	520	272
600	600	273	600	620	309
700	700	323	700	720	432
800	800	373	800	820	556
900	900	423	900	920	679
1000	1000	473	1000	1020	864

带颈对焊法兰YC-PH-C

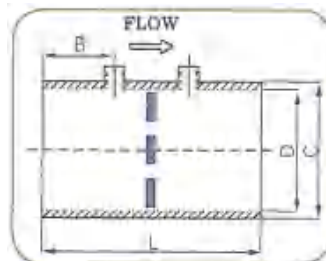
Welding neck flange YC-PH-C



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	48	15	55	8
20	150	48	20	55	9
25	150	48	25	55	9
32	150	48	32	55	9
40	150	48	40	80	9
50	200	73	50	80	11
65	200	73	65	95	14
80	200	73	80	110	20
100	250	98	100	130	25
125	250	98	125	155	35
150	300	123	150	180	49
200	350	148	200	230	63
250	400	173	250	270	118
300	500	223	300	320	139
350	500	223	350	370	181
400	600	273	400	420	208
450	600	273	450	470	292
500	600	273	500	520	306
600	600	273	600	620	347
700	700	323	700	720	486
800	800	373	800	820	625
900	900	423	900	920	764
1000	1000	473	1000	1020	972

管道直焊式YC-PH-E

Pipe direct-welding YC-PH-E



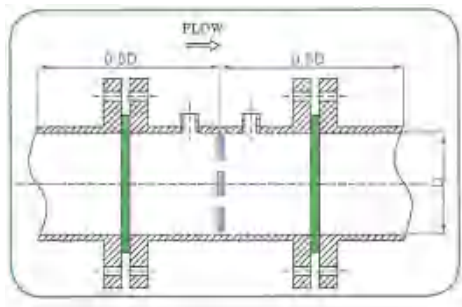
公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D (mm)	C (mm)	重量 Weight (Kg)
15	150	48	15	55	5
20	150	48	20	55	6
25	150	48	25	55	6
32	150	48	32	55	6
40	150	48	40	80	6
50	200	73	50	80	8
65	200	73	65	95	10
80	200	73	80	110	14
100	250	98	100	130	18
125	250	98	125	155	25
150	300	123	150	180	35
200	350	148	200	230	45
250	400	173	250	270	85
300	500	223	300	320	100
350	500	223	350	370	130
400	600	273	400	420	150
450	600	273	450	470	210
500	600	273	500	520	220
600	600	273	600	620	250
700	700	323	700	720	350
800	800	373	800	820	450
900	900	423	900	920	550
1000	1000	473	1000	1020	700

□ 安装

□ Installation

直管要求: 前0.5D, 后0.5D

Requirement of straight pipe section: upstream 0.5D, downstream 0.5D

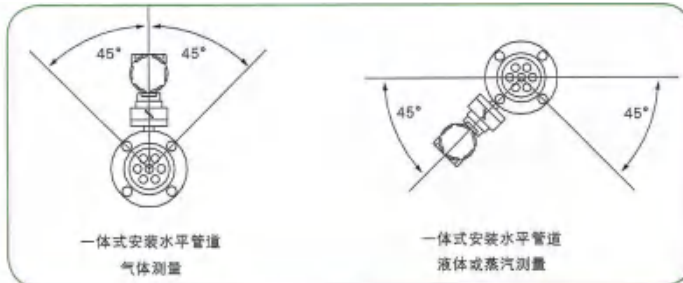


安装位置

Installation position

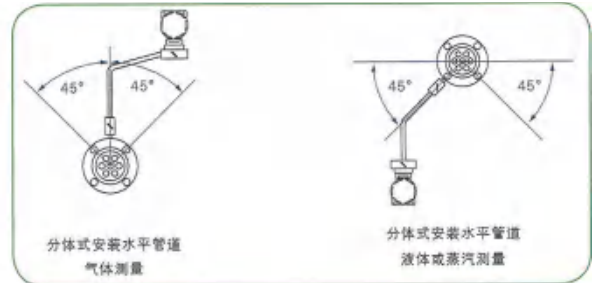
水平管道

Horizontal Pipe



Gas measurement of
integrated installation
horizontal pipe

Liquid or steam
measurement of
integrated installation
horizontal pipe

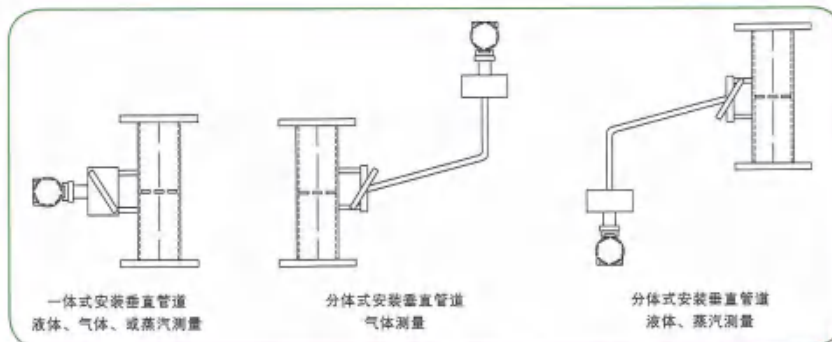


Gas measurement of
separated installation
horizontal pipe

Liquid or steam
measurement of
separated installation
horizontal pipe

垂直管道

Vertical pipe



Liquid, gas or steam measurement of
integrated installation vertical pipe

Gas measurement of
integrated installation
horizontal pipe

Liquid and steam measurement of
separated installation vertical pipe

选型表

Product Type Table

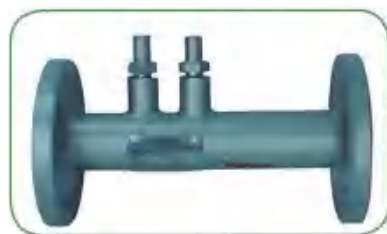
型号 Type	说明 Description
YC-PH	平衡流量计 Balance flowmeter
管道外径/壁厚 Outside diameter of the pipe/wall thickness	×××/××



连接方式 Connection way	A	板式平焊法兰 (PL) PL flange (PL)
	B	带颈平焊法兰 (SO) Plate flange with neck (SO)
	C	带颈对焊法兰 (WN) Welding neck flange (WN)
	D	对夹式 Clamp
	E	带管道直焊式 Pipe direct-welding
	T	特殊连接方式 Special connection mode
管道材质 Material of pipe	F	管道、法兰、连接均为316不锈钢 Pipe, flange and connection use 316 stainless steel
	B	管道、法兰、连接均为304不锈钢 Pipe, flange and connection use 304 stainless steel
	C	管道、法兰、连接均为碳钢 Pipe, flange and connection use carbon steel
	T	特殊材质 Special material
	CS	碳钢 Carbon steel
传感器材质 Material of sensor	SL	316不锈钢 316 stainless steel
	SS	304不锈钢 304 stainless steel
	T	特殊材质 Special material
	GB	国标 National standard
	AS	美标 American standard
法兰标准 Flange standard	HG	化工部标准 Standards for Ministry of chemical industry
	JB	机械部标准 Standards of the Ministry of machinery
	ES	其他标准, 请注明 If other standards, please indicate that
	2.5~420	0.25~42.0MPa (对应GB, HG, JB) 0.25 ~ 42.0MPa (corresponding to GB, HG, JB)
	150~2500	ANSI150~2500 (对应AS) ANSI150 ~2500 (corresponding to AS)
法兰压力等级 Flange pressure rating	F	平面 (FF) Flat surface (FF)
	R	凸面 (RF) Convex surface (RF)
	M	凹凸面 (MFM) Concave convex surface (MFM)
	S	其他 (RJ/TG等) Others (RJ/TG, ect)
	G	1/2"锥螺纹 1/2"taper thread
取压口 Taps	E	法兰取压 Flange tap
	F	一体化取压 Integration tap
	H	高温一体化取压 High temperature integration tap
	S	特殊要求 Special requirement

YC-VZ锥形流量传感器

YC-VZ Cone Flowmeter



□ 概述

□ Introduction

V锥流量计是一种新型的差压式流量测量装置，它以独特的边壁流逐渐收缩节流方式，改变传统节流装置中心流动所带来的缺点，其原理仍为伯努利能量守恒方程和流动连续性原理，并具有自整流、自清洗、自保护性能；直管段要求短，无积污、堵塞，可保持长期测量下限相对很低，从而使量程比达15:1，其永久压损是孔板的1/3与文丘里管相似。因此，V锥流量计可广泛应用于石油、化工、电力、供热等国民经济各领域。

V-cone flowmeter is a new differential flow measurement device. It has changed the defects brought by traditional throttling device, when fluids flow through the center. Its principle is still of the Bernoulli energy conservation equation and continuity of the flow. It also has these features, such as self-rectification, self-cleaning and self-protection. The straight pipe section is short, no accumulated pollutants or blockage. It can maintain relatively very low measurement limit for a long time, so that the range ratio can reach 15:1. Its permanent pressure loss is 1/3 of that of the orifice plate and is similar to the Venturi tube. Thus, V-cone flowmeter can be broadly used to all fields of the national economy, such as petroleum, chemical industry, power and heat supply.

□ 应用范围

□ Scope of Application

V锥流量计可测量单相的液体、气体、蒸汽，对液中含气、气中含液以及或液中含固体颗粒的介质，也能很好满足测量要求；适用于低温、高温、高压以及特殊要求的场合；由于压损小而能耗低，较适用于要求节能降耗的场合，是节能型产品；由于自整流特性直管段要求极短，从而节省了安装空间和安装成本，在无法满足直管段要求而不能试用其他流量的场合，V锥流量是最好的选择。

V-cone flowmeter can measure single-phase liquid, gas and steam. It can also meet the measurement requirements for media containing gas in liquid, liquid in gas and solid particles in liquid. It applies to the site under low temperature, high temperature, high pressure, as well as special requirements. For the small pressure loss and low energy consumption, it can be suitable to the site requiring energy saving and consumption reduction. It is the energy-saving product. Due to the character of self-rectification, the straight pipe section is extremely short, which has saved the installation space and costs. At the sites, where it can not satisfy the requirement of straight pipe section and other flows can not be applied properly, V-cone flowmeter is the best choice.

部分差压式流量计所适用的流体范围

Scope of flow for part differential flowmeters

流体 流量计 Fluid Flowmeter	洁净 气液体 Clean gas and liquid	脏污 气液体 Dirty gas and liquid	腐蚀性液 体 Corrosi- ve liquid	粘性 液体 Viscous liquid	腐蚀 浆体 Abrasive slurry	含纤维 浆液 Fibrous slurry	逆流束 液体 Counter- flow beam liquid	蒸汽 Steam	高温 流体 High tempera- ture fluid	低温 流体 Low tempera- ture fluid	不充满 管道 Unfilled pipe	非牛顿 流体 Non Newtonian fluid	明渠 Open channel
V锥 V cone	○	○	○	◎	○	○	○	○	○	○	×	×	×
孔板 Orifice plate	○	◎	○	◎	×	×	○	○	○	○	×	○	×
文丘里管 Venturi tube	○	√	◎	◎	◎	◎	◎	○	◎	◎	×	◎	×
喷嘴 Nozzle	○	◎	◎	◎	◎	◎	◎	○	◎	◎	×	◎	×
均速管 Uniform velocity pipe	○	◎	√	◎	×	×	◎	○	◎	◎	×	×	×
弯管 Elbow	○	√	√	◎	√	◎	×	○	◎	◎	×	◎	×

○：设计道选

◎：在一定条件下可用

√：通常可用

×：不适用

○：Design and selection

◎：Applicable under certain conditions

√：Applicable

×：Not applicable

□ 测量原理

□ Measurement Principle

V锥流量计是在测量管中心处悬挂V型圆锥体，流体经过锥体后被加速从而静压降低，在锥体后部形成一个低压带，即锥体前后形成静压力差 ΔP 。根据伯努力方程和流量连续性方程可推算出V锥流量计的体积流量方程。

V-cone flowmeter is to hang V-shaped cone in the center of the measuring tube. When the flow passes through the cone, it is accelerated, so that the static pressure becomes lower. At the back of the cone, it has formed a depression belt, which means the front part and the back part of the cone have formed ΔP - the static pressure difference. According to Bernoulli equation and flow rate continuation equation, volume flow rate equation of V-cone flowmeter can be achieved.

$$Q_v = \frac{C \cdot \varepsilon}{\sqrt{1 - \beta_v^4}} \cdot \frac{\pi}{4} D^2 \cdot \beta_v^2 \sqrt{\frac{2 \cdot \Delta P}{\rho}}$$

经过简化后公式为：
Simplified equation:

$$Q_v = \kappa \cdot \varepsilon \cdot \sqrt{\frac{2 \cdot \Delta P}{\rho}}$$

式中： Q_v ：体积流量， m^3/h

Q_v ：Volume flow, m^3/h

β_v ：等效直径比，

β_v ：Equivalent diameter ratio,

$$\beta_v = \sqrt{1 - \frac{d_v^2}{D^2}}$$

d_v ：锥体最大处直径， D ：管道内径

d_v ：Maximum diameter of cone, D : inner diameter of pipe

ρ ：流体工况下密度

ρ ：Density under fluid condition

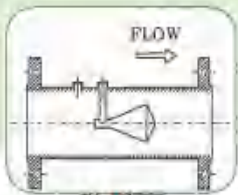
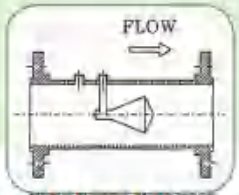
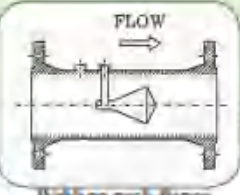
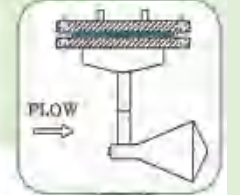
ε ：气体可膨胀性系数

ε ：Gas expansibility coefficient

□ 型号说明
□ Product Types Description

连接方式

Connection way

型号 Type	YC-VZ-01	YC-VZ-02	YC-VZ-03	YC-VZ-04
图示 Diagram				
连接方式 Connection way	板式平焊法兰 PL flange	带颈平焊法兰 Plate flange with neck	带颈对焊法兰 Welding neck flange	插入式 Plug-in
适用范围 Scope of application	管道中空气、液体、蒸汽的测量 Measurement of air, liquid and steam in pipe	管道中空气、液体、蒸汽的测量 Measurement of air, liquid and steam in pipe	管道中空气、液体、蒸汽的测量 Measurement of air, liquid and steam in pipe	管道中空气、液体、蒸汽的测量 Measurement of air, liquid and steam in pipe
公称通径 (DN) Nominal diameter (DN)	15~2000mm或更大 15-2000mm or bigger	15~2000mm或更大 15-2000mm or bigger	15~2000mm或更大 15-2000mm or bigger	15~2000mm或更大 15-2000mm or bigger
标准等级 Standard grade	ANSI150 (PN0.25~2.5)	ANSI150~ANSI300 (PN0.25~5.0)	ANSI150~ANSI2500 (PN0.25~42)	ANSI150 (PN0.25~2.5)
精度 Accuracy	±0.5%			
重复性 Repeatability	±0.1%			
量程比 Range ratio	大于10: 1 Bigger than 10:1			
标准 β 值 Standard value of β	0.450~0.850			
压力损失 Pressure loss	随 β 值变化而变化 Change with β value			
安装要求 Installation requirement	前0~3D, 后0~1D Upstream 0-3D, downstream 0-1D			



型号 Type	YC-VZ-05	YC-VZ-06	YC-VZ一体 YC-VZ Integration	YC-VZ高温一体 YC-VZ High temperature integration
图示 Diagram				
连接方式 Connection way	对夹式 Clamp	带管道直焊式 Direct-welding with pipe	一体式 Integration	高温一体式 High temperature integration
适用范围 Scope of application	小直径高流速管道中空气、液体、蒸汽的测量 Measurement of air, liquid and steam in small diameter and high velocity pipe	空气、液体、蒸汽的测量 Measurement of air, liquid and steam	空气、液体、蒸汽的测量 Measurement of air, liquid and steam	空气、液体、蒸汽的测量 Measurement of air, liquid and steam
公称通径 (DN) Nominal diameter	15~150mm或更大 15-150mm or bigger	15~2000mm或更大 15-2000mm or bigger	15~2000mm或更大 15-2000mm or bigger	15~2000mm或更大 15-2000mm or bigger
标准等级 Standard grade	ANSI150 (PN0.25~2.5)	ANSI150~ANSI300 (PN0.25~42)	ANSI150~ANSI2500 (PN0.25~42)	ANSI150~ANSI300 (PN0.25~5.0)
精度 Accuracy	$\pm 0.5\%$			
重复性 Repeatability	$\pm 0.1\%$			
量程比 Range ratio	大于10: 1 bigger than 10:1			
标准 β 值 Standard value of β	0.450~0.850			
压力损失 Pressure loss	随 β 值变化而变化 Change with β value			
安装要求 Installation requirement	前0~3D, 后0~1D Upstream 0-3D, downstream 0-1D			

取压方式

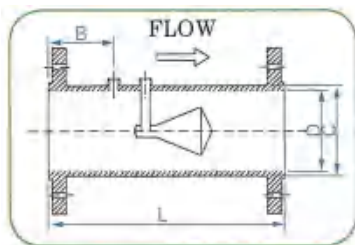
Pressure tap mode

名称 Type	1/2"锥螺纹 1/2" taper thread	法兰取压 Flange tap	一体化取压 Integration tap	高温一体化取压 High temperature integration tap
图示 Diagram				
适用范围 Scope of application	各种温度、压力不高, 应用于气体、液体、蒸汽 Max.ANSI2500 All kinds of temperature and not too high pressure, applied to gas, liquid and steam Max.ANSI2500	高温、高压、高粘度, 应用于气体、液体、蒸汽 Max.ANSI2500 High temperature, high pressure, and high viscosity, applied to gas, liquid and steam Max.ANSI2500	各种温度小于100℃、压力小于5MPa, 其应用于气体、液体、蒸汽 Max.ANSI300 High temperature, high pressure, and high viscosity, applied to gas, liquid and steam Max.ANSI300	高温小于350℃, 压力小于5MPa, 应用于气体、液体、蒸汽 Max.ANSI300 High temperature is less than 350℃, pressure is less than 5MPa, applied to gas, liquid and steam Max.ANSI300

□ 尺寸表
□ Dimension Table

板式平焊法兰YC-VZ-01

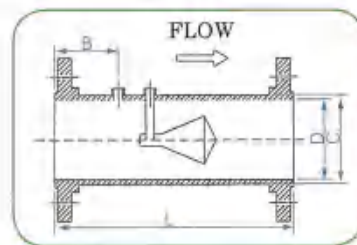
PL flange YC-VZ-01



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D不锈钢 Stainless steel (mm)	D碳钢 Carbon steel (mm)	C (mm)	重量 Weight (Kg)
15	200	89	15	--	21	6
20	200	89	21	--	27	7
25	200	89	26	--	34	7
32	200	89	32	--	38	7
40	250	76	40	--	48	7
50	300	86	52	--	60	9
65	300	89	66	66	76	11
80	350	95	80	78	89	16
100	400	102	104	102	114	23
125	400	102	125	125	133	39
150	550	102	149	145	159	50
200	550	118	205	203	219	73
250	700	118	257	254	273	118
300	750	124	307	305	325	153
350	750	140	359	357	377	186
400	750	140	405	406	426	206
450	800	10	460	460	480	262
500	900	140	506	510	530	332
600	1200	241	610	610	630	481
700	1500	241	--	700	720	599
800	1500	241	--	800	820	686
900	1500	241	--	900	920	750
1000	1800	292	--	1000	1020	996
1200	1800	292	--	1200	1220	1185
1400	2100	292	--	1400	1420	1574
1600	2450	342	--	1600	1620	2021
1800	2750	342	--	1800	1820	2577
2000	3100	342	--	2000	2020	3210

带颈平焊法兰YC-VZ-02

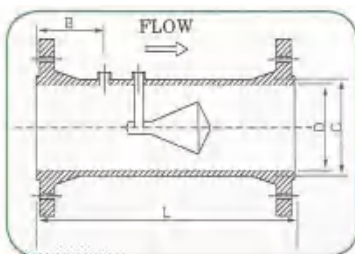
Plate flange with neck YC-VZ-02



公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D不锈钢 Stainless steel (mm)	D碳钢 Carbon steel (mm)	C (mm)	重量 Weight (Kg)
15	200	89	15	--	21	7
20	200	89	21	--	27	8
25	200	89	26	--	34	8
32	200	89	32	--	38	8
40	250	76	40	--	48	8
50	300	86	52	--	60	10
65	300	89	66	66	76	12
80	350	95	80	78	89	18
100	400	102	104	102	114	26
125	400	102	125	125	133	43
150	550	102	149	145	159	56
200	550	118	205	203	219	81
250	700	118	257	254	273	131
300	750	124	307	305	325	170
350	750	140	359	357	377	207
400	750	140	405	406	426	229
450	800	10	460	460	480	291
500	900	140	506	510	530	369
600	1200	241	610	610	630	534
700	1500	241	--	700	720	666
800	1500	241	--	800	820	762
900	1500	241	--	900	920	833
1000	1800	292	--	1000	1020	1107
1200	1800	292	--	1200	1220	1317
1400	2100	292	--	1400	1420	1749
1600	2450	342	--	1600	1620	2246
1800	2750	342	--	1800	1820	2863
2000	3100	342	--	2000	2020	3567

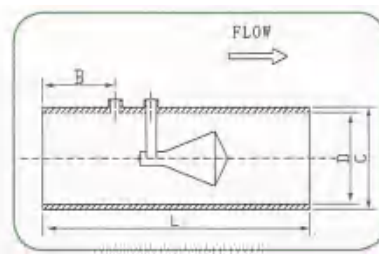
带颈对焊法兰YC-VZ-03

Welding neck flange YC-VZ-03



带管道直焊式YC-VZ-06

Pipe direct-welding YC-VZ-06

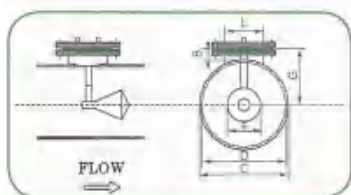


公称通径 Nominal diameter (DN)	PN1.0-2.5		PN4.0-6.4		D不锈钢 Stain less steel (mm)	D碳钢 Carbon steel (mm)	C (mm)	重量 Weight (Kg)
	L (mm)	B (mm)	L (mm)	B (mm)				
15	200	89	250	89	15	-	21	8
20	200	89	250	89	20	-	27	9
25	200	89	250	89	25	-	64	9
32	200	89	250	89	32	-	38	9
40	250	76	300	76	40	-	48	9
50	300	86	350	86	50	-	60	11
65	300	89	350	89	65	-	76	14
80	350	95	400	95	80	-	89	20
100	400	102	450	102	100	-	114	29
125	400	102	450	102	125	125	133	49
150	550	102	600	102	150	150	168	63
200	550	118	600	118	200	200	219	91
250	700	118	750	118	254	254	273	148
300	750	124	800	124	305	303	325	191
350	750	140	800	140	337	333	377	233
400	750	140	800	140	387	381	426	258
450	800	10	850	140	460	460	480	328
500	900	140	950	140	500	500	208	415
600	1200	241	1250	241	600	600	609	601
700	1500	241	-	-	-	700	720	749
800	1500	241	-	-	-	800	820	858
900	1500	241	-	-	-	900	920	938
1000	1800	292	-	-	-	1000	1020	1245
1200	1800	292	-	-	-	1200	1220	1481
1400	2100	292	-	-	-	1400	1420	1968
1600	2450	342	-	-	-	1600	1620	2526
1800	2750	342	-	-	-	1800	1820	3221
2000	3100	342	-	-	-	2000	2020	4013

公称通径 Nominal diameter (DN)	L (mm)	B (mm)	D不锈钢 Stain less steel (mm)	D碳钢 Carbon steel (mm)	C (mm)	重量 Weight (mm)
15	200	89	15	-	21	5
20	200	89	21	--	27	6
25	200	89	26	--	34	6
32	200	89	32	--	38	6
40	250	76	40	--	48	6
50	300	86	52	--	60	8
65	300	89	66	66	76	10
80	350	95	80	78	89	14
100	400	102	104	102	114	21
125	400	102	125	125	133	35
150	550	102	149	145	159	45
200	550	118	205	203	219	66
250	700	118	257	254	273	106
300	750	124	307	305	325	138
350	750	140	359	357	377	167
400	750	140	405	406	426	185
450	800	140	460	460	480	236
500	900	140	506	510	530	299
600	1200	241	--	610	630	433
700	1500	241	--	700	720	539
800	1500	241	--	800	820	617
900	1500	241	--	900	920	675
1000	1800	292	--	1000	1020	896
1200	1800	292	--	1200	1220	1067
1400	2100	292	--	1400	1420	1417
1600	1450	342	--	1600	1620	1819
1800	2750	342	--	1800	1820	2319
2000	3100	342	--	2000	2020	2889

插入式YC-VZ-04

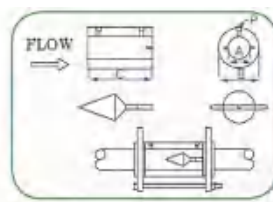
Plug in YC-VZ-04



开孔尺寸 Hole dimension L (mm)	锥体直径 范围 Cone diameter range F (mm)	使用管道 范围 Pipe range D (mm)	法兰等级 Flange rating PN0.25~1.0 B (mm)	法兰等级 Flange rating PN1.6~2.5 B (mm)
150	140	150~350	125	150
200	191	200~500	125	150
250	241	250~600	125	150
300	292	300~750	125	150
350	324	350~750	125	150
400	375	400~900	125	150
450	426	450~1000	175	200
500	476	500~1200	175	200
600	578	600~1400	175	200
750	730	750~1700	175	200
900	883	900~2250	175	200

对夹式YC-VZ-05

Clamp YC-VZ-05

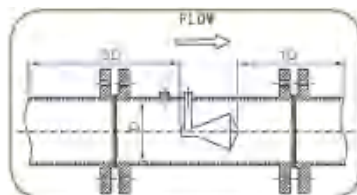


公称通径 Nominal diameter (DN)	L (mm)	D (mm)	C (mm)	P (NPT)	重量 Weight (Kg)
15	15	56	60	1/2"	5
20	20	58	60	1/2"	5
25	25	68	60	1/2"	6
40	40	88	80	1/2"	7
50	50	102	85	1/2"	8
65	65	122	100	1/2"	10
80	80	138	120	1/2"	12
100	100	158	150	1/2"	15
150	150	212	240	1/2"	20

□ 安装 □ Installation

直管段要求：前0~3D，后0~1D

Requirement of straight pipe section: upstream 0~3D, downstream 0~1D

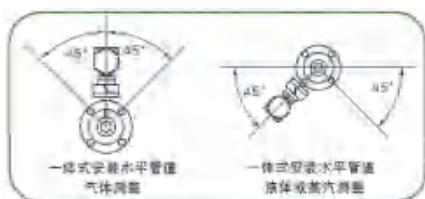


安装位置

Installation position

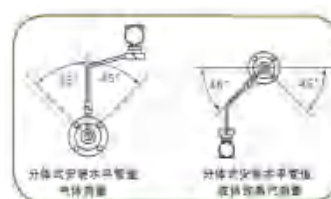
水平管道

Horizontal pipeline



Gas measurement of integrated installation horizontal pipe

Liquid or steam measurement of integrated installation horizontal pipe



Gas measurement of separated installation horizontal pipe

Liquid or steam measurement of separated installation horizontal pipe

垂直管道

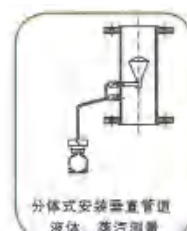
Vertical pipeline



Liquid, gas or steam measurement of integrated installation vertical pipe



Gas measurement of separated installation vertical pipe



Liquid and steam measurement of separated installation vertical pipe

□ 选型表 □ Product Type Table

型号 Type	说明 Description
YC-VZ	锥管流量传感器 Cone flow sensor
管道外径/壁厚 Outside diameter of the pipe/wall thickness	×××/××



连接方式 Connection way	01	板式平焊法兰 (PL) PL flange (PL)
	02	带颈平焊法兰 (SO) Plate flange with neck (SO)
	03	带颈对焊法兰 (WN) Welding neck flange (WN)
	04	插入式 Plug-in
	05	对夹式 Clamp
	06	带管道直焊式 Pipe direct-welding
测量管材质 Material of measuring pipe	1	316不锈钢 316 stainless steel
	2	304不锈钢 304 stainless steel
	3	碳钢 Carbon steel
	4	特殊材质 Special material
锥体材质 Material of cone	CS	碳钢 Carbon steel
	SL	316不锈钢 316 stainless steel
	SS	304不锈钢 304 stainless steel
	T	特殊材质 Special material
法兰标准 Flange standard	GB	国标 National standard
	AS	美标 American standard
	HG	化工部标准 Standards for Ministry of chemical industry
	JB	机械部标准 Standards of the Ministry of machinery
	ES	其他标准, 请注明 If other standards, please indicate that
法兰压力等级 Flange pressure rating	2.5~420	0.25~42MPa (对应GB, HG, JB) 0.25 ~ 42MPa (corresponding to GB, HG, JB)
	150~2500	ANSI150~2500 (对应AS) ANSI150 ~2500 (corresponding to AS)
法兰密封面 Face of flange	1	平面 (FF) Flat surface (FF)
	2	凸面 (RF) Convex surface (RF)
	3	凹凸面 (MFM) Concave convex surface (MFM)
	4	其他 (RJ/TG等) Others (RJ/TG, ect)
取压口 Taps	1	1/2"锥螺纹 1/2" taper thread
	2	法兰取压 Flange tap
	3	一体化取压 Integration tap
	4	高温一体化取压 High temperature integration tap
	5	特殊要求 Special requirement

FL 冷凝器 FL Condenser



测量蒸汽流量时，节流装置和差压变送器之间必须安装二个位于同一高度上的冷凝器，使蒸汽冷凝成液体后将测量信号传送给差压变送器。对于工作过程中压力容室容积变化大的差压变送器，安装冷凝器可以大大减少因室容积变化而造成导压管内冷凝液柱高度的变化。

When measuring the steam flow, two condensers must be installed at the same height between the throttle device and the differential pressure transmitter, which can condense steam into liquid and transmit the measuring signal to the differential pressure transmitter. For the differential pressure transmitter with large changes in the volume of the chamber during the working process, installing the condenser can largely reduce the changes of the height of condensing liquid column inside the connecting pipe due to the changes of the volume of the chamber.

□ 主要技术指标

□ Main Technical Specifications

型号 Type	最大工作压力MPa Maximum operating pressure MPa	容积截面积cm ² Volume sectional area cm ²	材料 Material
FL-64	6.4	100	20号钢 No.20 steel
YZF-H	10		20号钢 No.20 steel
YZF-Y	10		12Gr1MoV

□ 工作原理

□ Operating Principle

蒸汽容易变液体，但要在节流件正负压取压孔出口装两个容积足够大的，高度相等的冷凝器，使蒸汽在经过冷凝器后变成液体，由液体将测量信号传送到差压变送器上。

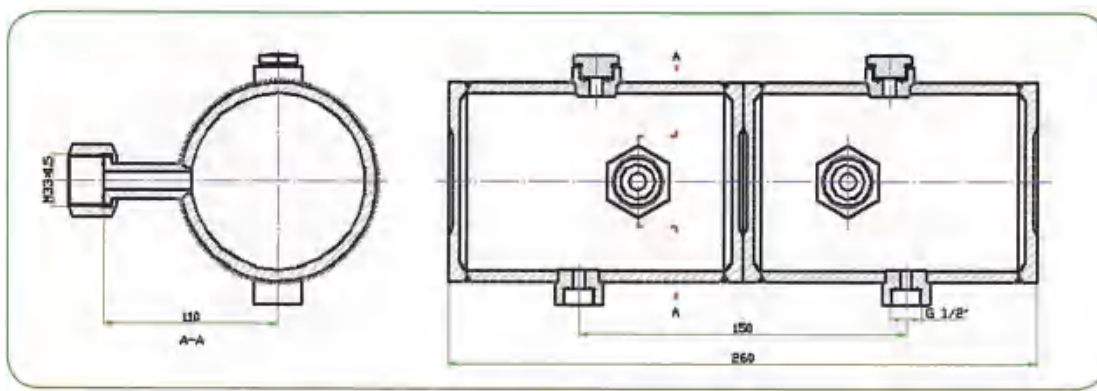
Steam is easy to change into liquid, but two condensers with enough volume and equal height should be installed at the outlet of positive and negative pressure tapping holes of throttle parts. Thus, the steam will become

liquid after passing through the condenser, and the measurement signal will be transmitted to the differential pressure transmitter by the liquid.

- ☐ 外形及安装尺寸
- ☐ Outline and Installation Dimension

单位: mm

Unit: mm



FG隔离器 FG Isolator



测量粘性或腐蚀性液体或气体的流量时，在节流装置和差压变送器之间要安装隔离器，使被测介质不能直接进入差压变送器，而由隔离液将差压信号传送到差压变送器上。

When measuring the flow of viscous or corrosive liquid or gas, an isolator shall be installed between the throttle device and the differential pressure transmitter. Thus, the measured medium cannot enter the differential pressure transmitter directly, and the differential pressure signal is transmitted to the differential pressure transmitter by the isolating liquid.

☐ 型号规格 ☐ Type Specifications

型号 Type	FG-64A	FG-64B
最大工作压力 (MPa) Maximum operating pressure (MPa)	6.4	
适用范围 Scope of application	被测介质的密度小于隔离液 The density of measured medium is less than that of isolation liquid	被测介质的密度大于隔离液 The density of measured medium is more than that of isolation liquid
材料 Material	碳钢 Carbon steel	

☐ 结构原理 ☐ Structural Principle

在隔离器到差压变送器之间注入隔离液，开始时正、负压室两边的隔离液界面必须调整为一样高，并且隔离液中不允许有气泡或泄露现象。这样隔离液就能起传送压力差和保护差压变送器的作用。

Injecting the isolation liquid between the isolator and the differential pressure transmitter. At the beginning, the isolation liquid interface on both sides of the positive and negative pressure chambers must be adjusted to the same height, and no bubble or leakage is allowed in the isolation liquid. In this way, the isolating liquid can transmit the pressure difference and protect the differential pressure transmitter.

当被测介质的密度小于隔离液时，采用FG-64A型隔离器（见图1）。当被测介质的密度大于隔离液时，

采用FG-64B型隔离器（见图2）

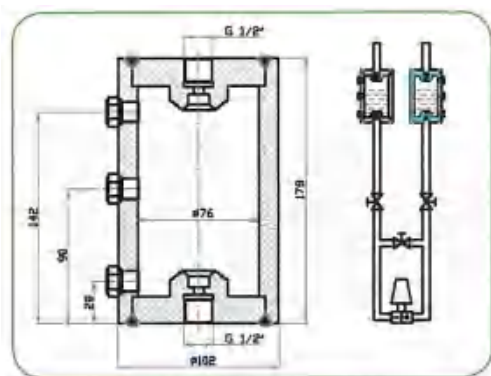
When the density of the measured medium is less than that of isolation liquid, FG-64A isolator can be used (see Figure 1). When the density of the measured medium is greater than the isolation liquid, FG-64B isolator can be used (see Figure 2).

□ 外形及安装尺寸

□ Outline and Installation Dimension

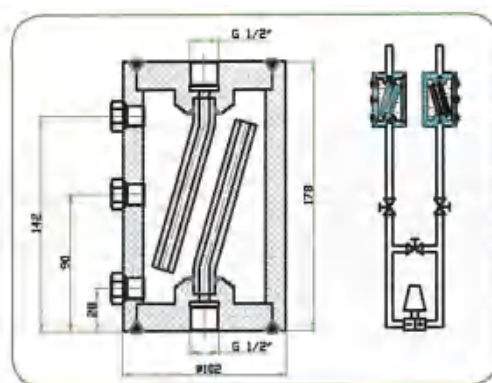
单位：mm

Unit: mm



FG-64A型（图1）

FG-64A (Figure 1)



FG-64B型（图2）

FG-64B (Figure 2)

FP平衡器 FP Balancer

FP型平衡器是非法兰式差压变送器用于测量液位时用的附件。测量低压容器的液位时，采用FP-64A型单层平衡器；测量锅炉水鼓水位时，应采用FP-64B型双层平衡器。

FP balancer is an accessory of non-flanged differential pressure transmitter that is used to measure liquid level. FP-64A single-layer balancer can be used to measure the liquid level of low-pressure vessel; FP-64B double-layer balancer can be used to measure the water level of boiler water drum.

□ 工作原理

□ Operational Principle

测量低压容器的液位时，当容器内外温差大，或气相容器凝结成液体，就要采用FP-64A型单层平衡器进行测量（见图1）。将平衡器中充灌隔离液，其重度为 ρ_2 。

When measuring the liquid level of the low-pressure vessel, FP-64A single-layer balancer is used to measure if the temperature inside and outside the vessel or vapor phase vessel is condensed to liquid (see Figure 1). The balancer is filled in spacer fluid and its weight is ρ_2 .

此时，变送器承受的压差 $\Delta P = \rho_1(H+h_1+h_2) - \rho_2 h_3 = \rho_1 H - (\rho_2 h_3 - \rho_1 h_1 - \rho_1 h_2)$ 式中 $(\rho_2 h_3 - \rho_1 h_1 - \rho_1 h_2)$ 是不变值，调正变送器的迁移量可以将这个不变值平衡掉，于是变送器的输出压力一般与测量信号（H）的变化有关。

At this moment, differential pressure born by the transmitter is $\Delta P = \rho_1(H+h_1+h_2) - \rho_2 h_3 = \rho_1 H - (\rho_2 h_3 - \rho_1 h_1 - \rho_1 h_2)$, in which $(\rho_2 h_3 - \rho_1 h_1 - \rho_1 h_2)$ is the unchanged value. Adjusting the transfer volume of the transmitter can balance out the unchanged value. Thus, output pressure of the transmitter is generally related to the changes of the measuring signal (H).

平衡器由内外二层容室构成。平衡器的外层容室与锅炉水鼓的蒸汽部份相连，外层容室内注满了水，冷凝水，当液面低于平衡器上侧导压管时，由冷凝水补足，当液面高于平衡器上侧导压管时，水经导压管流入锅炉，外层容室水位高度始终保持不变。平衡器的内层容室（水位管）经平衡器下侧导压管与锅炉水鼓的水相连通，其水位高度随水鼓的水位变化而变化。平衡器外层容室与变送器的低压侧连接（变送器负迁移补偿之），水位管与变送器高压侧连接。当蒸汽的压力，温度参数恒定时，变送器的输出信号仅与锅炉水鼓的水位有关（图2）。

The balancer is composed of inner and outer two-layer chambers. The outer chamber of the balancer is related to the steam part of the boiler water drum. And the outer chamber is filled in water and the water is condensed. When the liquid level is lower than the upper connecting pipe, it is filled by replacement of condensed water. When the liquid level is higher than the side connecting pipe on the balancer, water flows in the boiler through the connecting piper. The height of the water level of the outer chamber remains unchanged. The inner chamber of the balancer (water level tube) is connected with the water of the boiler water drum through the lower connecting pipe of the balancer. Its water level height changes as the water level of the water drum changes. The outer chamber of the balancer connects with the low pressure side of the transmitter. The water level tube connects the high pressure side of the transmitter. When the pressure and the temperature parameters of steam are constant, the output signal of the transmitter is only related to the water level of the water drum of the boiler (Figure 2).

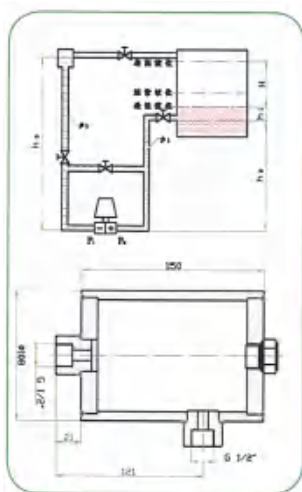


图1 FP-64A
Figure 1 FP-64A

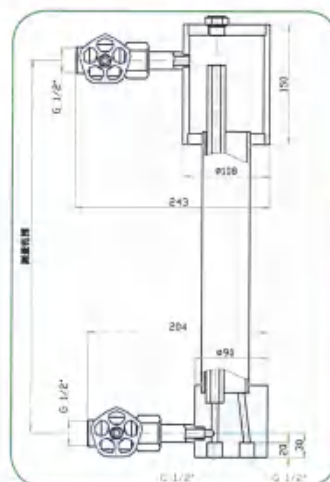
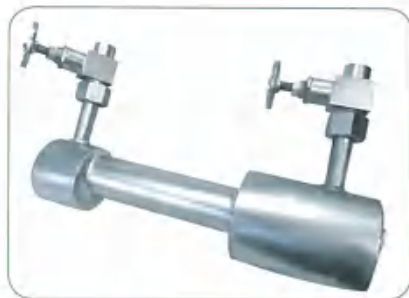


图2 FP-64B
Figure 2 FP-64A

□ 型号规格
□ Type Specifications

型号 Type	名称 Name	工作压力MPa Operating pressure MPa	测量范围KPa Measurement range KPa
FP-64A	单层平衡器 Single layer balancer	6.4	
FP-64B	双层平衡器 Double layer balancer	6.4	用户自定 User defined

注：FP-64A有三个接头

Note: FP-64A has three connectors

FP-64B只有平衡器部分及水位管，带两个截止阀。

FP-64B only has balancer part and water level pipe with two stop valves.

YC-LGW-DH型插入式多喉径流量测量

YC-LGW-DH Plug-in Multi-throat Runoff Measurement

概述

Introduction

YC-LGW-DH 型插入式多喉径流量装置是采用航空动力学原理，以航空喷气发动机进气道为模型设计的入口，使用了内部整流直管段，双环室取压以及多级提速技术，构成了一个具有较小压力损失的、插入式安装形式的流量测量装置。适用于具有一定直管段的冷、热空气及其它气体的流速及流量的测量。

YC-LGW-DH plug-in multi-throat runoff device is a flow measurement device with small pressure loss and plug-in installation form, which adopts the principle of aero-dynamics, takes the inlet of aero-jet engine as the model design, and uses the internal rectifying straight pipe section, double-ring chamber pressure measurement and multi-stage speed-up technology. It is suitable for measuring the flow rate and flow rate of cold, hot air and other gases with a certain straight pipe section.



插入式多喉径流量装置

Plug-in multi-throat runoff device

主要技术指标

Main Technical Indicators

- 工作压力: $-100\text{kPa} \sim 1\text{MPa}$
Working pressure: $-100\text{ kPa} \sim 1\text{MPa}$
- 工作温度: $-40^{\circ}\text{C} \sim 400^{\circ}\text{C}$
Working temperature: $-40^{\circ}\text{C} \sim 400^{\circ}\text{C}$
- 测量精度: $\pm 1\%$
Measurement accuracy: $\pm 1\%$
- 量程比: 10: 1
Range ratio: 10: 1
- 安装开孔尺寸: (与管道尺寸有关) 长: 300mm, 宽: 160mm;
Installation opening size: (related to pipe size) length: 300mm, width: 160mm;
- 适用范围: 当量直径大于 300mm 的圆管或矩形管道;
Scope of application: round pipe or rectangular pipe with equivalent diameter greater than 300mm;
- 适应直管段: 前 4D、后 2D;
Adapt to the straight pipe section: upstream 4D, downstream 2D;

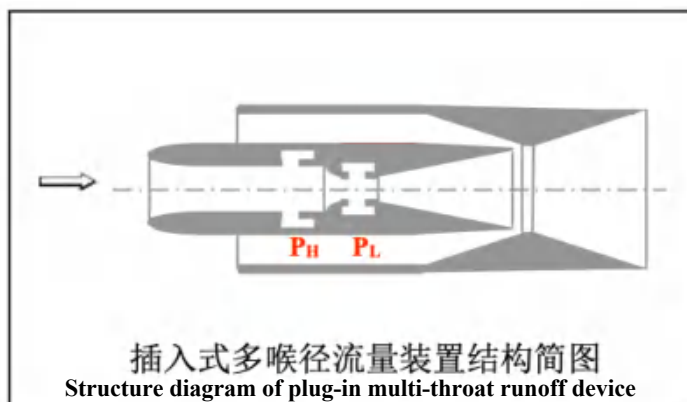
8. 适用介质：空气及其它气体

Applicable medium: air and other gases

测量原理

Measuring Principle

介质从按航空发动机模型设计的入口进入内部整流段，使流体充分发展为紊流状态（并通过设置在此处的环室取出高压），以便于流体进入测量喉部进行流速测量，在喉部最小处，由于流速提高，其静压降低（通过设置在此处的环室取出低压）；而经过外导流管的流体，通过外提速段，在内扩散段的末端形成负压区，达到对中心流的抽吸和引流作用，使测量喉部的静压进一步降低，从而达到信号放大及稳压的目的。



The medium enters the internal rectifying section from the inlet designed according to the aero-engine model, and the fluid can fully develop into turbulent state (and the high pressure is taken out through the annular chamber arranged here), so that the fluid can enter the measuring throat to measure the flow rate. At the throat minimum, the static pressure decreases due to the increase of the flow rate (the low pressure is taken out through the annular chamber arranged here); However, the fluid passing through the outer flow guide pipe forms a negative pressure zone at the end of the inner diffusion section through the outer speed-increasing section, which achieves the suction and drainage of the central flow, further reduces the static pressure of the measuring throat, and thus achieves the purpose of signal amplification and pressure stabilization.

数学模型

Mathematical Model

体积流量

Volume flow

$$Q_v = K_v \cdot \gamma \cdot (\Delta P/P)^{1/2} \quad \text{m}^3 / \text{h}$$

质量流量

Mass flow

$$Q_m = K_m \cdot \gamma \cdot (\Delta P \cdot P)^{1/2} \quad \text{kg} / \text{h}$$

式中：

Where:

ΔP ---- 输出差压 Pa

ΔP ---- Output differential pressure Pa

P ---- 介质密度 kg/m^3

P ---- Density kg/m^3

Kv ---- 体积流量系数

Kv ---- Volume flow coefficient

Km ---- 质量流量系数

Km ---- Mass flow coefficient

γ ---- 干扰系数（与前后阻流件、内部支撑件等有关）

γ ---- Interference coefficient (related to upstream and downstream spoilers, internal supports, etc.)

YC-LGW-DH-D 型插入式多点均速双喉径流量测量

YC-LGW-DH-D Plug-in Multi-point Average Speed Double Throat Runoff

Measurement

概述

Introduction

YC-LGW-DH-D 型插入式多点均速双喉径流量装置是在插入式双喉径流量测量装置基础上开发研制的又一种流量测量的新产品。产品利用了多喉径流量装置的大信号、防堵性能优越的特点，结合巴类流量计多点均速的流量测量技术，将多个外形设计为子弹头形状的双喉径流量装置组合在一起，然后将各自的高、低压取压室分别相互串联，最后引出差压信号。可广泛用于各种风量测量场合，特别适合于火力发电厂的一次、二次风量以及安装直管段不足的磨煤机入口风量的测量。

YC-LGW-DH-D plug-in multi-point average speed dual-throat runoff device is another new product of flow measurement developed on the basis of plug-in dual-throat runoff measurement device. The product makes use of the characteristics of large signal and excellent anti-blocking performance of multi-throat runoff devices, and combines the multi-point average speed flow measurement technology of bar flowmeter, and combines several dual-throat runoff devices designed in bullet shape, then connects their respective high-pressure and low-pressure pressure tapping chambers in series, and finally leads out the differential pressure signal. It can be widely used in all kinds of air volume measurement conditions, especially for the measurement of primary and secondary air volume in thermal power plants and the inlet air volume of coal mills with insufficient straight pipe sections.



主要技术指标

Main Technical Indicators

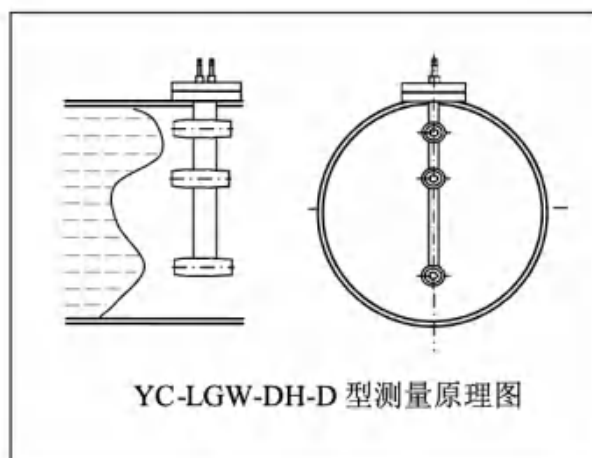
1. 工作压力: $-10\text{kPa} \sim 3.5\text{MPa}$;
Working pressure: $-10\text{kPa} \sim 3.5\text{MPa}$;
2. 工作温度: $-40^{\circ}\text{C} \sim 400^{\circ}\text{C}$ (水: $0 \sim 90^{\circ}\text{C}$);
Working temperature: $-40^{\circ}\text{C} \sim 400^{\circ}\text{C}$ (Water: $0 \sim 90^{\circ}\text{C}$);
3. 测量精度: $\pm 1\%$
Measurement accuracy: $\pm 1\%$
4. 量程比: 10 : 1
Range ratio: 10: 1
5. 安装开孔尺寸: (与管道尺寸有关) 长: $136 \sim 200$, 宽: $30 \sim 60$;
Installation opening size: (related to pipe size) length: $136 \sim 200$, width: $30 \sim 60$;
6. 适用范围: 当量直径大于 50mm 的圆管或矩形管道;
Scope of application: round pipe or rectangular pipe with equivalent diameter greater than 50mm ;
7. 适用介质: 空气、水及其它气体
Applicable medium: air, water and other gases.

测量原理

Measuring Principle

根据速度面积法流量计量原理, 将多个外形依据子弹头形状设计的双喉径流量测量装置, 按设计位置组合在一起, 然后安装于被管道中进行流速(流量)的计量。在使用时可根据管道尺寸大小、节流件前后阻力件的形式和安装直管段以及管内流态分布情况, 安装一套或多套本测量装置, 并将它们的高、低压引压管分别互相连通后取出输出信号, 从而达到多点差压(流速)平均的目的, 克服了由于安装直管段不足、节流件前后阻力件及管道内部支撑件等阻流件引起的流场畸变(如上图所示流场)造成的测量误差。

Based on the principle of flow measurement by velocity area method, several double-throat runoff measuring devices designed on the basis of the shape of bullet are combined according to the designed position, and then installed in the pipeline to measure the current speed (flow rate). When in use, one or more sets of this measuring device can be installed according to the size of the pipeline, the form of upstream and downstream resistance parts of throttle, the installation of straight pipe sections and the distribution of flow patterns in the pipeline, and their high and low pressure pipes are connected with each other to take out the output signals, so as to achieve the goal of multi-point differential pressure (flow rate) averaging, and overcome the distortion of flow field measurement (shown in the



Measurement schematic diagram of YC-LGW-DH-D

above figure) caused by insufficient installation of straight pipe sections, upstream and downstream resistance parts of the throttle piece and resistance pieces inside the pipeline.

数学模型

Mathematical Model

体积流量

Volume flow

$$Q_v = K_v \cdot A \cdot W \cdot I \cdot (\Delta P/P)^n \quad \text{m}^3 / \text{h}$$

质量流量

Mass flow

$$Q_m = K_m \cdot A \cdot W \cdot I \cdot (\Delta P \cdot P)^n \quad \text{kg} / \text{h}$$

式中:

Where:

A ---- 管道内截面积 m^2

A ---- Cross-sectional area of the pipeline m^2

W ---- 结构系数

W ---- Structural coefficient

I ---- 流量分布系数

I ---- Flow distribution coefficient

ΔP ---- 输出差压 Pa

ΔP ---- Output differential pressure Pa

K_v ---- 体积流量系数

K_v ---- Volume flow coefficient

K_m ---- 质量流量系数

K_m ---- Mass flow coefficient

P ---- 介质密度 kg/m^3

P ---- Density kg/m^3

n ---- 流量系

n ---- Flow system

主要特点

Main Features

1. 插入式结构，安装简单、维修方便

Plug-in structure, simple installation and convenient maintenance

2. 压力损失小:

Low pressure loss:

压力损失一般为标准节流装置的 1/10 以内;

The pressure loss is generally less than 1/10 of the standard throttling device;

3. 差压信号较大:

Large differential pressure signal:

具有插入式双喉径流量装置的特点，是巴类流量计输出差压的两倍以上;

It has the characteristics of plug-in double-throat runoff device, which is more than twice the output differential pressure of bar flowmeter;

4. 信号输出稳定:

Stable signal output:

由于该装置各个测点都采用环室取压方式，可获得更为稳定的输出信号;

Each measuring point of the device adopts ring chamber pressure measurement mode, it can obtain more stable output signal;

5. 更适应大尺寸管道流量计量。

More suitable for large-size pipeline flow measurement.

按照速度面积法原理设置测点个数，与单点式测量方法相比，径向多点均速测量方式取得的流速大小，更能准确地反映整个管道内部的流体流量状况。

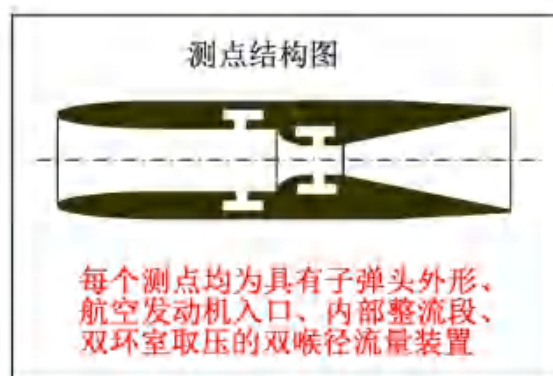
According to the principle of velocity area method, the number of measuring points is set. Compared with the single-point measurement method, the velocity obtained by the radial multi-point average velocity measurement method can more accurately reflect the fluid flow in the whole pipeline.

6. 直管段要求低:

Low requirements for straight pipe sections:

每个测点均有内部整流段，对前直管短要求较低。一般情况下，使用两套本装置构成的多点均速双喉径流量计，单弯管前后直管段长度可小至 0.5D，后直管段长度为 0.2D。

Structure diagram of measuring points



Each measuring point is a double-throat runoff device with bullet shape, aero-engine inlet, internal rectifying section and double-ring chamber for pressure measurement.

YC-LGW-DH-D2 type



Each measuring point has an internal rectifier section, which has low requirements for the short upstream straight pipe. In general, using two sets of multi-point average-speed dual-throat flowmeters composed of this device, the length of the upstream straight pipe section after a single bend can be as small as $0.5D$, and the length of the downstream straight pipe section can be $0.2D$.

7. 来流方向校正功能:

Incoming flow direction correction function:

航空发动机入口设计, 可对由于直管段不足, 管道内支撑筋引起的流量不稳有校正效果。

The design of aero-engine inlet can correct the flow instability caused by the lack of straight pipe section and the support ribs in the pipe.

8. 防堵效果显著:

Significant anti-blocking effect:

高、低压取压孔设置在传感器的流速较高的内截面, 再加其环室取压结构, 与正面取压方式的巴类流量计相比, 有更好的防堵效果。

The high-pressure and low-pressure tap holes are arranged in the inner cross section of the sensor with high flow rate, and the ring chamber tap structure has a better plug release effect compared with the front tap type bar flowmeter.

9. 抗干扰、抗冲击的功能:

Anti-interference and anti-impact functions:

每个测量元件均采用外型结构为子弹头形状的双喉径流量测量装置, 而连接支臂采用航空翼形结构, 克服了各测点对流场的干扰, 同时也减小了流体对装置造成的冲击, 保证了装置的机械强度及使用的稳定性。

Each measuring element adopts a double-throat runoff measuring device with bullet-shaped external structure, and the connecting arm adopts an aviation wing-shaped structure, which overcomes the interference of each measuring point on the flow field, reduces the impact of fluid on the device, and ensures the mechanical strength and stability.

YC-LGW-DH-DJ 型插入式二次风流量测量

YC-LGW-DH-DJ Plug-in Secondary Air Flow Measurement

概述

Introduction

YC-LGW-DH-DJ型插入式二次风流量测量装置, 是在插入式多点均速双喉径流量测量装置的基础上针对300MW以上机组二次风管道(管道截面十平方米以上)一种新型流量测量装置, 它根据流体动力学原理、巧妙的利用了流速的动压为正, 和双喉径的静压为负这一原理, 并使两者在相同流速下产生的动压

和静压大小相等、符号相反，从而达到增压的目的（差压为动压的2倍），比使用风速管原理的多点流量测量装置有更大的输出信号。特别适用于电厂、钢厂锅炉的风机出口以及二次风系统冷、热风空气的流量测量。

YC-LGW-DH-DJ plug-in secondary air flow measuring device is a new type that based on plug-in multi-point average-speed dual-throat runoff measuring device, which is aimed at the secondary air pipeline (the pipeline section is more than 10 square meters) of units over 300MW. According to the principle of fluid dynamics, it skillfully makes use of the principle that the dynamic pressure of the flow rate is positive and the static pressure of the dual-throat diameter is negative, and makes the dynamic and static pressure generated by them equal at the same flow rate. It is especially suitable for measuring the flow rate of cold and hot air at the fan outlet of boilers in power plants and steel mills and in secondary air systems.

YC-LGW-DH-DJ plug-in multi-point combined pressurized flow measuring device



主要技术指标

Main Technical Indicators

- 工作压力: -25kPa ~ 1MPa
Working pressure: -25 kPa ~ 1MPa
- 工作温度: -40°C ~ 450 °C
Working temperature: -40 °C ~ 450 °C
- 精度: $\pm 1\%$
Accuracy: $\pm 1\%$
- 量程比: 10: 1
Range ratio: 10: 1
- 适用管道: 管径 1000 以上的管道

Applicable pipelines: pipe diameter above 1000

6. 适应直管段: 前至少 0.5D、后至少 0.2D

Adapt to straight pipe section: at least upstream 0.5D and downstream 0.2D

7. 适用介质: 风机出口, 一、二次冷风及二次热风总管、二次风支管等。

Applicable medium: fan outlet, main pipes of primary and secondary cold air and secondary hot air, secondary air branch pipes, etc.

数学模型

Mathematical Model

体积流量

Volume flow

$$Q_v = K_v \cdot \gamma \cdot (\Delta P/P)^{1/2} \quad \text{m}^3 / \text{h}$$

质量流量

Mass flow

$$Q_m = K_m \cdot \gamma \cdot (\Delta P \cdot P)^{1/2} \quad \text{kg} / \text{h}$$

式中:

Where:

ΔP ---- 输出差压 Pa

ΔP ---- Output differential pressure Pa

P ---- 介质密度 kg/m^3

P ---- Density kg/m^3

K_v ---- 体积流量系数

K_v ---- Volume flow coefficient

K_m ---- 质量流量系数

K_m ---- Mass flow coefficient

γ ---- 干扰系数 (与前后阻流件、内部支撑件等有关)

γ ---- Interference coefficient (related to upstream and downstream spoilers, internal supports, etc.)

工作原理

Working Principle

动压测点是一个由抛物面构成的类似车灯的动压采集装置, 它可以极大地采集到流体的动压信号, 即使来流有一定的偏角, 也可以使其产生足够的动压; 而依照航空发动机入口设计的双喉径也具有来流方向校正功能, 从而增强了使整个流量装置适应性, 实际设计时, 只要保证在相同流速下, 动压和静压大小相等, 符号相反, 即可保证整个流量装置计量的准确性。

The dynamic pressure measuring point is a dynamic pressure collecting device similar to a vehicle lamp, which is composed of a paraboloid. It can greatly collect the dynamic pressure signal of fluid, and even if the incoming flow has a certain deflection angle, it can generate enough dynamic pressure. The double throat diameter

designed according to the inlet of aero-engine also has the function of correcting the incoming flow direction, thus enhancing the adaptability of the whole flow device. In actual design, as long as the dynamic and static pressure are equal in magnitude and opposite in sign at the same flow rate, the accuracy of the whole flow device can be guaranteed.

YC-LGW-DH-DFJ 型插入式一次风流量测量

YC-LGW-DH-DFJ Plug-in Primary Air Flow Measurement

概述

Introduction

YC-LGW-DH-DFJ 型插入式一次风流量测量装置，是针对磨煤机入口特殊工况专门设计的一种截面计量的风量测量装置。由于介质考虑煤粉的影响，因此将原抛物面型动压测量头结构改为内置锥体的动压取压方式，从而彻底解决了磨煤机入口流量装置的防堵及耐磨问题，适用于燃煤锅炉的一次风系统的流量测量。

YC-LGW-DH-DFJ plug-in primary air flow measuring device is a cross-sectional device specially designed for the special working condition of coal pulverizer inlet. Since the medium considers the influence of pulverized coal, the original paraboloid dynamic pressure measuring head structure is changed into a dynamic pressure measuring method with a built-in cone, thus thoroughly solving the problem of blocking prevention and wear resistance of the inlet flow device of the coal pulverizer, and being suitable for the flow measurement of the primary air system of coal-fired boilers.

YC-LGW-DH-DJ series plug-in multi-point combined anti-blocking and wear-resistant flow measuring device



YC-LGW-DH-DJ-D3 type Application example YC-LGW-DH-DJ-J3 type

主要技术指标

Main Technical Indicators

1. 工作压力: -25kPa ~ 1MPa
Working pressure: -25kPa ~ 1 MPa
2. 工作温度: -40°C ~ 450 °C
Working temperature: -40°C ~ 450 °C
3. 精度: ±1%
Accuracy: ±1%
4. 量程比: 10 : 1
Range ratio: 10: 1
5. 适用管道: 管径 1000 以上的管道;
Applicable pipelines: diameter above 1000;
6. 适应直管段: 前至少 0.5D、后至少 0.2D
Adapt to straight pipe section: at least upstream 0.5D and downstream 0.2D
7. 适用介质: 主要适用于一次风系统, 特别适合于垂直管道有防堵要求的风量测量等。
Applicable medium: mainly suitable for primary air system, especially for air volume measurement of vertical pipes with anti-blocking requirements, etc.

数学模型

Mathematical Model

体积流量

Volume flow

$$Q_v = K_v \cdot \gamma \cdot (\Delta P/P)^{1/2} \quad \text{m}^3 / \text{h}$$

质量流量

Mass rate

$$Q_m = K_m \cdot \gamma \cdot (\Delta P \cdot P)^{1/2} \quad \text{kg} / \text{h}$$

式中:

Where:

ΔP ---- 输出差压 Pa

ΔP ---- Output differential pressure Pa

P ---- 介质密度 kg/m³

P ---- Density kg/m³

K_v ---- 体积流量系数

K_v ---- Volume flow coefficient

K_m ---- 质量流量系数

K_m ---- Mass flow coefficient

γ ---- 干扰系数 (与前后阻流件、内部支撑件等有关)

γ ---- Interference coefficient (related to upstream and downstream spoilers, internal supports, etc.)

工作原理

Working Principle

动压测点是一个由航空发动机入口和内置锥体构成动压采集装置，它和依照航空发动机入口设计的双喉径均具有来流方向校正功能，从而增强了使整个流量装置适应性，实际设计时，只要保证在相同流速下，动压和静压大小相等，符号相反，即可保证整个流量装置计量的准确性。可以根据实际需要在管道中设置测点数量和布置位置即可保证流量的精确计量。

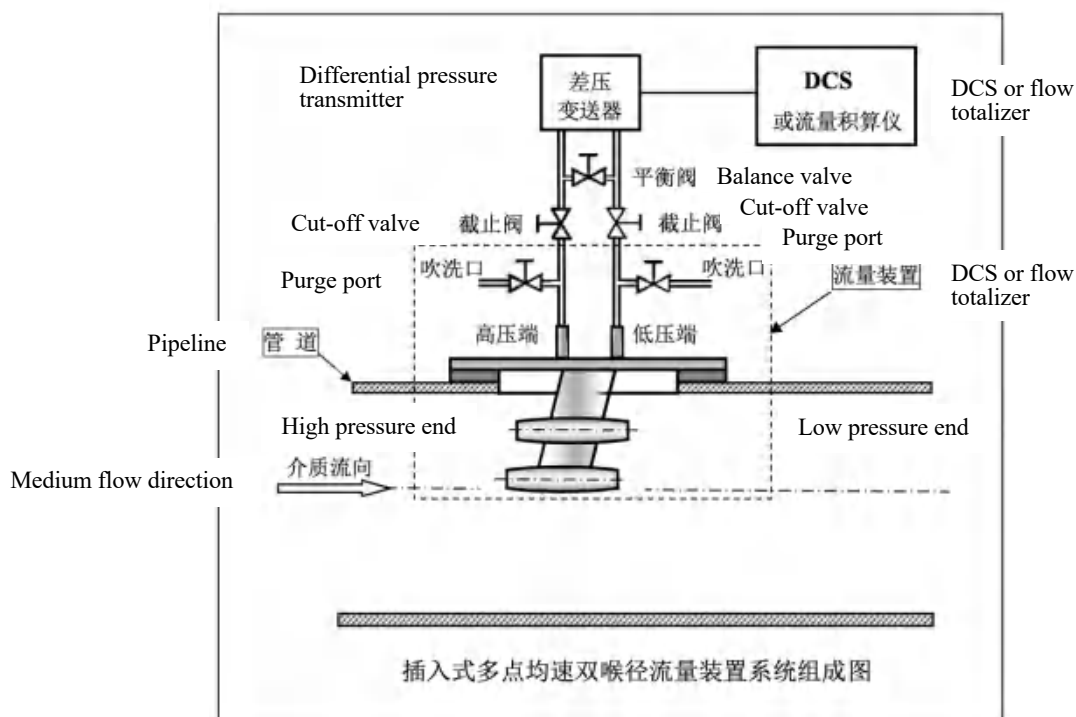
The dynamic pressure measure point is a dynamic pressure collecting device consist of an aeroengine inlet and a built-in cone, and both it and the double throat diameters designed according to the aeroengine inlet have the function of correct the incoming flow direction, thus enhancing the adaptability of the whole flow device. In actual design, as long as the dynamic pressure and static pressure are equal in magnitude and opposite in sign at the same flow rate, the measurement accuracy of the whole flow device can be guaranteed. According to the actual needs, the number and arrangement position of measuring points can be set in the pipeline to ensure the accurate measurement of flow.

系统的组成

Composition of the System

YC-LGW-DH 系列插入式多点均速双喉径流量测量装置，可通过差压变送器将流量大小转变为一个4~20mA的标准电流信号，送往DCS或智能流量积算仪，实现对被测介质的流量计量。对于计量精度要求较高时，可在测量系统附加压力变送器和温度变送器，进行温度或压力补偿。流量装置以及具有吹洗、防堵装置的取压装置等组成流量测量系统。如下图所示：

YC-LGW-DH series plug-in multi-point average-speed dual-throat runoff measuring device can convert the flow into a 4 ~ 20 mA standard current signal through differential pressure transmitter, and send it to DCS or intelligent flow totalizer to realize the flow measurement of the measured medium. When the measurement accuracy is high, a pressure and a temperature transmitter can be attached to the measurement system for temperature or pressure compensation. The flow measurement system consists of the flow device and the pressure taking device with purging and anti-blocking devices. As shown in the figure below:



System composition diagram of plug-in multi-point average speed dual-throat runoff device

安装与维护

Installation and Maintenance

1. 流量装置的安装位置直接影响其测量结果。管道上选择安装插入式多点均速双喉径流量测量装置时，应根据管道设计计算书要求，正确选定安装点位置；一般情况下，现场安装时，我方将派专业技术人员进行指导；

The installation position of the flow device directly affects its measurement results. When the plug-in multi-point average-speed double-throat runoff measuring device is installed on the pipeline, the installation point position should be correctly selected according to the requirements of the pipeline design calculation. Under normal circumstances, we may send professional and technical personnel to guide on-site installation;

2. 安装位置确定后，在检测点按照计算书或安装图给定尺寸开孔，一般情况下，矩形孔长的一侧顺轴线方向（注意：孔的长度方向应对称轴线并与管道轴线平行）。在开好的方孔上做好中心标记线。

After the installation position is determined, a hole shall be drilled at the inspection point according to the size given in the calculation or installation drawing. Generally, the long side of the rectangular hole is along the axis (note: the length direction of the hole shall be symmetrical to the axis and parallel to the pipeline axis). Make the center mark line on the square hole.

3. 再将专用焊接法兰盘安放到大管道矩形长方孔上，焊接时注意法兰盘长对称轴线与大管道轴线平行。为保证焊接不变形，安装时不要拆开发兰，直接进行整体安装，按中心标记对好法兰的位置。先点焊两点，确认无误后沿法兰周边焊接一圈即可，注意密封以及焊接强度。



Place the special welding flange on the rectangular hole of the large pipeline, and pay attention to the long symmetry axis of the flange parallel to the axis of the large pipeline during welding. In order to ensure welding deformation, do not disassemble the flange during installation, and directly install it as a whole. Mark the position of the flange according to the center. Spot-weld two points first, and then weld once around the flange after confirmation. Pay attention to sealing and welding strength.

4. 上紧各个螺栓，保证密封。

Tighten each bolt to ensure sealing.

5. 连接取压管路（与标准节流装置的安装规范要求一致）：取压管路应按规定使用三阀组或相应阀门，并安装好吹扫阀，保证各连接处密封无泄漏。

Connect the pressure-taking pipeline (consistent with the installation specification requirements of standard throttling devices): the pressure-taking pipeline should use three valve groups or corresponding valves as required, and the purge valves should be installed to ensure that all joints are sealed without leakage.

对去气体介质测量时，变送器应位于测点的上方，不能有存水的弯管。

When measuring the gas medium, the transmitter should be located above the measuring point, and there should be no elbow for water storage.

6. 对于组合式流量装置，其正压及负压为单独的，一般为多只联用，连接时将所有正压和负压先引入各自的均压容器（随机配带），然后从均压容器再引到差压变送器。

For the combined flow device, its positive and negative pressure are independent, and usually several are used together. When connecting, all positive and negative pressure will be introduced into their respective pressure equalizing containers (which will be attached randomly), and then will be introduced from the pressure equalizing container to the differential pressure transmitter.

7. 现场管道尺寸与计算书所述有差别时，应对计算结果进行相应修正。

If there is any difference between the field pipeline size and the calculation, the calculation results should be corrected accordingly.

8. 在线强吹扫的方法为：首先关闭差压变送器前的取压阀门，然后在吹扫阀外接上气源（压力在 0.6～0.8MPa），打开吹扫阀门，开通压缩空气进行吹扫，待两侧吹扫完毕后，关上吹扫阀，最后按规定打开取压阀门。

On-line forced purging method: first close the pressure taking valve in front of the differential pressure transmitter, then connect the air source (the pressure is 0.6 ~ 0.8 MPa) outside the purging valve, open the purging valve, turn on the compressed air for purging, and then close the purging valve after purging on both sides, and finally open the pressure taking valve according to the regulations.

9. 特别说明：对于吹扫周期，应根据介质的性质和洁净程度制定比较合理地吹扫周期，以提高产品可靠性和使用寿命。

Special note: for the purging cycle, a reasonable purging cycle should be formulated according to the nature and cleanliness of the medium, so as to improve the reliability and service life of the product.

10. 被测介质洁净度较差时，在测量管道的上游应加装有效地杂物清理装置，防止测量部件被堵塞。并配置相应的在线自动吹扫装置。

When the cleanliness of the measured medium is poor, an effective sundries cleaning device should be installed upstream of the measuring pipeline to prevent the measuring parts from being blocked. Also, it configures the corresponding online automatic purging device.

11. 对流量装置进行定期检查清理外，系统所用的差压变送器，压力、温度变送器等必须按有关规定定期进行标定，以保证计量的准确性。

In addition to regular inspection and cleaning of flow devices, differential pressure transmitters, pressure and temperature transmitters used in the system must be calibrated regularly according to relevant regulations to ensure the accuracy of measurement.

施工实例

Example of Construction

1. Select the installation position according to the situation

1. 根据情况选择安装部位



2. Determine the installation opening position and mark the opening

2. 确定安装开孔位置、划线开孔



3. Opening completed

3. 开孔完成



4. Product in place

4. 产品就位



5. Welding

5 焊接



6. Welding completed

6. 焊接完成



常见问题的处理

Treatment of Common Problems

本流量测量装置与标准节流装置相同，取压管路必须平行铺设，并在管路上设置截止阀，差压变送器前还应安装三阀组，以便于调试和检修。

This flow measuring device is the same as the standard throttling device. The pressure taking pipeline must be laid in parallel, and a cut-off valve should be set on the pipeline. 3 valves manifold should be installed before the differential pressure transmitter which is convenient for commissioning and maintenance.

关于公式的应用：流量计算书一般给的计算公式为稳压补偿后的公式，其中：综合系数 K_t 为包含管道面积、流量系数等常数的一个综合性系数；

About the application of formula: the calculation formula given in the flow calculation book is the formula after pressure stabilization compensation, in which: the comprehensive coefficient K_t is a comprehensive coefficient including the constant of pipeline area, flow coefficient, etc.

干扰系数 γ 实际上就是现场安装后根据实流标定的系数；

The interference coefficient γ is actually the coefficient calibrated according to the actual flow after field installation;

流量指数 n 就是公式中括号内所有值进行开方的意思。

The flow index n means that all the values in brackets in the formula are taken as root.

如果没有温度、压力信号，可按照实际值输入为常数；应用时注意流量单位，如果有问题请及时联系我们按照实际情况重新计算，根据我们多年的现场调试经验，仪表调试过程中的常见故障及解决方法如下：

If there is no temperature and pressure signal, it can be input as a constant according to the actual value; Pay attention to the flow unit when applying. If there is any problem, please contact us in time to recalculate according

to the actual situation. Based on our many years of on-site commissioning and verification, the common faults and solutions in the process of instrument commissioning are as follows:

常见调试故障及解决方法:

Common commissioning faults and solutions:

序号 No.	常见故障 Common faults	原因分析 Cause analysis	解决方法 Solutions
1	最大流量时, 输出差压值与计算书不符 At the maximum flow rate, the output differential pressure value is inconsistent with the calculation.	- 首先核对工位号或设计编号。 First check the station number or design number. - 详细检查工况条件是否相同。 Check in detail whether the working conditions are the same. - 确认流量值是标准状态还是工作状态。 Confirm whether the flow value is in standard state or working state. - 注意公式中的单位应用。 Pay attention to the unit application in the formula.	工况条件变化时应重新进行计算; 大气压和工作压力为 kPa, 差压单位为 Pa。 When the working conditions are changed, it should be recalculated; The atmospheric pressure and working pressure are kPa, and the differential pressure unit is Pa.
2	流量显示器无流量 The flow indicator has no flow.	- 确认取压阀门是否打开, 平衡阀是否关闭。 Confirm whether the pressure valve is open and the balance valve is closed. - 差压变送器排气阀是否关闭。 Whether the exhaust valve of differential pressure transmitter is closed. - 取压管路是否通畅 (或堵死)。 Whether the pressure taking pipeline is unobstructed (or blocked).	打开差压变送器 排气阀, 有气排出, 说明管路通畅。 Open the exhaust valve of the differential pressure transmitter, and the gas will be discharged, indicating that the pipeline is unobstructed.
3	正常工作时, 流量显示时有时无或流量值偏小 During normal operation, the flow rate is sometimes absent or the flow rate is too small.	- 差压变送器故障或量程偏大 The differential pressure transmitter is faulty or the range is too large. - 被测管道流量值过小, 通常小于刻度流量的 20%。被开方后的小信号切除给切掉了。 The measured pipeline flow value is too small, usually less than 20% of the calibrated flow. It was cut off by a small signal after the prescription. - 正压取压管路不太通畅, 或有漏风现象 The positive pressure pipeline is not smooth, or there is air leakage.	确认差压变送器是合适的, 适当减小小信号切除量, 检查取压管路。 Confirm that the differential pressure transmitter is suitable, appropriately reduce the small signal cutting amount, and check the pressure taking pipeline.

4	正常工作时，流量显示偏大或超量程 During normal operation, the flow rate display is too large or out of range.	1. 差压变送器故障或量程偏小 The differential pressure transmitter is faulty or the range is too small. 2. 负压取压管路不太通畅，或有漏风现象 The negative pressure pipeline is not smooth, or there is air leakage.	确认差压变送器零点是否合适的，检查取压管路。 Confirm that the zero point of differential pressure transmitter is appropriate, and check the pressure taking pipeline.
5	系统停机时仍有小流量显示 There is still a small flow display when the system is stopped.	1. 差压变送器零位偏大 The zero position of differential pressure transmitter is too large. 2. 开方后的小信号切除太小 Small signal resection after prescribing is too small. 3. 被测管道阀门关闭不严。 The valve of the tested pipeline is not closed properly. 4. 由冷热空气交换产生（如烟道等） Produced by the exchange of hot and cold air (such as flue, etc.)	校验差压变送器，小信号切除至少 1%，阀门有 10% 的死区，烟道流量属正常现象。 Check the differential pressure transmitter, the small signal is removed by at least 1%, the valve has 10% dead zone, and the flue flow is normal.

注意：不管什么情况，首先检查差压变送器的零点输出是否正常；引压管的气密性应该保证没有问题，否则进行标定就没有意义。

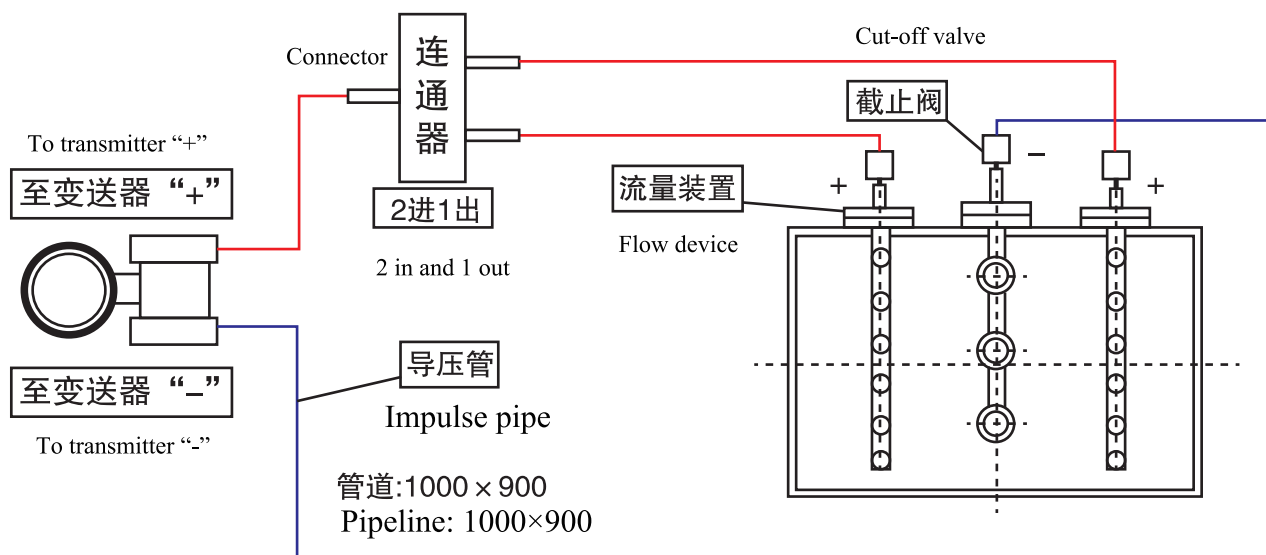
Note: In any case, first check whether the zero output of the differential pressure transmitter is normal; The air tightness of the pressure lead pipe should be guaranteed, otherwise it is meaningless to calibrate.

安装实例

Installation Example

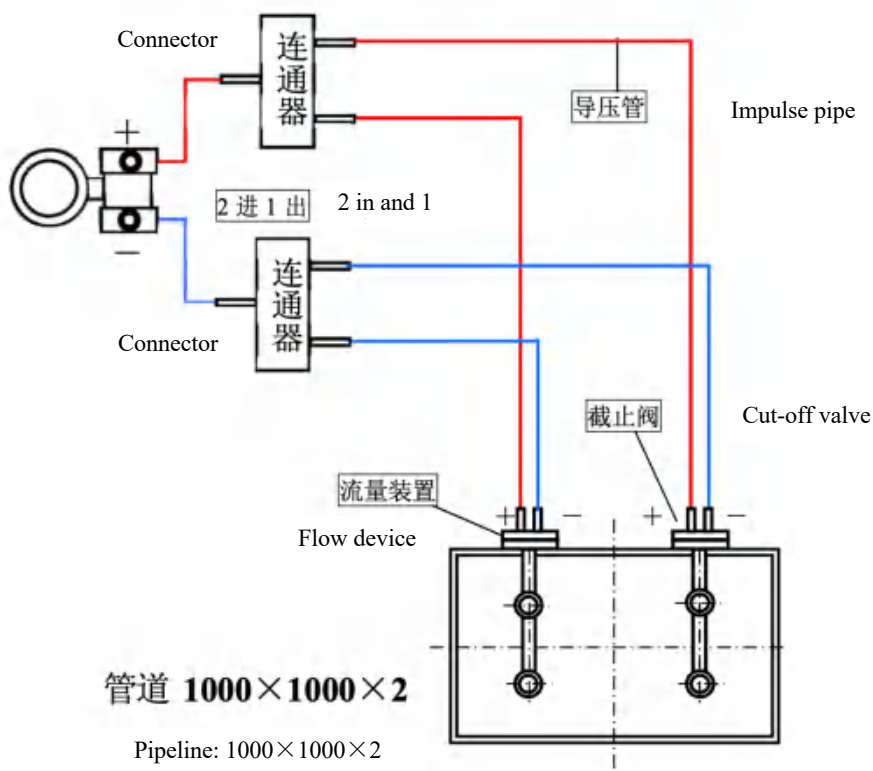
Schematic diagram of installation of pressure piping of YC-LGW-DH-D12J3 flow device

YC-LGW-DH-D12J3型流量装置管道安装示意图

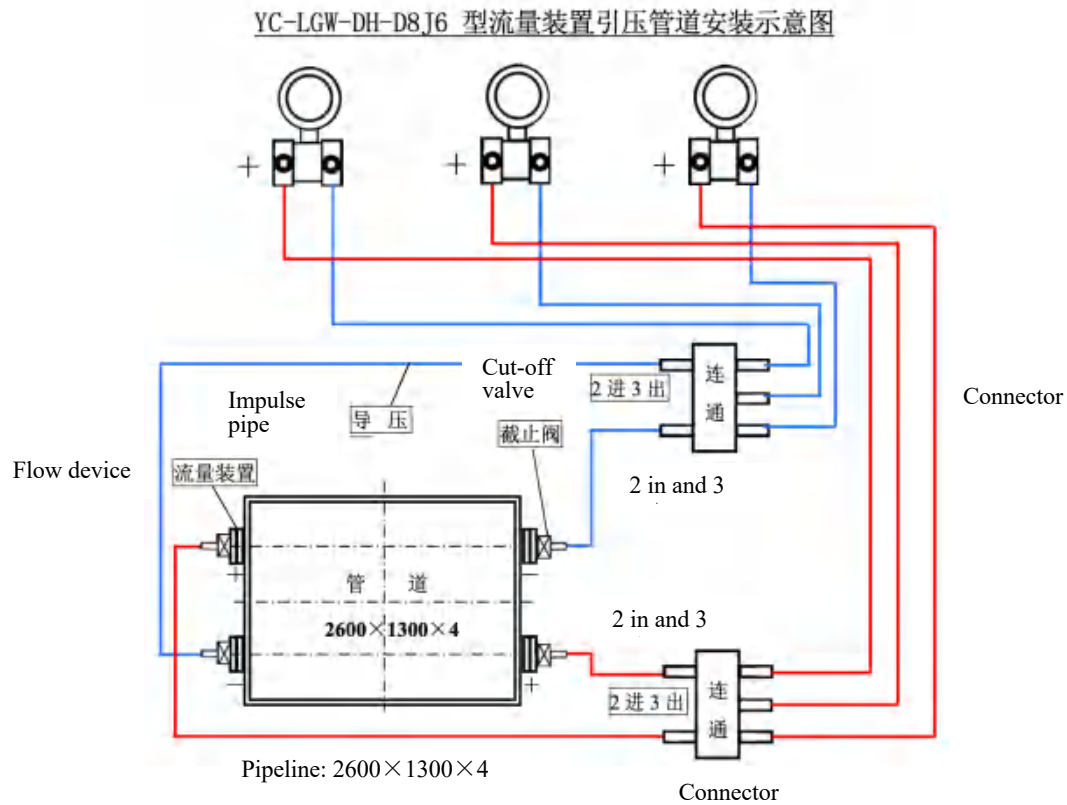


Schematic diagram of installation of pressure piping of YCLGW-DH-D8J6

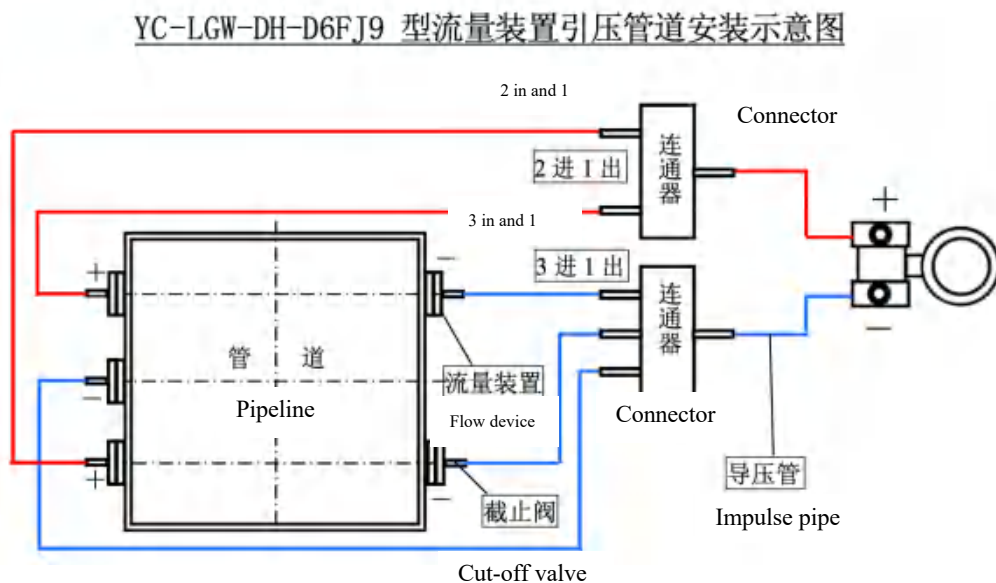
YC-LGW-DH-D4 型流量装置引压管道安装示意图



Schematic diagram of installation of pressure piping of YC-LGW-DH-D4 flow device



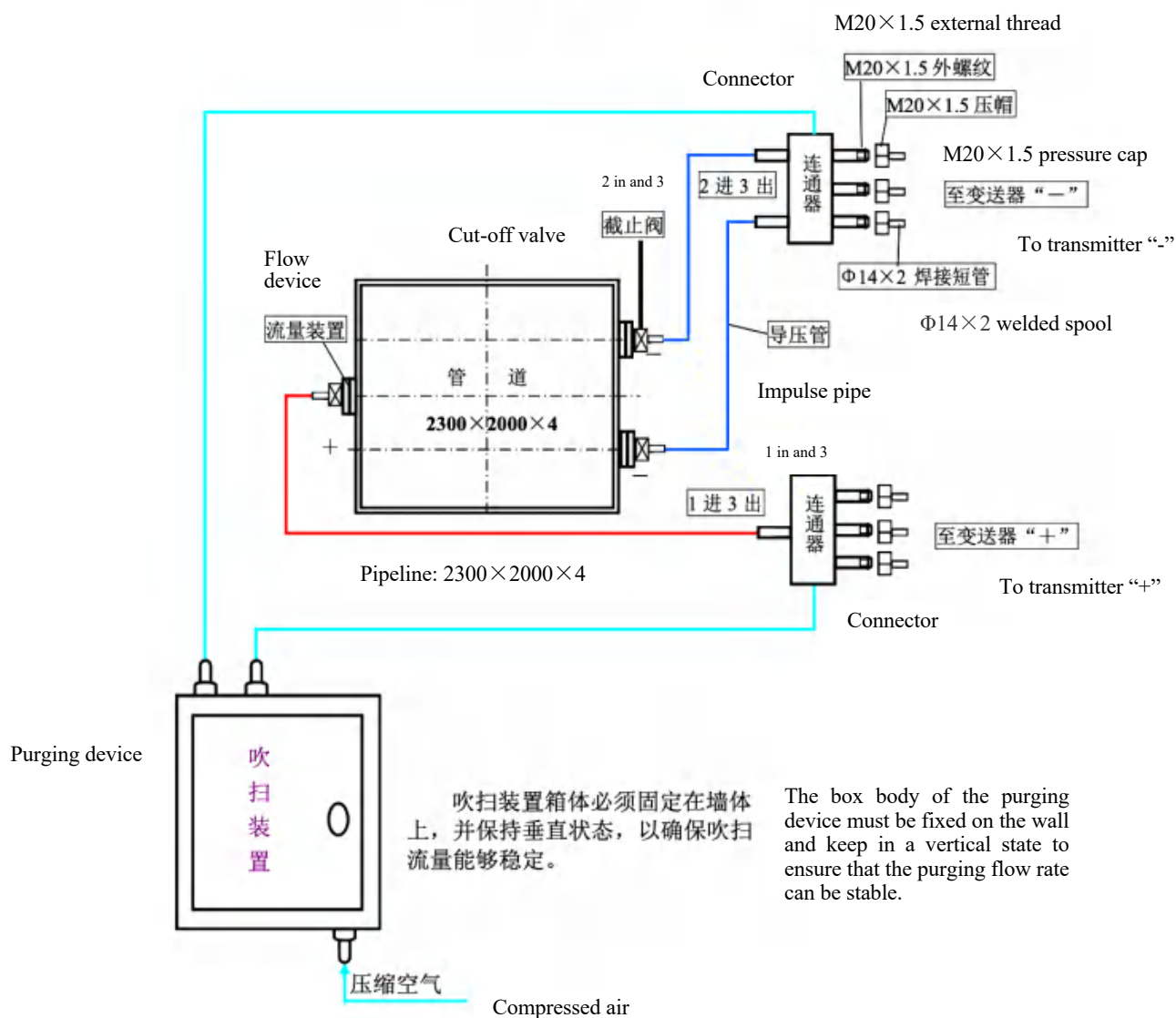
Schematic diagram of installation of pressure piping of YC-LGW-DH-D6FJ9 flow device



Schematic diagram of installation of pressure piping of YC-LGW-DH-D3FJ6 flow device

YC-LGW-DH-D3FJ6 型流量装置引压管道安装示意图

(三路变送器带吹扫装置)



流量测量节流装置咨询书

Consultation document of flow measuring and throttling device

节流件型号或名称 Type or name of throttling device				气体成分 Gas composition	容积量% Volume%	在何种状态下 In what state
取压方式 Pressure-taking mode						
流体名称 Fluid name		流量状态 Flow status				
最大容量 Maximum flow		t/h、m ³ /h	0°C, 101.325kPa			
常用流量 Common flow		t/h、m ³ /h	20°C, 101.325kPa 干 20°C, 101.325kPa dry			
最小流量 Minimum flow		t/h、m ³ /h	20°C, 101.325kPa 湿 20°C, 101.325kPa wet			
刻度流量 Scale flow		t/h、m ³ /h	工作状态 Operative mode			
工作压力 Working pressure		kPa、MPa				
使用地大气压 Use atmospheric atmosphere		Mbar				
工作压力 Working temperature		°C				
相对湿度 Relative humidity		相对湿度状态 Relative humidity condition	工作状态 Operative mode			
			0°C			
			对应 Correspond to °C	安装方式 Installation mode	水平 Horizontal	
工况下密度 Working condition density		Kg/m ³			垂直 Vertical	
工况下粘度 Working condition viscosity		mPa · s		与管道的连接方式 Connection mode with pipeline	法兰连接 Flanged connection	
允许压力损失 Allowable pressure loss		kPa			焊接式 Welding type	
参考差压 Reference differential pressure		kPa			插入式 Plug-in type	
管道	内径	mm	外径 Outside	mm	冷凝器	

	Inner diameter		diameter		附件 Attachment	Condenser
	材质 Texture					截止阀 Cut-off valve
	表面状态 Surface state	无缝管(新、旧)、直缝焊管、螺旋焊管 Seamless pipe (new and old), straight welded pipe, spiral welded pipe				集气器、隔离容器 Gas collector, isolation container
管路安装状况 Pipe installation condition	1. 上游第一阻力件形式 _____; The form of the upstream first resistance member _____; 2. 上游第二阻力件形式 _____; The form of the upstream second resistance member _____; 3. 下游第一阻力件形式 _____; The form of the downstream first resistance member _____; 4. 安装节流件用直管段总长: Total length of straight pipe section for installing throttle piece: L= _____ mm L ₁ = _____ mm L ₂ _____ mm L ₀ = _____ mm Resistance form: 1. 弯头 2. 空间弯头 3. 变径管(大变小) 4. 变径管(小变大) 5. 调节门 6. 闸板门 7. 三通 8. 膨胀节 1. Elbow 2. Space elbow 3. Reducer (big to small) 4. Reducer (small to big) 5. Damper 6. Slide valve 7. Tee joint 8. Expansion joint					

注：1.咨询书是设计、制造的依据，请认真填写、不得涂改。

Note: The consultation document is the basis of design and manufacture. Please fill it in carefully and do not alter it.

2. 介质为空气、水以及水蒸气时密度和粘度可以不填，但空气必须注明流量状态及相对湿度。

When the medium is air, water and steam, the density and viscosity can be omitted, but the flow state and relative humidity of air must be indicated.

3. 压力和温度为一定范围时，设计时选取均值。

When the pressure and temperature are within a certain range, the average value shall be selected in the design.

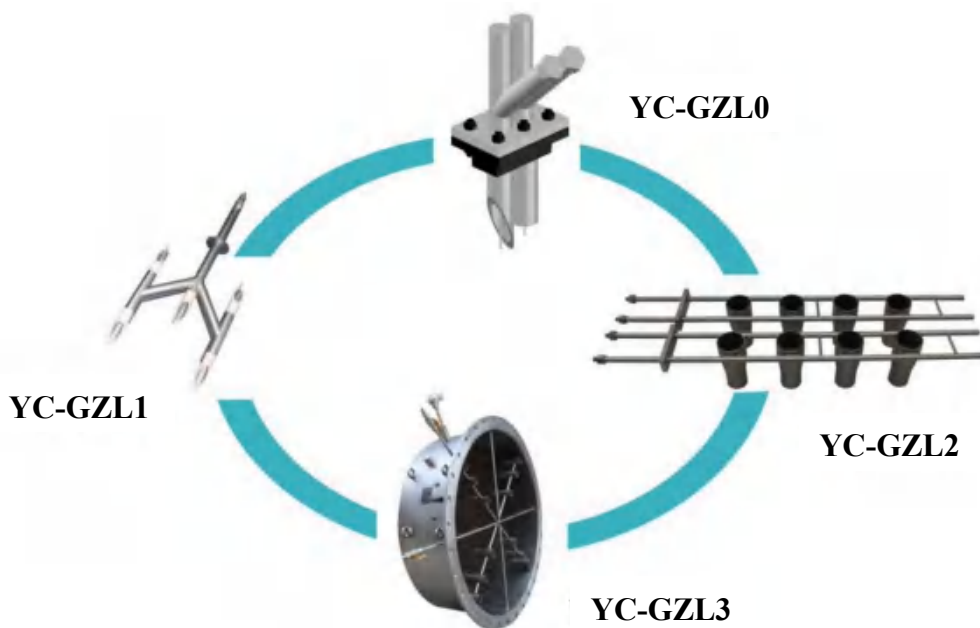
插入式多喉径流量测量装置系统构成图

System structure diagram of plug-in multi-throat runoff measuring device

YC-LGW-DH	-□	-□ -□插入式多点均速双喉径流量测量装置 Plug-in multi-point average-speed double-throat runoff measuring device
	D1	中心安装的单点（适用于管道尺寸 DN80 ~ 400mm） Single point of installation in the center (applicable to pipe size DN80 ~ 400mm)
	D2	双点均速型（适用于管道尺寸 DN400 ~ 800mm） Double-point average speed type (suitable for pipe size DN400 ~ 800mm)
	D3	三点均速型（适用于管道尺寸大于 DN800mm） Three-point average speed type (applicable to pipe size larger than DN800mm)
	D4	四点均速型（适用于管道尺寸大于 DN1500mm） Four-point average speed type (applicable to pipe size larger than DN1500mm)
	D6	六点均速型（适用于管道尺寸大于 DN2000mm） Six-point average speed type (applicable to pipe size larger than DN2000mm)
	D6J3	适用于大中型管道 Suitable for large and medium-sized pipelines
	D3FJ3	适用于小直管段含粉尘气体的流量测量 Suitable for the flow measurement of dust-containing gas in small straight pipe sections
	Y	产品附加型号，一体化结构 Additional product models and integrated structure
	T	产品附加型号，特制型（按客户的特殊需求制作） Additional product models, special models (according to customers' special requirements)
		管道尺寸 例如：（Φ1200×4） Pipe size For example, (Φ1200× 4)

YC-GZL 多点矩阵式风量测量装置

YC-GZL Multi-point Matrix Air Volume Measuring Device



测量原理

Measuring Principle

YC-GZL 多点矩阵式风量测量装置是基于背靠背测量原理：测量装置安装在管道上，其探头插入管内，当管内有气流流动时，迎风面受气流冲击，在此处气流的动能转换成势能，因而迎面管内压力较高，其压力称为“全压”，背风侧由于不受气流冲压，其管内的压力为风管内的静压力，其压力称为“静压”，全压和静压之差称为差压，其大小与管内风速（量）有关，风速（量）越大，差压越大；风速（量）小，差压也小，因此，只要测量出差压的大小，再找出差压与风速（量）的对应关系，就能正确地测出管内风量。

YC-GZL multi-point matrix air volume measuring device is based on the back-to-back measuring principle: the measuring device is installed on the pipe, and its probe is inserted into the pipe. When there is air flow in the pipe, the windward side is impacted by the air flow, where the

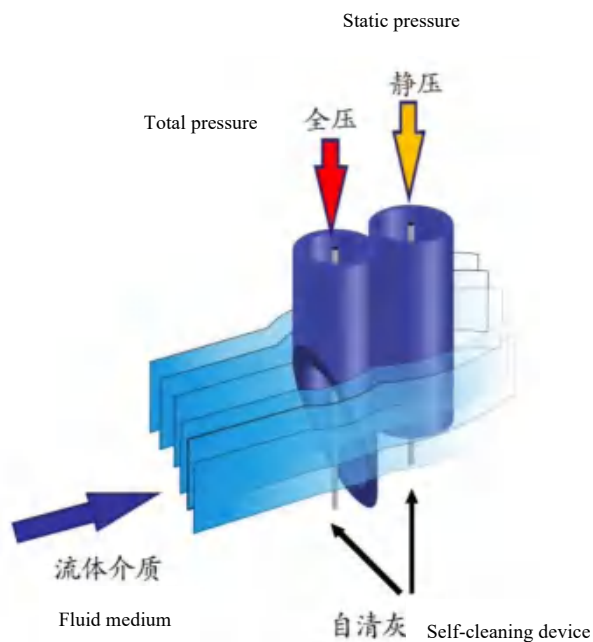


Figure 7 Schematic diagram of air volume device

kinetic energy of the air flow is converted into potential energy, so the pressure in the head-on pipe is high, which is called "total pressure". Since the leeward side is not pressed by the air flow, the pressure is the static pressure in

the air pipe, and its pressure is called "static pressure". The difference between total pressure and static pressure is called differential pressure, which is related to the wind speed (quantity) in the pipe. The higher the wind speed (quantity), the higher the differential pressure; The wind speed (quantity) is low, and the differential pressure is also low. Therefore, as long as the differential pressure is measured and the corresponding relationship between the differential pressure and the wind speed (quantity) is found, the air volume in the pipe can be measured correctly.

等截面均布

Constant Cross Section Distribution

由于大风道流场相对比较复杂，为了能更准确的测得风道流量，我们对风道进行等面积划分出具有代表性的区域，在这些区域分别设置测点，将这些测量点等截面有机地组装在一起，正压侧与正压侧相连，负压侧与负压侧相连，正、负压侧各引出一根总的引压管，分别与差压变送器的正、负端相连，测得截面的平均速度，然后计算出风量：

Since the flow field of the wind tunnel is relatively complex, in order to measure the flow rate of the wind tunnel more accurately, we divide the wind tunnel into representative areas with equal areas, set up measuring points in these areas respectively, and organically assemble these measuring points with constant cross sections. The positive side is connected with the positive side, the negative side is connected with the negative side, and the positive and negative sides are respectively connected with a general pressure lead pipe, which is connected with the positive and negative ends of the differential pressure transmitter. The average speed of the section is measured, and then the air volume is calculated:

$$Q_v = C' \times \sqrt{\frac{\Delta P}{\rho}}$$

$$Q_m = C' \times \sqrt{\Delta P \times \rho}$$

Qv: 体积流量

Qv: Volume flow

Qm: 质量流量

Qm: Mass flow

C': 流量系数

C': Flow coefficient

ρ: 工况密度

ρ: Working condition density

ΔP: 风量测量装置

ΔP: Air volume measuring device

输出的差压

Output differential pressure

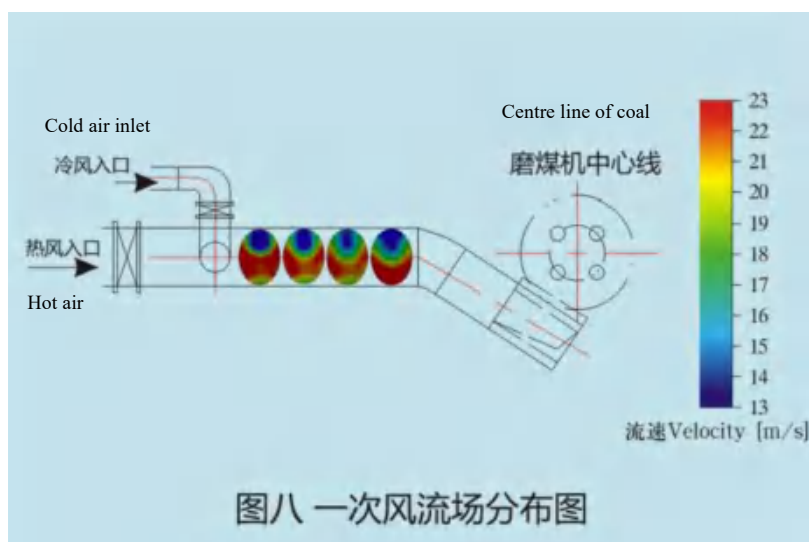


Figure 8 Distribution diagram of primary air flow field



Figure 9 Multi-point uniform layout of measuring device with constant cross

应用范围

Applied Range

多点矩阵式风量测量装置采用独特的开放式取压和自清灰装置的独特设计，彻底有效的解决了堵塞问题，以其良好的线性度和卓越的稳定性，被广泛应用在电厂锅炉自动控制领域，除了可以测量常规的锅炉冷一次风、热一次风、二次风外，还可以测量粉尘含量较大的脱硫、脱销的烟气等介质。

Multi-point matrix air volume measuring device adopts the unique design of open pressure taking and self-cleaning device, which thoroughly and effectively solves the blocking problem. With its good linearity and excellent stability, it is widely used in the field of boiler automatic control in power plants. It can not only measure conventional boiler cold primary air, hot primary air and secondary air, but also measure desulfurized and out-of-stock flue gas and other media with large dust content.

产品特点

Product Features

- ◆ YC-GZL 多点矩阵式测量装置彻底解决了测量含尘气流时的信号堵塞问题，风量测量装置本身具有利用流体动能进行自清灰防堵塞的功能，绝对不需要外加任何压缩气体进行吹扫，无论气体含尘浓度多大，完全可以做到长期运行免维护。
YC-GZL multi-point matrix measuring device completely solves the problem of signal blockage when measuring dusty airflow. The air volume measuring device itself has the function of self-cleaning ash and preventing blockage by using fluid kinetic energy, and absolutely does not need any compressed gas for purging. No matter how dusty the gas concentration is, it can run for a long time without maintenance.
- ◆ YC-GZL 多点矩阵式测量装置性能稳定，调节线性好。
YC-GZL multi-point matrix measuring device has stable performance and good adjustment linearity.
- ◆ YC-GZL 多点矩阵式测量装置传感器可采用 316L 不锈钢、耐磨陶瓷、耐酸、碱腐蚀的合金等材质，能够满足各种复杂工况和恶劣环境。
The sensor of YC-GZL multi-point matrix measuring device can be made of 316L stainless steel, wear-resistant ceramics, acid-resistant and alkali-resistant alloys, etc., which can meet various complex working conditions and harsh environments.
- ◆ YC-GZL 多点矩阵式测量装置对管道直管段的要求很低，只要具备安装节流件的位置即可，适合各种复杂管道安装。
YC-GZL multi-point matrix measuring device has very low requirements for straight pipe sections, as long as it has the position for installing throttle pieces, and it is suitable for installation of various complicated pipes.
- ◆ YC-GZL 多点矩阵式测量装置测量精度高，长期测量精度在 $\pm 1\%$ 。
YC-GZL multi-point matrix measuring device has high measurement accuracy, and its long-term measurement accuracy is $\pm 1\%$.

与同类产品比较

Compare with Similar Products

YC-GZL 多点矩阵式测量装置与传统差压式风量测量装置比较

Comparison between YC-GZL multi-point matrix measuring device and traditional differential pressure air volume measuring device

YC-GZL 多点矩阵式测量装置彻底解决堵塞的问题

YC-GZL multi-point matrix measuring device completely solves the problem of blockage.

当含尘气流流经机翼测风装置和巴类流量计时，由于惯性以及蠕动作用，粉尘会进入取压孔并逐渐造成堵（如右图所示）。而多点等截面测量装置其独特的设计 - 开放式取压和自清灰系统，能完全杜绝信号堵塞问题。

When the dusty airflow passes through the wing anemometer and the bar flowmeter, due to inertia and creep, the dust will enter the pressure tap hole and gradually cause blockage (as shown in the right figure). However, the unique design of multi-point constant cross section measuring device - open pressure taking and self-cleaning system can completely eliminate the problem of signal blocking.



图十 Figure 10

YC-GZL 多点矩阵式测量装置稳定性更好

YC-GZL multi-point matrix measuring device has better stability.

机翼测风装置和巴类流量计采用的是径向插入测量方法，它只实现了管道流体剖面的某一径向的连续测量，其得到的平均差压并不能代表整个管道流体流场的运动状况，受流体局部干扰大，信号很难保证稳定。

The wing anemometer and the bar flowmeter adopt the radial insertion measurement method, which only realizes the continuous measurement of a certain radial direction of the pipeline fluid profile. The average differential pressure obtained by it cannot represent the movement of the whole pipeline fluid flow field, and it is difficult to guarantee the stability of the signal due to the local interference of the fluid.

YC-GZL 多点矩阵式测量装置差压信号大

YC-GZL multi-point matrix measuring device has large differential pressure signal.

机翼测风装置和巴类流量计的取压孔直径一般都在 3 ~ 8mm 以内，靠流体撞击节流元件产生的差压信号较小。

The diameter of the pressure tap hole of the wing anemometer and the bar flowmeter is generally within 3 ~ 8mm, and the differential pressure signal generated by the fluid hitting the throttle element is small.

YC-GZL 多点矩阵式测量装置与热质式流量计比较

Comparison between YC-GZL multi-point matrix measuring device and thermal mass flowmeter

- ◆ YC-GZL 多点矩阵式测量装置采用等截面测量方法，真实的测量了流体整个剖面的流场的平均速度。热质式流量计是采用单点测量方式，受流速分布畸变影响很大，测量有一定的局限性。（如右图所示）
YC-GZL multi-point matrix measuring device adopts the constant cross section measurement method, which truly measures the average velocity of the flow field in the whole cross section of the fluid. The thermal mass flowmeter adopts the single point measurement method, which is greatly affected by the distortion of velocity distribution, and the measurement has certain limitations. (As shown in the right picture)

- ◆ 受热质式流量计测量原理的限制，当介质含有水汽时，测量会产生很大漂移，严重时测量会失效。

Due to the limitation of the measurement principle of heated mass flowmeter, when the medium contains water vapor, the measurement will drift greatly, and the measurement will fail in serious cases.

- ◆ 热质式流量计测量受漩涡及非对称流动的影响大。热质式流量计测量流体漩涡角不超过 40° ；在大管道中流动的流体流速分布轴对称性极差，即非对称性指数高，非对称性指数过高，热质式流量计将失去测量的意义。

The measurement of thermal flowmeter is greatly influenced by vortex and asymmetric flow. The vortex angle of fluid measured by thermal flowmeter shall not exceed 40° ; The axial symmetry of the flow velocity distribution of the fluid

flowing in the large pipeline is very poor, that is, the asymmetry index is high. If the asymmetry index is too high, the thermal mass flowmeter will lose the significance of measurement.

- ◆ 热质式流量计造价高，特别是在大管道上运用，其造价更为昂贵，而且一旦飞尘、杂质覆盖了热敏感元件，其信号会急剧衰退，甚至消失，所以需要经常清洗、维护。

The cost of thermal flowmeter is high, especially when it is used in large pipelines. Moreover, once flying dust and impurities cover the heat-sensitive sensor, its signal will decline sharply or even disappear, so it needs to be cleaned and maintained frequently.

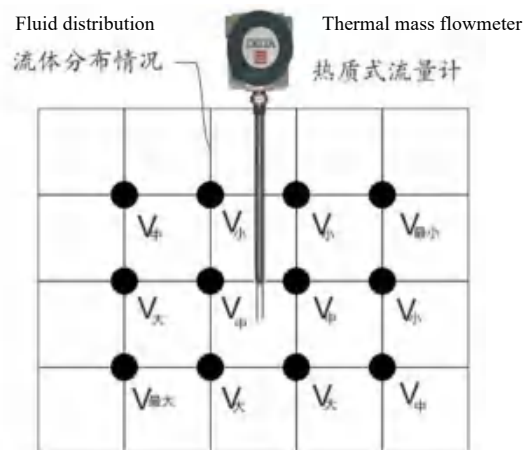


Figure 11 Schematic diagram of thermal mass

图十一 热质式测量示意图

YC-GZL 分类

YC-GZL Classification

1. YC-GZL 0 型

YC-GZL 0 type

YC-GZL 0 型风量测量装置又称风速仪或单点背靠管。它主要应用在小管道风量或风速的测量，结构简洁，使用方便。传感器加套耐磨陶瓷，广泛的应用于锅炉煤粉管风粉在线检测，具有良好的耐磨、防堵性能。

YC-GZL 0 air volume measuring device is also called anemometer or single-point back pipe. It is mainly used to measure the air volume or wind speed of small pipes, with simple structure and convenient use. The sensor with wear-resistant ceramics is widely used in on-line detection of pulverized coal in boiler tubes, and has good wear-resistant and anti-blocking properties.



YC-GZL0

2. YC-GZL 1 型

YC-GZL 1 type

YC-GZL 1 型风量测量装置适用于水平大管道测量，严格按照等截面法进行取压布点，其线性度、稳定性等性能远远优于机翼、巴类等流量计。

YC-GZL 1 air volume measuring device is applicable to the measurement of large horizontal pipelines. The pressure distribution points are strictly carried out according to the constant section method. Its linearity and stability are far better than those of wing, bar and other flowmeters.

同时，自清灰棒的独特设计使其实现了流量计本质防堵，减少了外配吹扫装置的成本。

At the same time, the unique design of the self-cleaning rod makes it realize the intrinsic blockage prevention of the flowmeter, and reduces the cost of the external purging device.

传感器材质采用 316L，具有优良的耐高温、耐磨性能；表面还可进行贴陶瓷等特殊处理，使其能够在各种恶劣的工况环境下长期、稳定的精准测量。

The sensor is made of 316L, which has excellent high temperature resistance and wear resistance. The surface can also be subjected to special treatment such as ceramic coating, so that it can make long-term, stable and accurate measurement under various harsh working conditions.



YC-GZL1

3. YC-GZL 2 型 YC-GZL 2 type

YC-GZL 2 型风量测量装置适用于垂直管道测量，传感器采用双文丘里结构，采用喉部取压，流体被二次加速，差压信号大。设备测量精度高，稳定性好。

YC-GZL 2 air volume measuring device is suitable for vertical pipe measurement. The sensor adopts double venturi structure and throat pressure taking. The fluid is accelerated twice and the differential pressure signal is large. The device has high measurement accuracy and good stability.



YC-GZL2

4. YC-GZL 3 型 YC-GZL3 type

YC-GZL 3 型风量测量装置多用在管道前后布置复杂、无直管段的测量点，本身带整流栅格，对流体流场进行引流、整直。它具有以下四个方面的优点：

YC-GZL 3 air volume measuring device is mostly used in measuring points with complex arrangement in upstream and downstream of the pipeline and no straight pipe section. It is equipped with rectifier grid to drain and straighten the fluid flow field. It has the following four advantages:

- a. 直管段要求低，只要有 300-500mm 的安装位置即可；

Low straight pipe section requirements, as long as there is a 300-500mm installation position;

- b. 不受不规则流体、甚至是多向旋转气流的影响；

It is not affected by irregular fluid or even multi-directional rotating airflow;

- c. 压力损失很小；

Small pressure loss;

- d. 测量线性度高，稳定性好，能够确保锅炉自动控制的安全运行。

High measurement linearity and good stability can ensure the safe operation of boiler automatic control.



YC-GZL3

选型参考表

Selection Reference Table

选型 Model selection	基本代码 Basic code	说明 Description	选型举例 Example
YC-GZL		多点横截面风量测量装置 Multi-point cross section air volume measuring device	YC-GZL



流量计形式 Flowmeter form	0 1 2 3	单点风速仪 Single-point anemometer 用于水平管道测量 Used for horizontal pipeline measurement 用于垂直管道测量 Used for vertical pipeline measurement 带整流装置 With rectifying device	1
管道形式 Pipeline form	-C -R	圆形管道 Circular pipe 方形管道 Square pipe	-C
测点数 Measuring points	1 5 9 17	测点数为 1 个 1 measuring point 测点数为 5 个 5 measuring points 测点数为 9 个 9 measuring points 测点数为 17 个 17 measuring points	17
连接方式 Connection mode	FC PS	法兰连接 Flanged connection 焊接连接 Welded connection	PS
传感器材质 Material of sensor	1 2 3	304 不锈钢 304 stainless steel 316 不锈钢 316 stainless steel 特殊材质 Special material	1
仪表阀门 (可选) Instrument valve (optional)	1 N	不锈钢球阀 Stainless steel ball valve 不配 No match	N
管道尺寸 (DN 外径/壁厚) Pipe size (DN outside diameter / wall thickness)	-外径/壁厚 -Outside diameter/ wall thickness	表示管道外径及壁厚 (管道范围为 38mm-6000mm 可选) Indicates the outside diameter and wall thickness of the pipeline (pipeline range is 38mm-6000mm)	-1020/9

选型举例解释

Example selection descriptions

YC-GZL 1-C17PS1N-1020/9为用于水平管道测量的多点横截面风量测量装置, 测点分布数为17, 传感器材质为304不锈钢, 与管道的连接方式为直接焊接, 不配截止阀, 用于外径为1020mm, 壁厚9mm的管道的测量。

YC-GZL 1-C17PS1N-1020/9 is a multi-point cross section air volume measuring device for horizontal pipeline measurement. The number of measuring points is 17, and the sensor is made of 304 stainless steel. It is connected with the pipeline by direct welding, without a stop valve, and is used for measuring the pipeline with an outer diameter of 1020mm and a wall thickness of 9mm.

流量仪表 Flowmeter

YC-PHD系列多相流量计

YC-PHD Series Multiphase Flowmeter

概述

Introduction

多相流量计主要用于油田的单井及总量计量。该产品能够在油、气、水三相不分离的状态下，可覆盖 0~100% 的含水/含气率，完成对油井产生的油、气、水各相流量和其他过程参数的在线、实时测量与监测，是传统测试分离器的替代产品。多相流量计可永久安装在井口或计量站，实现对生产井的连续监测和常量计量。由于其体积小、重量轻、便于移动等特点，也可用来为油田用户提供移动式的生产测试、勘探测试和评价测试等服务。

Multiphase flowmeter is mainly used for single well and total quantity measurement in oil field. This product can cover 0 ~ 100% water / gas content under the condition of three-phase non separation of oil, gas and water. It is able to complete the online and real-time measurement and monitoring of oil, gas and water phase flow and other process parameters produced by the oil well, which is an alternative product to the traditional test separator. Multiphase flowmeter can be permanently installed at the wellhead or metering station to realize continuous monitoring and constant metering of production wells. Because of its small size, light weight and easy to move, it can also be used to provide mobile production testing, exploration testing and evaluation testing services for oilfield users.



多相流量计目前已经在世界范围内广泛应用于陆地油田和海洋油田的油井计量、生产过程监测以及移动式的油井测试服务等。由于其量程宽、测试精度高、性价比优异，多相流量计已经被国际上主流的石油公司普遍认可，并在许多新油田建设和老油田改造项目中作为首选的油井计量产品加以推广应用。

At present, multiphase flowmeter has been widely used in oil well metering, production process monitoring and mobile oil well testing services in onshore and offshore oil fields all over the world. Due to its wide range, high test accuracy and excellent cost performance, multiphase flowmeter has been widely recognized by international mainstream oil companies, and has been popularized and applied as the preferred oil well metering product in many new oilfield construction and old oilfield reconstruction projects.

为满足客户的不同需求，仪昌节流开发出适应不同工况测量的多相流量计产品，主要有：标准型多相流量计、短节型多相流量计。

In order to meet the different needs of customers, Yichang Throttle has developed multiphase flowmeter products suitable for measurement under different working conditions, mainly including standard multiphase flowmeter and short multiphase flowmeter.

标准型多相流量计

Standard Multiphase Flowmeter

概述

Introduction

标准型多相流量计包括在线式气液两相流量计、全量程油气水三相含水仪和基于工业计算机的数据采集和处理单元（DAU）三大模块。

The standard multiphase flowmeter includes three modules: on-line gas-water two-phase flowmeter, full range oil-gas-water three-phase water cut meter and data acquisition and processing unit (DAU) based on industrial computer.

气液两相流量计由文丘里管和安装在其喉部的单能伽玛传感器组成，主要完成气、液两相流量的实时测量。油气水三相含水仪由在线液体取样器和双能伽玛传感器组成，主要完成代表性液样取样及其在油气水三相状态下含水率的测量。

The gas-water two-phase flowmeter is composed of a venturi tube and a monoenergetic gamma sensor installed at its throat, which mainly completes the real-time measurement of two-phase flow of gas and water. The oil, gas and water three-phase water cut meter is composed of an on-line liquid sampler and a dual energy gamma sensor. It mainly completes the sampling of representative liquid samples and the measurement of water content in the three-phase state of oil, gas and water.

数据采集和处理单元（DAU），主要完成对系统内各传感器和仪表的信号采集、处理，基于多相流动模型的计算，以及最终测量结果的输出和数据远传等。

The data acquisition and processing unit (DAU) mainly completes the signal acquisition and processing of sensors and instruments in the system, the calculation based on multiphase flow model, the output of final measurement results and data remote transmission.

标准型多相流量计系统还包括了温度变送器、压力变送器、差压变送器和控制阀等辅助的测量仪表和控制装置。

The standard multiphase flowmeter system also includes temperature transmitter, pressure transmitter, differential pressure transmitter, control valve and other auxiliary measuring instruments and control devices.

标准型多相流量计最终输出的测量结果包括：油、气、水三相的瞬时流量和累计流量，含水率、含气率、气油比、混合液密度和流体的湿度、压力等过程参数的瞬时值和累计平均值等。

The final output measurement results of standard multiphase flowmeter include: instantaneous flow and cumulative flow of oil, gas and water, instantaneous value and cumulative average value of process parameters such as water content, gas content, gas oil ratio, mixed liquid density, fluid humidity and pressure, etc.

产品特点

Product Features

- ◆ 测量量程范围宽、高含气工况测量精度高
Wide measuring range, and higher measurement accuracy of high gas content
- ◆ 实时、连续测量
Real time and continuous measurement
- ◆ 具有良好的可靠性和稳定性
Good reliability and stability
- ◆ 适用的准确度和重复性
Applicable accuracy and repeatability
- ◆ 采用低能伽玛射线吸收技术
Adopt low energy gamma ray absorption technology
- ◆ 真正的多相不分离在线测量
Excellent on-line multiphase measurement



性能指标

Performance Index

短节型多相流量计测量典型不确定度 Typical measurement uncertainty of short multiphase flowmeter			
含气率范围 Gas content range	操作压力 Operating pressure	典型不确定度 Typical uncertainty	
		<2MPa	≥2MPa
0 ~ 95%	液量（相对误差） Liquid volume (relative error)	5%	
	气量（相对误差） Gas volume (relative error)	7%	5%
	含水率（绝对误差） Water content (absolute error)	2%	
95 ~ 100%	碳氢化合物（相对误差） Hydrocarbons (relative error)	5~10%	5%
	气量（相对误差） Gas volume (relative error)	7%	3%
	三相持水率（绝对误差） Three phase water holding capacity (absolute error)	0.5%	
重复性 Repeatability		1/3 的不确定度 1/3 uncertainty	



豁免源短节型多相流量计测量典型不确定度 Typical measurement uncertainty of exempt source short multiphase flowmeter			
含气率范围 Gas content range	测量 Measurement	典型不确定度 Typical uncertainty	
		压力<2MPa Pressure < 2MPa	压力≥2MPa Pressure ≥ 2MPa
0~90%	液量（相对误差） Liquid volume (relative error)	5%	
	气量（相对误差） Gas volume (relative error)	7%	5%
	液相含水率（绝对误差） Water content in liquid phase (absolute error)	2%	
90~100%	碳氢化合物（相对误差） Hydrocarbons (relative error)	5~10%	5%
	气量（相对误差） Gas volume (relative error)	7%	3%
	三相持水率（绝对误差） Three phase water holding capacity (absolute error)	1.5%	0.5~1.5%

短节型多相流量计

Short Multiphase Flowmeter

概述

Introduction

短节型多相流量计体积小，可用于 0 ~ 100% 含气率范围单井计量和测试。短节型多相流量计能够在油、气、水三相不分离的状态下完成对油井产生的各相流量和其它过程参数进行在线、实时测量。此产品可永久安装在井口或计量站，亦可使用活度非常低的放射源（根据国际原子能机构标准可划分为豁免级）。

The short multiphase flowmeter has small volume and can be used for single well metering and testing in the range of 0 ~ 100% gas content. The short multiphase flowmeter can complete the on-line and real-time measurement of each phase flow and other process parameters produced by the oil well under the condition of three-phase non separation of oil, gas and water. This product can be permanently installed at the wellhead or metering station, and can also use radioactive sources with very low activity (which can be classified as exemption level according to the standards of the International Atomic Energy Agency).

产品特点

Product Features

- ◆ 结构简洁、尺寸小、重量轻
Simple structure, small size and light weight
- ◆ 成本更低、易于推广
Lower cost and easy promotion
- ◆ 可覆盖低中高各类含气工况
Cover all kinds of low, medium and high gas containing working conditions
- ◆ 自动化程度高，可无人值守
High degree of automation and unattended



性能指标

Performance Index

短节型多相流量计测量典型不确定度 Typical measurement uncertainty of short multiphase flowmeter			
含气率范围 Gas content range	操作压力 Operating pressure	典型不确定度 Typical uncertainty	
		<2MPa	≥2MPa
0 ~ 95%	液量（相对误差） Liquid volume (relative error)	5%	
	气量（相对误差） Gas volume (relative error)	7%	5%
	含水率（绝对误差） Water content (absolute error)	2%	
95 ~ 100%	碳氢化合物（相对误差） Hydrocarbons (relative error)	5~10%	5%
	气量（相对误差） Gas volume (relative error)	7%	3%
	三相持水率（绝对误差） Three phase water holding capacity (absolute error)	0.5%	
重复性 Repeatability		1/3 的不确定度 1/3 uncertainty	

豁免源短节型多相流量计测量典型不确定度 Typical measurement uncertainty of exempt source short multiphase flowmeter			
含气率范围 Gas content range	测量 Measurement	典型不确定度 Typical uncertainty	
		压力<2MPa Pressure < 2MPa	压力≥2MPa Pressure ≥ 2MPa
0 ~ 90%	液量（相对误差） Liquid volume (relative error)	5%	
	气量（相对误差） Gas volume (relative error)	7%	5%
	液相含水率（绝对误差） Water content in liquid phase (absolute error)	2%	
90 ~ 100%	碳氢化合物（相对误差） Hydrocarbons (relative error)	5 ~ 10%	5%
	气量（相对误差） Gas volume (relative error)	7%	3%
	三相持水率（绝对误差） Three phase water holding capacity (absolute error)	1.5%	0.5 ~ 1.5%

机械加工产品（一） Mechanical Processing Product I

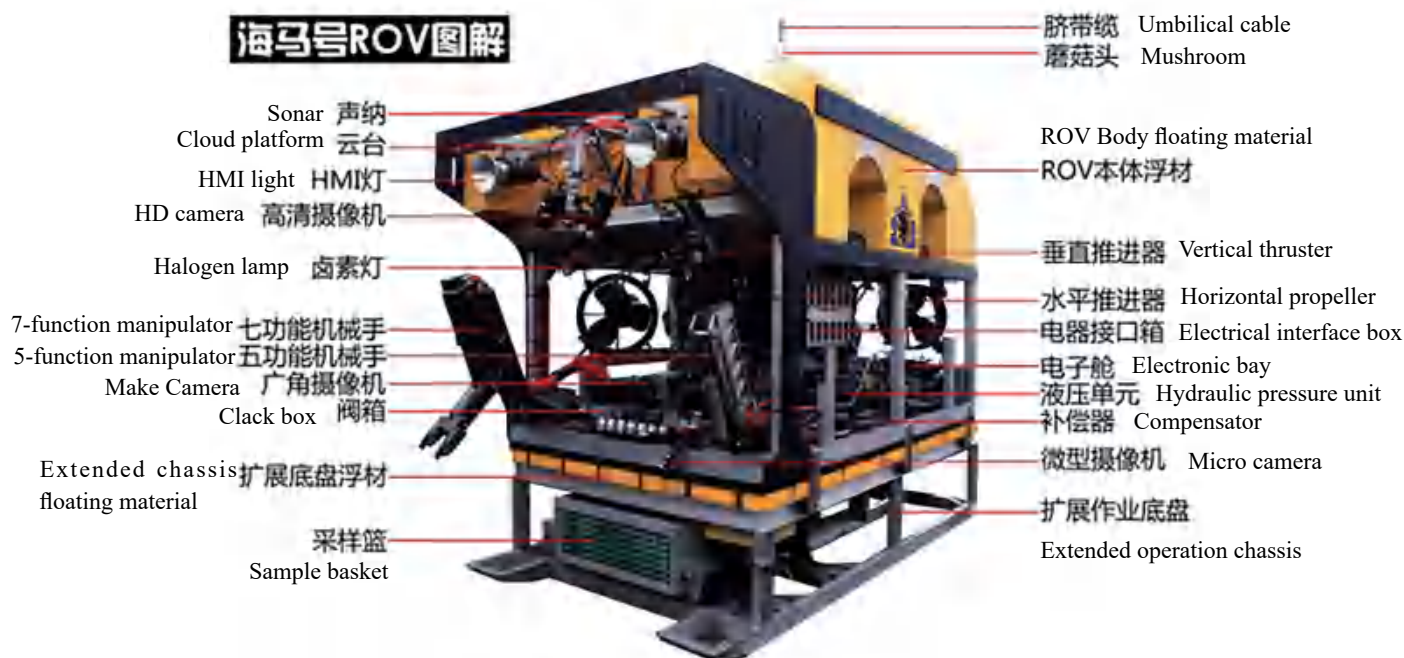
我国自主研发的首台4500米级深海遥控无人潜水器作业系统——“海马号”ROV, 是科技部通过863计划支持的重点项目, 是中国自主研发的下潜深度最大、国产化率最高的无人遥控潜水器系统。

ROV - the first 4,500m unmanned remote-controlled underwater vehicle operation system, which is independently developed by our country, is the key project supported by National 863 Program. It is the unmanned remote-controlled underwater vehicle system, which can submerge the deepest and enjoys the highest localization rate.

“海马号”的蘑菇头、电气接口箱、电子箱、补偿器装机外壳、微型摄像机装机外壳、HMI灯装灯外壳、高清摄像机装机外壳、卤素灯装灯外壳、广角摄像机装机外壳等以上产品均有我公司机械加工而成的。

The ROV's mushroom head, electrical interface box, electronic box, installation shell of the compensator, the installation shell of the mini camera, installation shell of HMI lights, installation shell of the HD camera, installation shell of halogen lamps, installation shell of the wide-angled camera, etc. are all manufactured and machined in our company.

Detailed illustration of ROV



图为海马号详细图解

Detailed illustration of ROV

机械加工产品（二） Mechanical Processing Product II

SH353型高容积密封传感器之承重外壳及其相关部件（包括压力筒体、端盖、高强度螺栓、镍垫圈、过程接管、毛细管接头、三通、护套管、塞头、闷头、安装护套）、SH2008型灌充阀、SH6000/B型液压隔离器（包括正负压容室法兰、毛细管接头、抽真空组件、螺丝螺栓）

The load-carrying shell of SH353 high-volume sealed sensor and its relevant parts and components (including the barrel body of pressure, end cover, high-strength bolt, nickel washer, process nozzle, capillary joint, tees, protection cover tube, chock plug, bulkhead and installation sheath), SH2008 filling valve and SH6000/B hydraulic isolator (including positive-negative chamber flange, capillary joint, vacuum components and screws & bolts)

为打破美国人的技术封锁，我公司机械加工中心与上海自动化仪表股份有限公司系统工程公司共同合作研制，该产品均已达到国际水准、国家核级要求，从而正式取代了美国巴顿公司的产品，已被广泛应用于巴基斯坦恰希玛C2C3C4核电等重要工程项目中。

In order to break the technical blockage from the USA, the mechanical processing center in our company and the systematic engineering company of Shanghai Automatic Instrument Co., Ltd. have jointly developed the product. The product has reached the international standard and national nuclear grade requirement and has formally replaced the products in America Barton Company. Besides, it has been broadly used in Pakistan Chasma C2C3C4 Nuclear Power and other important projects.



SH353型高容积密封传感器

SH2008型灌充阀

SH353 High volume sealed sensor

SH2008 Filling valve



SH6000/B型液压隔离器

SH6000/B Hydraulic isolator

流量仪表Flowmeter

YC-LZ 系列金属管浮子流量计

YC-LZ Series Metal Pipe Float Flowmeter

概述

Introduction

YC-LZ 系列金属管浮子流量计（又称金属转子流量计或变面积流量计），具有结构简单、工作可靠、适用范围广、精度较高、安装方便等特点。该系列流量计与玻璃转子流量计比较，具有耐高压、高温、安全感强、读数简明等特点。并可适用于不透明介质和腐蚀性介质的流量测量。仪表管体及法兰采用不锈钢（304SS 或 316L）。浮子及管体内衬采用聚四氟乙烯 PTFE 及 304SS 或 316L。

YC-LZ series metal pipe float flowmeter (also known as metal rotameter or variable area flowmeter) has the features of simple structure, reliable operation, wide application range, high precision and convenient installation. Compared with glass rotameter, this series of flowmeter has the features of high-pressure resistance, high temperature resistance, strong sense of safety and concise reading. It can be applied to the flow measurement of opaque and corrosive medium. The pipe body and flange are made of stainless steel (304SS or 316L). The float and pipe body lining use PTFE and 304SS or 316L.



YC-LZ 系列由仪表管体、标准浮子、锥形管和磁转换仪组成。本系列仪表的工作参数及其换算、修正由仪表计算软件提供标准的计算方法，保证仪表的计量准确性。

YC-LZ series consists of pipe body, standard float, conical pipe and magnetic conversion instrument. The standard calculation method for the working parameters, conversion and correction of this series of instruments is provided by the instrument calculation software to ensure the measurement accuracy.

测量原理

Measuring Principle

YC-LZ 系列金属管浮子流量计为变面积式流量计，即在流量计的垂直测量管中，当流体向上流经管子时，浮子向上移动，在某一位置浮子所受升力与浮子重力达到平衡，此时浮子与孔板（或锥管）间的流通环隙面积保持一定。环隙面积与浮子的上升高度成比例，即浮子的某一高度代表流量的大小。浮子上下移

动时，以磁耦合的形式将位置传递到外部指示器，使指示器的指针跟随浮子移动，并借助凸轮板使指针线性地指示流量值的大小，参见图 1。

YC-LZ series metal pipe float flowmeter is a variable area flowmeter, that is, in the vertical measuring pipe, when the fluid flows upward through the pipe, the float moves upward. At a certain position, the lifting force on the float is balanced with the gravity of the float. At this time, the flow annular gap area between the float and the orifice plate (or cone tube) remains certain. The annular gap area is proportional to the rising height of the float, that is, a certain height of the float represents the flow. When the float moves up and down, the position is transferred to the external indicator in the form of magnetic coupling, so that the pointer of the indicator moves with the float, and the pointer linearly indicates the flow value with the help of the cam plate, as shown in Figure 1.

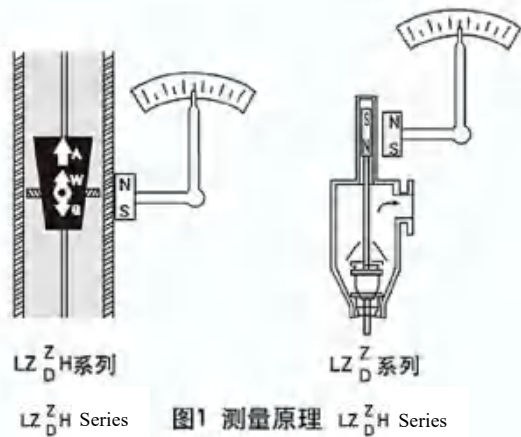


Figure 1 Measuring principle

电远传型是在指针现场指示流量的同时再通过角位移传感器及电变送电路，把流量值精确地转换成 4~20mA 的标准信号。

The electric remote transmission type is to accurately convert the flow value into a standard signal of 4 ~ 20mA through the angular displacement sensor and electric transmission circuit while the pointer indicates the flow on site.

技术参数

Technical Parameter

表 1
Table 1

仪表类型 Instrument type	YC-LZ _D ^Z H 系列 YC-LZ _D ^Z H Series
流量范围 Flow range	水 6~100000L/h (详见表 4) 空气 0.2~1000m ³ /h Water 6 ~ 100000L / h (see Table 4 for details) Air 0.2 ~ 1000m ³ / h
范围度 Range degree	DN < 80mm : 10 : 1 DN ≥ 80mm : 5 : 1
精度 Precision	标准型 2.5 级，特殊订货可达 1.0 级 Standard type: grade 2.5, and special order can reach grade 1.0
最大工作压力 Maximum working pressure	DN15, DN25, DN40, DN50 : 6.4MPa DN25, DN40, DN50, DN80, DN100 : 2.5MPa, DN150 : 1.6MPa
介质温度	普通型 H1: -40℃ ~100℃，高温型 H2: -80℃ ~250℃

Medium temperature	Ordinary type H1: - 40 ° C ~ 100 ° C, high temperature type H2: - 80 ° C ~ 250 ° C
环境温度 Environment temperature	-25°C ~ +55°C
连接方式 Connection mode	法兰连接 (法兰标准; 参照 GB9115-88, JB82-59 (6.4MPa), 特殊规格根据用户需求而定) Flange connection (flange standard; refer to GB9115-88 and JB82-59 (6.4MPa), and special specifications are determined according to user requirements)
防爆等级 Explosion proof grade	Exia II C T6 Ga 配安全栅 LB987S Exia II C T6 Ga is equipped with safety barrier LB987S
防护等级 Degree of protection	IP65/IP66/IP67
粘度 Viscosity	DN15 : ≤5MPa.s, DN25 ~ DN150 : ≤250MPa.s
产品执行标准 Product executive standard	JB/T6844

YC-LZ_D^ZH 系列规格

YC-LZ_D^ZH Series Specifications

表 2

Table 2

通径(mm) Diameter (mm)	工作号 Operation No.	流量范围 Flow range			压力损失 kPa Pressure loss kPa		
		水 L/h* Water L / h*		空气 m³/h* Air m³ / h*	水 Water		空气 Air
		常规型 Conventional type	防腐型 Anticorrosive type	常规型, 防腐型 Conventional type, anti-corrosion type	常规型 Conventional type	防腐型 Anticorrosive type	
15	1A	2.5 ~ 25	—	0.07 ~ 0.7	6.5	—	7.1
	1B	4.0 ~ 40	2.5 ~ 25	0.11 ~ 1.1	6.5	5.5	7.2
	1C	6.3 ~ 63	4.0 ~ 40	0.18 ~ 1.8	6.6	5.5	7.3
	1D	10 ~ 100	6.3 ~ 63	0.28 ~ 2.8	6.6	5.6	7.5
	1E	16 ~ 160	10 ~ 100	0.48 ~ 4.8	6.8	5.6	8.0
	1F	25 ~ 250	16 ~ 160	0.7 ~ 7.0	7.0	5.8	10.8
	1G	40 ~ 400	25 ~ 250	1.0 ~ 10	8.6	6.1	10.0
	1H	63 ~ 630	40 ~ 400	1.6 ~ 16.0	11.1	7.3	14.0
25	2A	100 ~ 1000	63 ~ 630	3 ~ 30	7.0	5.9	7.7

	2B	160 ~ 1600	100 ~ 1000	4.5 ~ 45	8.0	6.0	8.8
	2C	250 ~ 2500	160 ~ 1600	7 ~ 70	10.8	6.8	12.0
	2D	400 ~ 4000	250 ~ 2500	11 ~ 110	15.8	9.2	19.0
40	4A	500 ~ 5000	300 ~ 3000	12 ~ 120	10.8	8.6	9.8
	4B	600 ~ 6000	350 ~ 3500	16 ~ 160	12.6	10.4	16.5
50	5A	630 ~ 6300	400 ~ 4000	18 ~ 180	8.1	6.8	8.6
	5B	1000 ~ 10000	630 ~ 6300	25 ~ 250	11.0	9.4	10.4
	5C	1600 ~ 16000	1000 ~ 10000	40 ~ 400	17.0	14.5	15.5
80	8A	2500 ~ 25000	1600 ~ 16000	60 ~ 600	8.1	6.9	12.9
	8B	4000 ~ 40000	2500 ~ 25000	80 ~ 800	9.5	8.0	18.5
100	10A	6300 ~ 63000	4000 ~ 40000	—	15.0	8.5	—
150	15A	20000 ~ 100000	—	—	19.2	—	—

注：水 20℃，空气 0.1013MPa，20℃；特殊流量可特别订货。DN150 口径，最大水流量可达 180m³/h。

Note: water 20°C, air 0.1013MPa, 20 ° C; special flow can be ordered. The maximum water flow can reach 180m³ / h for DN150.

YC-LZ_D^ZH 系列流量计安装尺寸mm

Installation Dimension of YC-LZ_D^ZH Series Flowmeter mm

表 3
Table 3

通径(mm) Diameter (mm)	D1	D2	孔数-ød Hole number - ød	f
15	65	95	4-Ø14	224
25	85	115	4-Ø14	245
40	110	150	4-Ø18	266
50	125	160	4-Ø18	285
80	160	195	8-Ø18	306
100	180	215	8-Ø18	336
150	240	280	8-Ø23	386

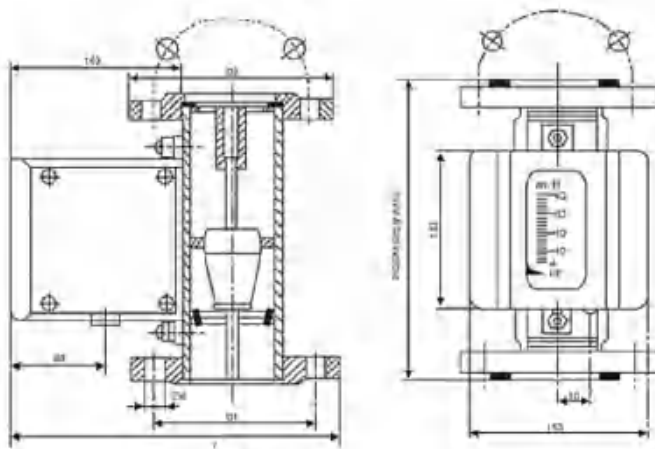


图2 LZ_D^ZH系列外形尺寸连接图

Figure 2 LZ_D^ZH series overall dimension connection drawing

型号选择及说明

Model Selection and Description

型号 Model	产品名称 Product name
YC-LZ	金属管浮子流量计 Metal pipe float flowmeter
代号 Code	指示类型 Indicator type
Z	就地指示 Local indicator
D	电远传带就地指示 Electric remote belt local indicator
代号 Code	通径 Diameter
X	DN
代号 Code	测量管材料选择 Material selection of measuring pipe
R1	R1 不锈钢 (304) R1 stainless steel (304)
R0	R0 不锈钢 (316L) R0 stainless steel (316L)
F	F 聚四氟乙烯 (PTFE) 衬里 F PTFE lining
代号 Code	指示器形式* Indicator form*
M1	指针式线性指示瞬时流量 Pointer linear indication instantaneous flow
M2	指针式非线性指示瞬时流量 (仅适用于 DN15 ~ DN80) Pointer non-linear indication instantaneous flow (only applicable to DN15 ~ DN 80)
M2S	指针式非线性指示瞬时流量, 液晶显示累积流量 Pointer non-linear indication instantaneous flow, liquid crystal display cumulative flow
代号 Code	远传变送器选择* Selection of remote transmitter*
Es4	电远传: 4 ~ 20mA 二线制 24VDC 供电 Electric remote transmitter: 4 ~ 20mA two wire 24VDC power supply
代号 Code	防爆类型* Explosion proof type*
Exi	本安型与关联设备 LB987S 安全栅配套防爆等级 Exib II CT4 Intrinsically safe is matched with the IB987S safety barrier of the associated equipment, and the explosion-proof grade is Exib II CT4
Exd	隔爆型 Explosion-proof type
代号 Code	测量管特殊要求 Special requirements for measuring pipes
T	保温夹套 (适用于 H 系列) Heating jacket (applicable to H Series)
代号	介质温度选择



Code	Medium temperature selection
H1	-40°C ~ +100°C
H2	-80°C ~ +250°C
代号	公称压力选择
Code	Nominal pressure selection
P1	1.6MPa (DN80 ~ DN150)
P2	2.5MPa (DN40 ~ DN100)
P4	4.0MPa (DN15 ~ DN50)
P6	6.4MPa (DN15 ~ DN50)
代号	流量范围选择
Code	Flow range selection
X	选用工作号 (参考流量规格表 2, 也可直接标注测量范围及单位) Select the work No. (refer to flow specification table 2, or directly mark the measurement range and unit)
代号	介质状态选择
Code	Media status selection
A	气体 (测量气体优先选用 LZZ 系列, 并选配气体阻尼器) Gas (LZZ series is preferred for measuring gas, and gas damper is selected)
L	液体 Liquid
代号	报警选择*
Code	Alarm selection*
X	K1, K2 (仅适配于 M2 指示器, 而且不能与 Es4 共选) K1, K2 (only applicable to M2 indicator, and cannot be co selected with Es4)

注: 带*空格可以按需填写, 不填说明无此功能选项, 其它空格必须正确填写。

Note: the space with * can be filled in as needed. If it is not filled in, there is no function option. Other spaces must be filled in correctly.

流量仪表Flowmeter

YC-LDE系列电磁流量计

YC-LDE Series Electromagnetic Flowmeter

概述

Introduction

YC-LDE电磁流量计由传感器和转换器两部分构成。它是基于法拉第电磁感应定律工作的，用来测量电导率大于 $5\mu\text{S}/\text{cm}$ 导电液体的体积流量，是一种测量导电介质体积流量的感应式仪表。除可测量一般导电液体的体积流量外，还可用于测量强酸、强碱等强腐蚀液体和泥浆、矿浆、纸浆等均匀的液固两相悬浮液体的体积流量。广泛应用于石油、化工、冶金、轻纺、造纸、环保、食品等工业部门及市政管理、水利建设、河流疏浚等领域的流量计量。

YC-LDE electromagnetic flowmeter consists of sensor and converter. It is based on Faraday law of electromagnetic induction. It is used to measure the volume flow of conductive liquid with conductivity greater than $5\mu\text{S}/\text{cm}$. It is an inductive instrument to measure the volume flow of conductive medium. In addition to measuring the volume flow of general conductive liquids, it can also be used to measure the volume flow of strongly corrosive liquids such as strong acid and alkali and uniform liquid-solid two-phase suspension liquids such as mud, ore pulp and paper pulp. It is widely used in flow measurement in industrial departments, municipal management, water conservancy construction, river dredging and other fields such as petroleum, chemical industry, metallurgy, light textile, papermaking, environmental protection and food.



原理与结构

Principle and Structure

根据法拉第电磁感应原理，在与测量管轴线和磁力线相垂直的管壁上安装了一对检测电极，当导电液体沿测量管轴线运动时，导电液体切割磁力线产生感应电势，此感应电势由两个检测电极检出，数值大小与流量成比例，其值为：

$$E=KBV^-D$$

According to Faraday law of electromagnetic induction, a pair of detection electrodes are installed on the pipe wall perpendicular to the axis of the measuring pipe and the magnetic line of force. When the conductive liquid moves along the axis of the measuring pipe, the conductive liquid cuts the magnetic line of force to produce the induced potential, which is detected by the two detection electrodes. The value is proportional to the flow. Its value is:

$$E=KBV^-D$$

式中：E - 感应电势；

K - 与磁场分布及轴向长度有关的系数。

B - 磁感应强度；

V^- - 导电液体平均流速；

D - 电极间距；（测量管内直径）

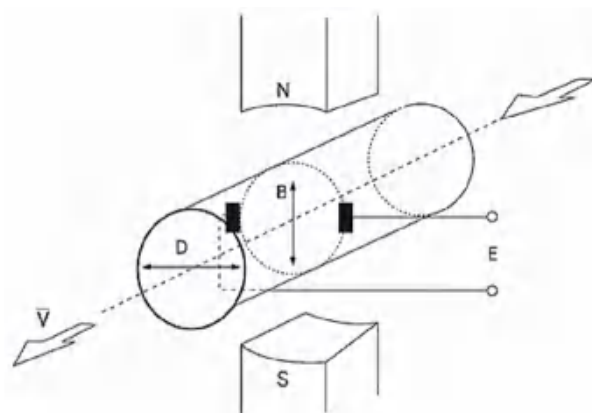
Where: E - induction electromotive force;

K - coefficient related to magnetic field distribution and axial length;

B - magnetic induction intensity;

V^- - average flow rate of conductive liquid;

D - electrode spacing (diameter of the inner measuring pipe)



传感器将感应电势 E 作为流量信号，传送到转换器,经放大，变换滤波及一系列的数字处理后，用带背光的点阵式液晶显示瞬时流量和累积流量。转换器有 4~20mA 输出，报警输出及频率输出，并设有 RS-485 等通讯接口。

The sensor takes the induced potential E as the flow signal and transmits it to the converter. After amplifying, transforming filter and a series of digital processing, the instantaneous and cumulative flow are displayed by dot matrix liquid crystal with backlight. The converter has 4~20mA output, alarm output and frequency output, and is equipped with RS-485 and other communication interfaces.

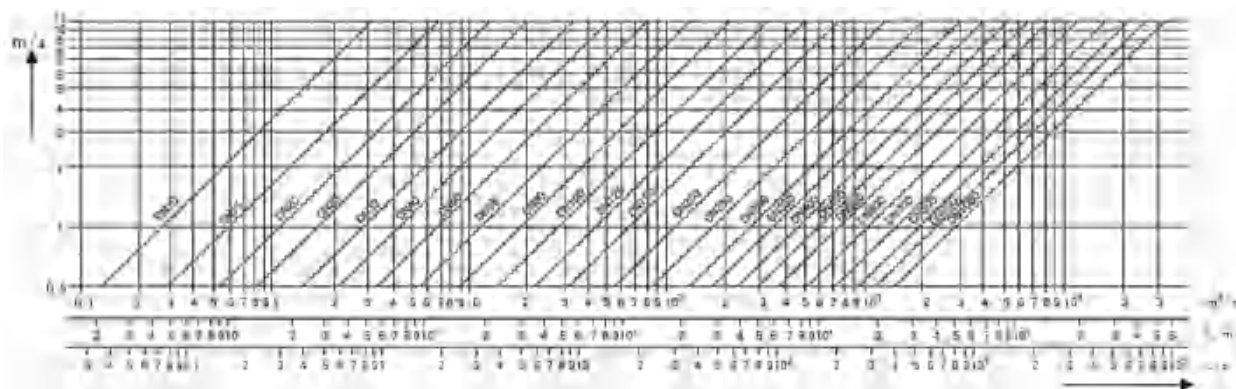
仪表特点

Instrument Features

- ◆ 测量管内无阻流件，压力损失为零，不易堵塞。
There is no baffle in the measuring pipe, the pressure loss is zero, and it is not easy to be blocked.
- ◆ 只要合理选用电极及衬里材料，即可达到耐腐蚀、耐磨损的要求。
As long as the electrode and lining materials are reasonably selected. It can meet the requirements of corrosion and wear resistance.
- ◆ 测量结果与液体的压力、温度、密度、粘度、电导率（不小于最低电导率）等物理参数基本无关，不受环境影响，所以测量精度高、工作稳定、可靠。
The measurement results are basically independent of physical parameters such as liquid pressure, temperature, density, viscosity, conductivity (not less than the minimum conductivity) and are not affected by the environment, so the measurement accuracy is high, the work is stable and reliable.
- ◆ 采用现代模拟信号转换技术和高性能超大规模集成芯片，对信号进行隔离、滤波、放大及数字处理。精确显示测量结果。
Modern analog signal conversion technology and high-performance VLSI chip are used to isolate, filter, amplify and digitally process the signal. Accurately display the measurement results.
- ◆ 具有测量值断电保护及过量程报警功能，可对传感器内流体的流向进行设置，因而传感器安装不受液体流动方向限制，可实现双向流测量。
With the functions of measured value power-off protection and over range alarm, the flow direction of the fluid in the sensor can be set, so the installation of the sensor is not limited by the flow direction of the liquid, and the two-way flow measurement can be realized.
- ◆ 采用带背光点阵式双排流量显示器，同时显示瞬时流量、累积流量，并能显示工作状态、参数、计量单位等。
It adopts dot matrix double row flow display with backlight, which can display instantaneous and cumulative flow. At the same time, it can display working status, parameters, measurement units, etc.
- ◆ 电磁流量计的量程范围宽（最大流量/最小流量），正常适用范围 20: 1 ,一般 30: 1 或更大。
The electromagnetic flowmeter has a wide range (maximum flow / minimum flow), and the normal application range is 20:1, generally 30:1 or greater.
- ◆ 仪表配置有多种输出功能，可与计算机、单元组合仪表配套，可完成打印、通讯和联网的要求。
The instrument is equipped with a variety of output functions, which can be matched with computers and unit combination instruments to meet the requirements of printing, communication and networking.

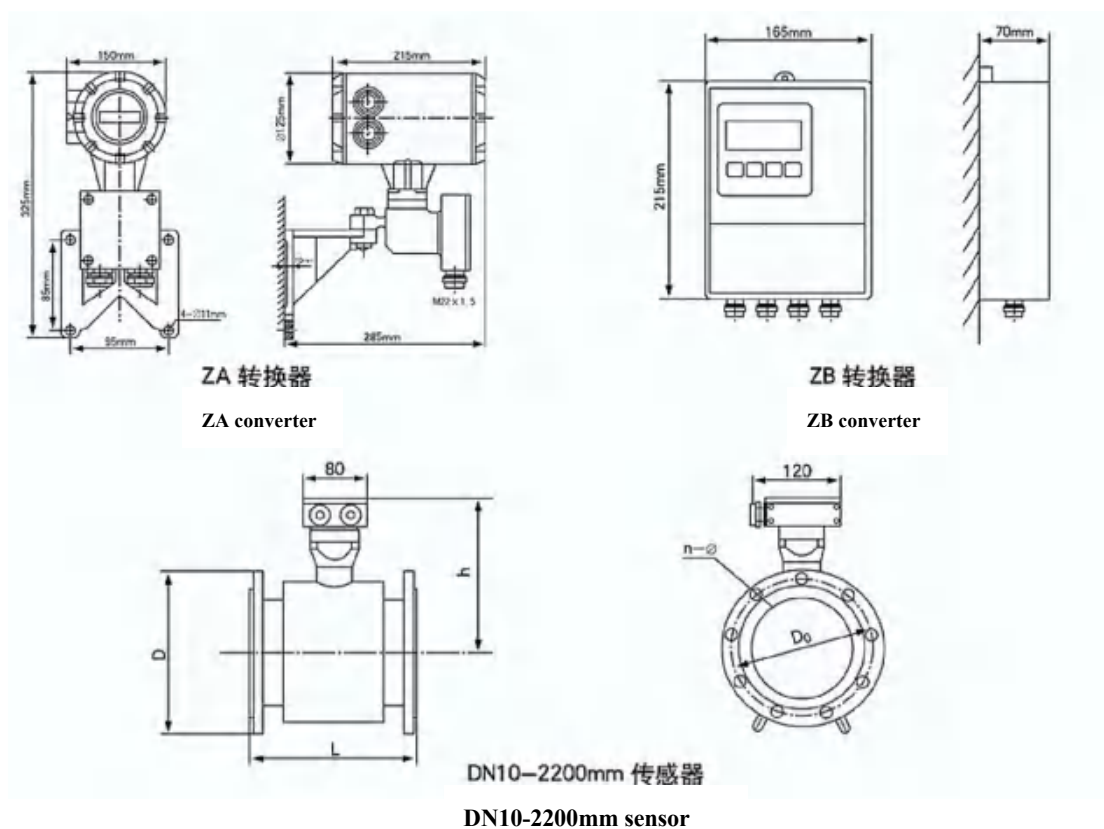
流量计通径、流速与流量关系的曲线图

Curve Diagram of Relationship Between Flowmeter Diameter, Flow Rate and Flow



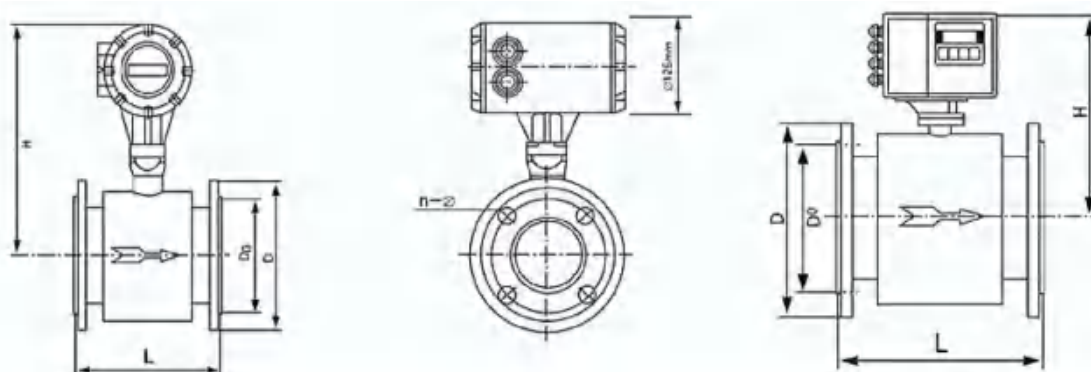
分体式流量计外形尺寸图

Overall Dimension Drawing of Split Flowmeter



一体式流量计外形尺寸图

Overall Dimension Drawing of Integrated Flowmeter



法兰标准:

GB9115.11-2010 (PN4.0)

GB9115.9-2010 (PN1.6)

GB9115.8-2010 (PN1.0)

Flange standard:

GB9115.11-2010 (PN4.0)

GB9115.9-2010 (PN1.6)

GB9115.8-2010 (PN1.0)

一体式和分体式流量计外形尺寸

Overall Dimensions of Integrated and Split Flowmeters

mm

通径 Diameter	耐压 MPa Pressure MPa	L	D	Do	H	h	n-Ø
10	4.0	150	90	60	220	102	4-Ø14
15		150	95	65	222	106	4-Ø14
20		150	105	75	230	110	4-Ø14
25		150	115	85	235	115	4-Ø14
32		150	140	100	255	122	4-Ø18
40		150	150	110	260	127	4-Ø18
50		200	165	125	270	140	4-Ø18
65		200	185	145	275	148	8-Ø18
80		200	200	160	280	154	8-Ø18

100	1.6	250	220	180	290	163	8-Ø18
125		250	250	210	320	175	8-Ø18
150		300	285	240	330	200	8-Ø22
200	1.0	350	340	295	340	220	8-Ø22
250		400	395	350	360	240	12-Ø22
300		500	445	400	405	285	12-Ø22
350		500	505	460	440	320	16-Ø22
400		600	565	515	470	350	16-Ø26
450		600	615	565	500	380	20-Ø26
500		600	670	620	530	410	20-Ø26
600		600	780	725	590	470	20-Ø30
700		700	895	840	650	530	24-Ø30
800		800	1015	950	720	600	24-Ø33
900		900	1115	1050	770	650	28-Ø33
1000		1000	1230	1160	830	700	28-Ø36
1200	0.6	1200	1405	1340	950	800	32-Ø33
1400		1400	1630	1560	1050	900	36-Ø36
1600		1600	1830	1760	1150	1000	40-Ø36
1800		1800	2040	1970	1250	1100	44-Ø39
2000		2000	2265	2180	1350	1200	48-Ø42
2200	0.25	2200	2405	2340	1450	1300	52-Ø33

注：口径 10~100 内衬为 PTFE 的传感器 L 的长度增加 5mm, 口径 125 以上的传感器 L 的长度增加 10mm。

Note: the length of sensor L with a size of 10~100 lined with PTFE increases by 5mm, and the length of sensor L with a size of more than 125 increases by 10mm.

技术参数

Technical Parameter

主要技术指标

Main Technical Parameters

流量选择表（参考曲线图）

Flow Selection Table (refer to the curve)

介质电导率 Dielectric conductivity	>5μS / cm 304SS 或 316L >5μS / cm 304SS or 316L	通径 Diameter	最小流量 选择 Minimum flow selection	常用满量程流量选择(m³/h) Selection of common full-scale flow (m³/h)
		10	0.10	0.4,0.5,0.6,0.8,1.0,1.2,1.6,2.0,2.5
流速 Current Speed	0.3 ~ 12m/s	15	0.20	1.0,1.2,1.6,2.0,2.5,3.0,4.0,5.0,6.0
		20	0.35	2.0,2.5,3.0,4.0,5.0,6.0,8.0,10.0,12.0
		25	0.55	3.0,4.0,5.0,6.0,8.0,10.0,12.0,14.0,16.0
量程 Measuring range	在可测流速范围内，满量程流量可编程，详见右表 Within the measurable flow rate range, the full-scale flow is programmable. See the table on the right for details.	32	1.0	5.0,6.0,8.0,10.0,12,16,20,25
		40	1.5	8.0,10.0,12,16,20,25,30,40
精度 Precision	测量示值±0.3%, ±0.5%, ±1% Measurement indication±0.3%, ±0.5%, ±1%	50	2.5	12,16,20,25,30,40,50,60,70
		65	4.0	20,25,30,40,50,60,80,100,120
环境温度 Environment temperature	-10℃ ~ 50℃	80	5.5	25,30,40,50,60,80,100,120,160
		100	8.5	40,50,60,80,100,120,160,200,250
介质温度 Medium temperature	T1 ≤ 65℃, T2 ≤ 120℃, T3 ≤ 180℃	125	14	60,80,100,120,160,200,250,300,400
		150	20	100,120,160,200,250,300,400,500,600
	DN 10 ~ 80: PN ≤ 4MPa	200	35	160,200,250,300,400,500,600,800,1000
	DN 100 ~ 150: PN ≤ 1.6MPa	250	55	200,250,300,400,500,600,800,1000,1200,1600



工作压力 Working pressure	DN 200 ~ 1000: PN≤ 1.0MPa	300	80	300,400,500,600,800,1000,1200,1600,2000 2500
	DN 1200 ~ 2000: PN ≤ 0.6MPa	350	10.5	400,500,600,800,1000,1200,1600,2000,2500,3000
	DN 2200: PN ≤ 0.25MPa	400	135	500,600,800,1000,1200,1600,2000,2500,3000,4000
	DN 2200: PN ≤ 0.25MPa	450	175	600,800,1000,1200,1600,2000,2500,3000, 4000,5000
	以上各口径如需更高压力, 可以特殊订货。 If higher pressure is required for the above sizes, special order can be made.	500	215	800,1000,1200,1600,2000,2500,3000,4000, 5000,6000
电源 Power Supply	220V AC 50Hz (90-245V AC 50Hz) 24V DC (20~36V DC)	600	305	1000,1200,1600,2000,2500,3000,4000,5000, 6000,10000
功耗 Power consumption	6.5VA	800	545	1600,2000,2500,3000,4000,5000,6000,10000, 12000,16000
防护等级 Degree of protection	标准型 IP66 特殊型 IP67 或 IP68	900	690	2000,2500,3000,4000,5000,6000,10000, 12000,16000,20000
	Standard IP66, special IP67 or IP68	1000	850	2500,3000,4000,5000,6000,10000,12000, 16000,20000,25000
电极材质 Electrode material	316L, Hc, Hb, Ti, Ta	1200	1250	6000,10000,15000,20000,25000,30000,35000
衬里材质 Lining material	1. 氯丁橡胶 Chloroprene rubber	1400	1700	8000,10000,20000,30000,40000,50000
		1600	2500	10000,20000,30000,40000, 50000,65000
	2. 聚四氟乙烯 PTFE	1800	3000	15000,20000,30000,40000,50000,60000, 70000,80000
	3. 聚氯乙烯 Polyvinyl chloride	2000	3500	20000,40000,60000,80000,100000
	4. F46 5. PFA			
		2200	4000	20000,40000, 60000,80000,100000,120000

型号选择及说明

Model Selection and Description

型号 Model	基本代码 Basic code			说明 Description
YC-LDE				电磁流量计 Electromagnetic flowmeter
公称 口径 Nominal diameter	C			插入式 Plug-in type
	Y			一体式 Integrated type
	F			分体式 Split type
	口 径 Size			如 50-表示 DN50 For example, 50- indicates DN50
电源 Power supply	AC			交流 220V AC 50Hz (90 ~ 245V AC 50Hz) AC 220V AC 50Hz (90 ~ 245V AC 50Hz)
	DC			直流 24V DC (20 ~ 36 V DC) DC 24V DC (20 ~ 36 V DC)
	EC			电池供电 3.6V Battery powered 3.6V
输出信号 Output signal	I			4 ~ 20mA
	IH			4 ~ 20mA+HART
	F			频率 1kHz Frequency 1kHz
	R			串行通讯 (485) Serial communication (485)
防爆要求 Explosion proof requirements	N			无防爆 No explosion-proof
	Ex			防爆 Exd b II CT6 Gb Explosion proof Exd b II CT6 Gb
介质温度 Medium temperature	T1			≤ 65°C
	T2			≤ 120°C
	T3			≤ 180°C (仅适用于分体式) ≤ 180°C (only applicable to split type)
内衬材质 Lining material	NE			(氯丁橡胶 ≤ 65°C) (DN50 ~ DN2200) (Chloroprene rubber ≤ 65 ° C) (DN50 ~ DN2200)
	PTFE			(聚四氟乙烯 ≤ 180°C) (DN10 ~ DN600) (PTFE ≤ 180 ° C) (DN10 ~ DN600)

	PVC		(聚氯乙烯 $\leq 70^{\circ}\text{C}$) (DN10 ~ DN150) (PVC $\leq 70^{\circ}\text{C}$) (DN10 ~ DN150)
	PU		(聚胺脂衬里) (DN10 ~ DN2200) (Polyurethane lining) (DN10 ~ DN2200)
	PFA		PFA 衬里(DN10 ~ DN400) PFA lining (DN10 ~ DN400)
电极材质 Electrode material	316L		316L
	Hc		哈氏合金 c Hastelloy c
	Hb		哈氏合金 b Hastelloy b
	Ti		钛 Titanium
	Ta		钽 Tantalum
	Pt		铂 Platinum
防护等级 Protection level		A	IP65
		B	IP66
		C	IP67
		D	IP68 (仅适用于分体式) IP68 (split type only)
接地环 Ground ring		N	没有No
		D	有Yes
压力等级 Pressure grade			4.0; 1.6; 1.0; 0.6; 0.25
信号线长度 Signal line length			(米) (仅适用于分体式) (m) (Split type only)

电极材料及衬里材料的选择

Selection of Electrode and Lining Materials

1. 电极材料的选择

Selection of electrical materials

应根据被测介质的腐蚀性, 由用户负责选定, 对一般介质, 可查有关防腐蚀手册, 选定电极材料, 对混酸等成份复杂的介质, 应做挂片试验。

The user shall be responsible for the selection according to the corrosivity of the measured medium. For general medium, please refer to the relevant anti-corrosion manual and select the electrode material. For medium with complex components such as mixed acid, the coupon tests shall be carried out.

电极材料的耐腐蚀性能（仅供参考，详见附录 1、附录 2）

Corrosion resistance of electrode materials (for reference only, see Appendix 1 and Appendix 2 for details)

电极材料 Electrode material	耐腐蚀性能 Corrosion resistance
含钼不锈钢 Molybdenum containing stainless steel 00Cr17Ni14Mo2 (316L)	对于硝酸，室温下<5%硫酸、沸腾的磷酸、蚁酸、碱溶液，在一定压力下的亚硫酸、海水、醋酸等介质，有较强的耐腐蚀性，可广泛用于石油化工、尿素、维尼纶等工业。 海水、盐水、弱酸、弱碱 For nitric acid, sulfuric acid < 5% at room temperature, boiling phosphoric acid, formic acid, alkali solution, sulfite under certain pressure, seawater, acetic acid and other media have strong corrosion resistance, and can be widely used in petrochemical, urea, vinylon and other industries. Seawater, brine, weak acid, weak alkali
哈氏合金 B (HB) Hastelloy B (HB)	对沸点以下一切浓度的盐酸有良好的耐腐蚀性，也耐硫酸、磷酸、氢氟酸，有机酸等非氧化性酸、碱、非氧化盐液的腐蚀。 It has good corrosion resistance to all concentrations of hydrochloric acid below the boiling point, as well as the corrosion of sulfuric acid, phosphoric acid, hydrofluoric acid, organic acid and other non-oxidizing acids, alkali and non-oxidizing salt solutions.
哈氏合金 C (HC) Hastelloy C (HC)	能耐氧化性酸，如硝酸、混酸或铬酸与硫酸的混合物的腐蚀，也耐氧化性的盐类，如 Fe ⁺⁺⁺ , Cu ⁺⁺ 或含其他氧化剂的腐蚀。如高于常温的次氯酸盐溶液，海水的腐蚀。 It can resist the corrosion of oxidizing acids, such as nitric acid, mixed acid or the mixture of chromic acid and sulfuric acid, as well as the corrosion of oxidizing salts, such as Fe ⁺⁺⁺ , Cu ⁺⁺ or containing other oxidants. Such as subarginate solution higher than normal temperature, seawater corrosion.
钛(Ti) Titanium (Ti)	能耐海水，各种氯化物和次氯化盐，氧化性酸（包括发烟、硝酸），有机酸、碱等的腐蚀。不耐较纯的还原性酸（如硫酸、盐酸）的腐蚀，但如果酸中含有氟化剂时，则腐蚀大为降低。 It can resist the corrosion of seawater, various chlorides and hypochlorites, oxidizing acids (including fuming and nitric acid), organic acids and alkalis. It is not resistant to the corrosion of relatively pure reducing acids (such as sulfuric acid and hydrochloric acid), but if the acid contains fluorinating agent, the corrosion will be greatly reduced.
钽(Ta) Tantalum (Ta)	具有优良的耐腐蚀性，和玻璃很相似。除了氢氟酸、发烟硫酸、碱外。 It has excellent corrosion resistance and is very similar to glass. Except hydrofluoric acid, fuming sulfuric acid and alkali.
铂(Pt) Platinum (Pt)	几乎能耐一切化学介质腐蚀。 It can resist almost all chemical medium corrosion.

2. 衬里材料的选择

Selection of lining materials

应根据被测介质的腐蚀性，磨损性及温度来选择。氯丁橡胶，可耐一般的弱酸、弱碱腐蚀，耐温 65℃，氯丁橡胶有耐磨性。聚四氟乙烯几乎能耐除热磷酸以外的强酸、碱腐蚀，介质温度可达 180℃ 但不耐磨损。

It shall be selected according to the corrosivity, abrasiveness and temperature of the measured medium. Chloroprene rubber is resistant to general weak acid and weak alkali corrosion and temperature of 65 ° C. It also has wear resistance. PTFE is almost resistant to strong acid and alkali corrosion except hot phosphoric acid. The medium temperature can reach 180 ° C, but it is not resistant to wear.

3. 常用衬里材料的性能及其适用范围

Properties and application scope of common lining materials

衬里材料 Lining material	主要性能 Main performance	适用范围 Scope of application
聚四氟乙烯 PTFE	1.它是塑料中化学性能最稳定的一种材料，能耐沸腾的盐酸、硫酸、硝酸和污水、也能耐浓碱和各种有机溶剂。 It is a material with the most stable chemical properties in plastics. It can resist boiling hydrochloric acid, sulfuric acid, nitric acid and sewage, concentrated alkali and various organic solvents. 2. 耐磨性和粘接性能差。 Poor wear resistance and adhesion.	1. -40°C ~ +180°C 2. 酸，碱等强腐蚀性介质 Strong corrosive medium such as acid and alkali 3. 卫生类介质 Sanitary media 4. 不适用于负压管道 Not applicable to negative pressure pipes
氯丁橡胶 NEOPRENE	1. 有极好的弹性、高强的扯断力，耐磨性能好 It has excellent elasticity, high tensile strength and good wear resistance. 2. 耐一般低浓度酸、碱、盐介质的腐蚀，不耐氧化性介质的腐蚀。 It is resistant to the corrosion of general low concentration acid, alkali and salt media, and is not resistant to the corrosion of oxidizing media.	1. <65°C 2. 测一般水、污水、泥浆、矿浆 General water, sewage, mud and ore pulp can be measured.
聚全氟代乙丙烯 Polyperfluoroethylpropylene F46	化学性能最稳定的一种材料,可适用于已知任何有机溶剂或试剂介质或在高温下也不受影响。 A material with the most stable chemical properties, which can be applied to any known organic solvent or reagent medium and is not affected at high temperature.	1. -40°C ~ 180°C 2. 适用于强腐蚀介质 Suitable for highly corrosive media 3. 卫生级介质 Hygienic media
聚氯乙烯 Polyvinyl chloride PVC	适用于各种碱、盐、硫酸、硝酸、磷酸等及它们的水溶液，不耐浓硫酸、发烟硫酸、醋酐类、醚类、卤代烃芳胺。 It is suitable for all kinds of alkali, salt, sulfuric acid, nitric acid, phosphoric acid and their aqueous solutions. It is not resistant to concentrated sulfuric acid, fuming sulfuric acid, acetic anhydride, ether, halogenated hydrocarbon and aromatic amine.	1. -25°C ~ 70°C 2. 测一般水、污水、泥浆、矿浆、煤浆 General water, sewage, slurry, ore pulp and coal pulp can be measured. 3. 一般酸、碱、盐溶液 General acid, alkali and salt solutions.

聚氨脂 Polyurethane PU	适用于各种浆料，具有很强的耐磨性。 It is suitable for all kinds of pulp and has strong wear resistance.	纸浆、矿浆等浆液 Pulp, mineral pulp and other pulp
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流量仪表Flowmeter

YC-VF 系列涡街流量计

YC-VF Series Vortex Flowmeter

概述

Introduction

YC-VF 系列涡街流量计，主要用于工业管道流体介质的流量测量，如气体、液体、蒸汽等多种介质。其特点是压力损失小，量程范围大，精度高，在测量工况体积流量时几乎不受流体密度、压力、温度、粘度等参数的影响。无可动机械零件，因此可靠性高，维护量小。仪表常数能长期稳定。插入式仪表在管道的插入口安装，球阀则可进行不断流装卸。以便在脏污介质中运行时定期清洗和维修。本仪表采用压电应力式传感器，可靠性高，可在-20℃至+250℃的工作温度范围内工作。有模拟标准信号，也有数字脉冲信号输出，容易与计算机等数字系统配套使用，是一种比较先进、理想的流量仪表。

YC-VF series vortex flow Flowmeter is mainly used for flow measurement of industrial pipeline fluid media, such as gas, liquid, steam and other media. It is characterized by small pressure loss, wide measuring range and high precision. When measuring the volume flow under working conditions, it is almost not affected by the parameters such as fluid density, pressure, temperature and viscosity.

There are no movable mechanical parts, so it has high reliability and small maintenance. The instrument constant can be stable for a long time. The plug-in instrument is installed at the plug-in port of the pipeline, and the ball valve can be loaded and unloaded continuously for regular cleaning and maintenance when operating in dirty medium. This instrument adopts piezoelectric stress sensor with high reliability, and it can work within the temperature range of -20 °C to +250 °C. With analog standard signal and digital pulse signal output, it is easy to be used together with digital systems such as computers. It is an advanced and ideal flow instrument.



特点

Features

- ◆ 输出信号不受流体的温度压力、密度成份等影响，并与流体流速成正比。

The output signal is not affected by the temperature, pressure and density composition of the fluid, and is directly proportional to the fluid flow rate.

- ◆ 感测元件不接触介质，可靠性高。

The sensing element does not contact the medium and has high reliability.

- ◆ 无可动部件。结构简单、牢固。

No movable parts with simple and firm structure.

- ◆ 测量范围宽，精度高。

Wide measuring range and high precision.

- ◆ 压损小，节能显著。

Small pressure loss and significant energy saving.

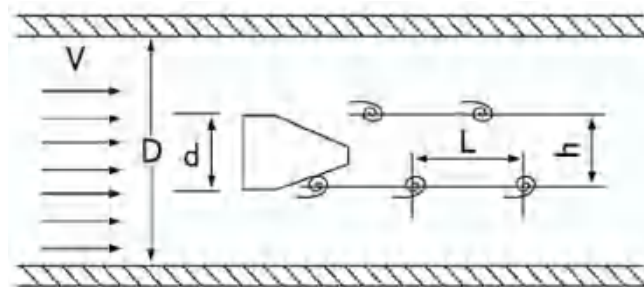


图1 旋涡形成示意图

Figure 1 Schematic diagram of vortex formation

工作原理

Working Principle

在流体中垂直地插入一根柱状阻力体时，在其两侧就会交替地产生旋涡，随着流体向下游方向运动，形成旋涡列，成为卡曼涡街，见图 1。产生涡街的阻力体称旋涡发生体。实验证明，旋涡的频率与流速成正比，可用下式表示：

$$f = S_r \frac{V}{\left(1 - \frac{4d}{\pi D}\right) d}$$

When a cylindrical resistance body is vertically inserted into the fluid, vortices will be generated alternately on both sides. As the fluid moves downstream, a vortex column will be formed to become a Karman Vortex Street, as shown in Figure 1. The resistance body that produces vortex street is called vortex generator. Experiments show that the frequency of vortex is directly proportional to the flow velocity, which can be expressed by the following formula:

$$f = S_r \frac{V}{\left(1 - \frac{4d}{\pi D}\right) d}$$

式中: f - 旋涡频率

d - 柱状体迎流面宽度

Sr - 斯特劳哈尔数

V - 管内平均流速

D - 管道内径

Where: f - vortex frequency

d - width of upstream surface of cylindrical body

Sr - Strouhal number

V - average velocity in the pipe

D - pipe inner diameter

实验证明: 当两列旋涡之间的距离 h 和同列两个旋涡之间的距离 L 满足公式 $L/h=0.281$ 时, 非对称旋涡列就能保持稳定状态。当流体雷诺数 Re 在 5000-150000 之间范围肉时, Sr 基本不变, 所以 d 和 Sr 为定值时旋涡发生体的频率 f 与流体的平均流速成正比, 即与体积流量 Q 成正比而与压力、温度、密度等参数无关。

Experiments show that when the distance h between two rows of vortices and the distance L between two vortices in the same row meet the formula $L / h = 0.281$, the asymmetric vortex column can maintain a stable state. When the fluid Reynolds number Re is in the range of 5000-150000, Sr is basically unchanged, so when d and Sr are fixed values, the frequency f of vortex generator is directly proportional to the average flow rate of fluid, that is, it is directly proportional to the volume flow Q , and has nothing to do with parameters such as pressure, temperature and density.

当旋涡在柱体两侧产生时, 传感器受到与流向垂直的交变升力的作用感生信号, 升力的变化频率是旋涡频率, 传感器将信号送转换器放大整形后得到与流速成线性比例的脉冲信号直接输出或将其转换成 4 ~ 20mA 标准信号输出, 流量 Q 与频率 f 的关系如下式:

$$Q = \frac{f}{k}$$

When the vortex is generated on both sides of the cylinder, the sensor receives the signal induced by the alternating lift perpendicular to the flow direction. The change frequency of the lift is the vortex frequency. The sensor sends the signal to the converter for amplification and shaping to obtain a pulse signal linearly proportional to the flow rate, which is directly output or converted into a 4 ~ 20mA standard signal output. The relationship between flow Q and frequency f is as follows:

$$Q = \frac{f}{k}$$

式中:

Q - 瞬时体积流量 (升/秒)

f - 频率 (Hz)

k - 仪表常数 (次/升)

Where:

Q - instantaneous volume flow (L / s)

F - frequency (Hz)

K - instrument constant (times / liter)

Function block diagram:

功能块框图如下:

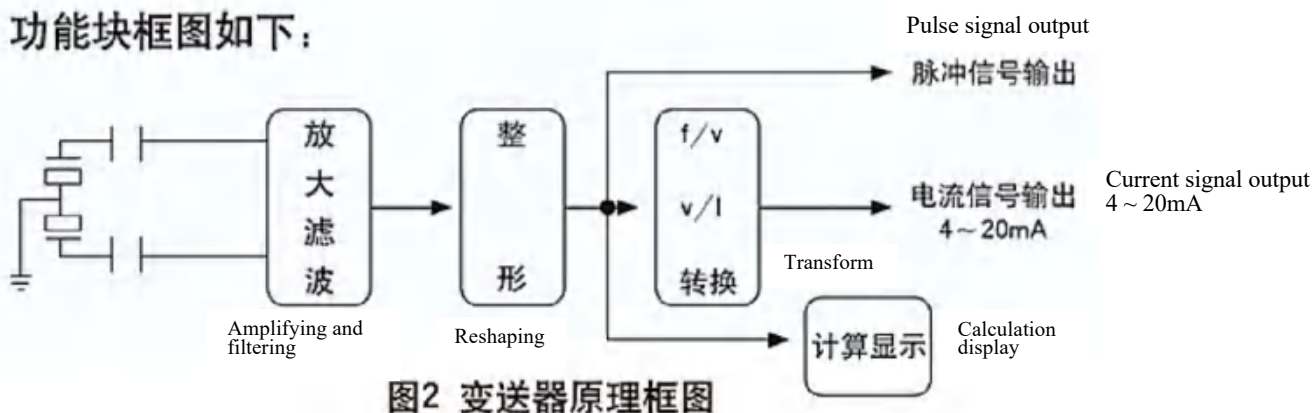


Figure 2 Transmitter principal diagram

技术参数

Technical Parameter

表 1

Table 1

测量介质 Measuring medium		气体、液体、蒸汽 Gas, liquid, steam
口径规格 Size specification	法兰卡装式 Flange clamping type	15, 25, 32, 40, 50, 65, 80, 100
	法兰连接式 Flange connection type	15, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300
	插入式口径规格 Plug-in size specification	200 ~ 2000
流量测量范围 Flow measurement range	正常测量流速 范围 Normal measurement flow rate range	气体 5 ~ 50 m/s ; 液体 0.5 ~ 7 m/s Gas: 5 ~ 50 m/s; Liquid 0.5 ~ 7 m/s
	正常测量流量 范围	液体、气体流量测量范围见表 2 ; 蒸汽流量范围见表 3 ; 插入式流量范围见表 4 See Table 2 for the measurement range of liquid and gas flow; see Table 3 for steam flow range; see Table 4 for plug-in type flow range



	Normal measured flow range	
测量精度 Measurement accuracy		法兰卡装式, 法兰式为 0.5 级, 1.5 级 Flange clamping type, flange type is grade 0.5 and grade 1.5
		插入式为 2.5 级 Plug-in type is grade 2.5
被测介质温度 Measured medium temperature		常温: $-25^{\circ}\text{C} \sim 150^{\circ}\text{C}$ 高温: $-25^{\circ}\text{C} \sim 300^{\circ}\text{C}$ Normal temperature $-25^{\circ}\text{C} \sim 150^{\circ}\text{C}$ High temperature $-25^{\circ}\text{C} \sim 300^{\circ}\text{C}$
工作压力 Working pressure		1.6MPa; 2.5MPa; 4.0MPa (可按订货要求供应) 1.6MPa; 2.5MPa; 4.0MPa (can be supplied according to the order requirements)
输出信号 (信号线接口为 M20X1.5 内螺纹) Output signal (Signal line interface) M20x1.5 internal thread)	脉冲电压输出信号 Pulse voltage output signal	高电平 8 ~ 10V 低电平 0.7 ~ 1.3V (防爆型; 高电平 4 ~ 5V 低电平 0.7 ~ 1.3V) High level 8 ~ 10V, low level 0.7 ~ 1.3V (explosion-proof type; high level 4 ~ 5V, low level 0.7 ~ 1.3V)
	标准电流输出信号 Standard current output signal	脉冲占空比约 50%, 传输距离为 100 米 Pulse duty cycle is about 50% and the transmission distance is 100m
仪表使用环境 Instrument service environment		温度: $-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$ 湿度: 5 ~ 90% (RH50°C) Temperature: $-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$ Humidity: 5 ~ 90% (RH50 ° C)
材质 Material		表体为 304SS 或 316L, 转换器外壳为铝合金 Body is 304SS or 316L, and the converter shell is aluminum alloy
电源 Power Supply		12V DC $\pm$ 10%; 24V DC $\pm$ 10%; 3.6V 7.5Ah
防爆等级 Explosion proof grade		本安防爆 Exia II C T6 Ga Intrinsically safe explosion-proof Exia II C T6 Ga 隔爆 Exd b II C T6 Gb Flame proof Exd b II C T6 Gb
防护等级 Degree of protection		IP65/IP66/IP67
前后直管段要求 Requirements for upstream and downstream straight pipe sections		前段 $\geq 5 \sim 15\text{DN}$, 后段 $\geq 5\text{D}$ Upstream section $\geq 5 \sim 15\text{DN}$, downstream section $\geq 5\text{D}$

液体、工况气体流量范围

Flow Range of Liquid and Gas under Working Conditions

表 2

Table 2

通径 Diameter mm	DN mm	15	25	32	40	50	65	80	100	125	150	200
液体 Liquid	m ³ /h	0.3~4	1.2~13	1.5~18	2.25~30	4~50	5.9~84	9~120	14~200	22~280	28~400	65~700
气体 Gas	m ³ /h	5 ~ 30	10.2~80	15~150	22~220	35~350	60~600	90~900	140~1400	220~2200	300~3000	550~5500

饱和蒸汽流量范围

Saturated Steam Flow Range

表 3

Table 3

通径 Diameter 压力 Pressure	25mm		32mm		40mm		50mm		65mm		80mm		100mm		125mm		150mm		200mm		温度 Temperature °C	密度 Density kg/m³
	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max	最小 Mini	最大 Max		
0.1	20	101	22.5	150	36	229	59	358	93	600	129	917	220	1.43	348	2.25	479	3.22	840	5.73	120.1	1.126
0.2	21	136	29.5	210	47	333	77	520	124	880	168	1.33	288	2.08	463	3.30	628	4.68	1.10	8.34	133.3	1.638
0.3	24	151	36	280	56	436	92	680	152	1.15	201	1.74	345	2.78	567	4.30	750	6.13	1.32	11.0	143.2	2.140
0.4	27	186	42	340	65	536	105	836	171	1.40	231	2.14	396	3.39	640	5.24	862	7.54	1.51	13.6	151.4	2.635
0.5	30	248	46	410	72	636	118	994	188	1.69	259	2.55	444	3.98	691	6.23	966	8.95	1.70	15.9	158.3	3.127
0.6	34	256	50	470	80	733	130	1.15	206	1.95	285	2.94	489	4.66	766	7.20	1.07	10.3	1.87	18.6	164.4	3.615
0.7	37	325	54	530	87	833	142	1.30	225	2.20	310	3.34	531	5.22	832	8.15	1.16	11.7	2.03	20.9	169.8	4.099
0.8	39	325	58	600	93	931	152	1.45	243	2.47	334	3.73	572	5.91	888	9.10	1.25	13.1	2.19	23.6	174.7	4.581
0.9	42	394	62	650	100	1.03	163	1.61	253	2.73	357	4.12	612	6.44	936	10.0	1.34	14.5	2.34	25.8	179.2	5.064
1.0	45	441	66	720	106	1.13	173	1.76	272	3.00	379	4.51	650	7.16	1.00	11.0	1.42	15.8	2.49	28.6	183.3	5.553
1.1	47	479	70	780	112	1.23	183	1.92	289	3.26	401	4.91	687	7.67	1.07	12.0	1.50	17.3	2.63	30.7	187.2	6.033
1.2	50	463	73	850	118	1.32	193	2.05	306	3.50	422	5.29	723	8.4	1.12	13.0	1.58	18.5	2.76	33.6	190.8	6.509
1.3	52	555	77	910	123	1.42	202	2.22	314	3.77	422	5.68	757	8.88	1.17	13.9	1.65	20.0	2.89	35.5	194.2	6.980
1.4	54	593	79	970	129	1.51	211	2.37	328	4.00	461	6.07	792	9.49	1.22	14.8	1.73	21.3	3.02	37.6	197.5	7.456
1.5	57	630	82	1.00	135	1.60	219	2.52	341	4.30	481	6.47	825	10.3	1.26	15.8	1.80	22.6	3.15	41.4	200.5	7.934
1.6	59	669	86	1.1	140	1.71	229	2.68	353	4.55	501	6.86	258	10.7	1.31	16.8	1.87	24.1	3.28	42.9	203.5	8.419
1.7	61	707	89	1.15	146	1.81	237	2.83	365	4.80	519	7.24	890	11.3	1.36	17.7	1.94	25.9	3.40	45.3	206.2	8.897
1.8	63	746	93	1.22	151	1.91	246	2.98	385	5.07	538	7.64	922	11.9	1.41	18.7	2.01	26.9	3.53	47.8	208.9	9.388
1.9	66	784	96	1.28	155	2.01	254	3.14	395	5.33	556	8.03	954	12.6	1.46	19.6	2.08	28.3	3.65	50.0	211.5	9.868
2.0	68	822	98	1.35	161	2.10	262	3.27	404	5.60	574	8.43	985	13.2	1.50	20.6	2.15	29.6	3.76	53.5	213.9	10.35
3.0	87	1.21	128	1.98	207	3.10	338	4.84	532	8.21	743	12.4	1.27	19.3	1.95	30.3	2.78	43.5	4.86	77.4	234.6	15.21
4.0	106	1.61	158	2.60	251	4.11	409	6.43	647	11.0	898	16.5	1.53	25.7	2.40	40.2	2.35	57.8	5.87	102.8	250.7	20.21
4.3	111	1.73	161	2.80	264	4.43	429	6.91	666	11.6	942	17.7	1.61	27.7	2.47	43.0	3.52	62.2	6.17	110.6	254.9	21.74

注：上表中粗框线内黑体数据单位为 t/h；其余数据单位为 kg/h。压力单位：MPa

Note: the bold data in the bold frame in the above table is in t/h; Other data are in kg/h. Pressure unit: MPa

液体、工况气体（蒸汽）插入式涡街流量计流量范围

Flow Range of Liquid and Gas (Steam) Plug-in Vortex Flowmeter

表 4

Table 4

通径 Diameter (mm) DN	液体 Liquid (m ³ /h)		气体 Gas (m ³ /h)		通径 Diameter (mm) DN	液体 Liquid (m ³ /h)		气体 Gas (m ³ /h)	
	最小 Mini	最大 Max	最小 Mini	最大 Max		最小 Mini	最大 Max	最小 Mini	最大 Max
200	55	570	560	4530	900	1145	11450	11450	91605
250	88	885	880	7070	1000	1410	14140	14135	113095
300	125	1275	1270	10180	1100	1710	17110	17100	136840
350	170	1735	1730	13860	1200	2035	20360	20230	162850
400	225	2265	2260	18100	1300	2385	23895	23890	191125
450	286	2870	2860	22905	1400	2770	27710	27705	221660
500	350	3540	3530	28275	1500	3170	31800	31700	254455
600	505	5090	5085	40715	1600	3610	36200	36105	289510
700	690	6930	6925	55420	1800	4580	45850	45750	366410
800	900	9050	9045	72380	2000	5650	56550	56545	452365

型号选择及说明

Model Selection and Description

型号 Model	基本代码 Basic code			说明 Description
YC-VF				涡街流量计 Vortex Flowmeter
连接 方式 Connect mode	- 1			法兰式 Flange type
	- 2			法兰卡装式 Flange clamping type
	- 3			插入式 Plug-in type
被测介质 Measured medium	2			液体 Liquid
	3			气体 Gas
	4			饱和蒸汽 Saturated steam
	4G			过热蒸汽 Superheated steam
	5			热水 Hot water
通径标志 Diameter mark	-	XXX		参见下表 See the table below

输出信号 Output signal	-0		无信号输出 No signal output
	-3		三线制脉冲 Three wire pulse
	-4		二线制 4 ~ 20mA Two wire system 4 ~ 20mA
	-5		二线制 4 ~ 20mA+HART Two wire system 4 ~ 20mA + HART
表头指示 Header indicator	N		无指示表头 No indication header
	B		双排液晶显示智能表头 (瞬时、累积流量) Intelligent meter with double row LCD display (instantaneous, cumulative flow)
配接电源 Matched power supply	X		12V DC (仅配三线制脉冲输出) 12V DC (only equipped with three wire pulse output)
	Y		24V DC
	Z		电池 (仅配智能数显表头 B) Battery (only equipped with intelligent digital display meter B)
表体材料 Body material	-C		316L
	-D		304
压力 Pressure	1		1.6MPa (DN ≥ 125)
	2		2.5MPa (DN65 ~ 100)
	3		4.0MPa (DN25 ~ 50)
防护等级 Protection level	A		IP65
	B		IP66
	C		IP67
防爆性能 Explosion proof performance	-N		无 No
	-B		本安防爆 Exia II C T6 Ga Intrinsically safe explosion-proof Exia II C T6 Ga
	-C		隔爆Exd b II C T6 Gb Flame proof Exd b II C T6 Gb

例: YC-VF -

- 2 - 连接方式 法兰卡装
- 2 - 被测介质 液体
- 005 - 公称通径 DN 50
- 4 - 输出信号 4 ~ 20mA
- B - 表头指示 带智能表头
- Y - 配接电源 24V DC
- D - 表体材料 不锈钢304
- 2 - 压力 PN 2.5
- A - 防护等级 IP65
- N - 防爆要求 无

Example: YC-VF-

- 2 - Connection method: flange clamping
- 2 - Measured medium: liquid
- 005 - Nominal diameter: DN 50
- 4 - Output signal: 4 ~ 20mA
- B - Header indicator: with smart meter
- Y - Connected power supply: 24V DC
- D - Body material: stainless steel 304
- 2 - Pressure: PN 2.5
- A - Protection level IP65
- N - Explosion proof requirements: none

通径标志表

Diameter Mark Table

通径 Diameter mm	15	25	32	40	50	65	80	100	125	150	200	250	300	350	400
标志 Mark	001	002	003	004	005	006	008	010	012	015	020	025	030	035	040
通径 Diameter mm	450	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	...	2000
标志 Mark	045	050	060	070	080	090	100	110	120	130	140	150	160	...	200

流量仪表 Flowmeter

YC-VFZ系列智能温压一体化涡街流量计

YC-VFZ Series Intelligent Temperature Pressure Integrated Vortex Flowmeter

概述

Introduction

智能一体化涡街流量计集流量、温度、压力传感器于一体，除了保留YC-VF系列的所有特点外，采用现代微处理技术，并通过现场的液晶显示器，无需与流量积算仪配合即可实现对气体和蒸汽的标准状态流量或质量流量的计量（即：现场实现自动温压补偿）。

The intelligent integrated vortex flowmeter integrates flow, temperature and pressure sensors. In addition to retaining all the features of YC-VF series, it adopts modern microprocessor technology and through the on-site liquid crystal display to realize the measurement of standard state flow or mass flow of gas and steam without using the flow integrator (i.e., automatic temperature and pressure compensation on site).



技术参数

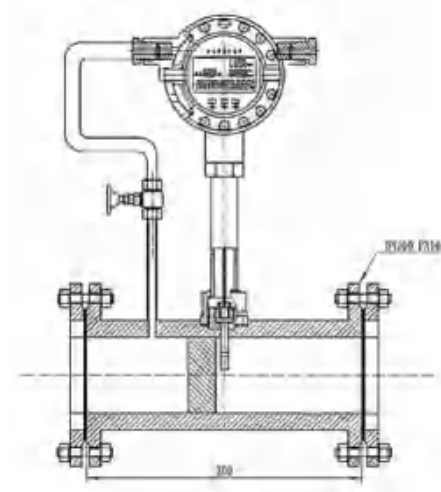
Technical Parameters

公称口径 Nominal diameter	DN25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300
适用介质 Applicable media	气体式蒸汽 Gas steam
介质温度 Medium temperature	-40°C ~ 300°C （大于 300°C 时需进行交流） -40 ° C ~ 300 ° C (AC is required when it is greater than 300 ° C)
公称压力 Nominal pressure	1.6MPa (DN125~200), 2.5MPa (DN25~100). >2.5MPa 协商供货 1.6MPa (DN125~200), 2.5MPa (DN25~100). >2.5MPa negotiated supply
精度等级 Accuracy grade	0.5 级、1.0 级、1.5 级 Grade 0.5, 1.0, 1.5
补偿精度 Compensation accuracy	压力传感器：0.2% 温度传感器：0.2% Pressure sensor: 0.2% temperature sensor: 0.2%

测量范围 Measuring range	参见常规涡街流量计 LUGB 系列工况气体流量或质量流量 Refer to gas flow or mass flow under LUGB series working conditions of conventional vortex flowmeter
输出信号 Output signal	电压脉冲: 原始脉冲输出: 低电平 $\leq 1V$, 高电平 $\geq 5V$, 或 0C 门输出 Voltage pulse: original pulse output: low level $\leq 1V$, high level $\geq 5V$, or open collector gate output 二线制 4 ~ 20mA (可带 HART 或 RS485) Two wire system 4 ~ 20mA (with HART or RS485)
参数显示位数 Parameter display digit	累积流量 (8 位), 瞬时流量 (6 位), 压力 (4 位), 温度 (4 位), 频率 (6 位) Cumulative flow (8 bits), instantaneous flow (6 bits), pressure (4 bits), temperature (4 bits), frequency (6 bits)
供电电源 Power supply	双电源自动切换供电: 外部供电 +18VDC ~ +24VDC, 内部电池供电 3.6V Dual power supply automatic switching power supply: external power supply + 18VDC ~ + 24VDC, internal battery power supply 3.6V 1 节锂电池, 使用寿命大于 2 年 1 lithium battery with service life of more than 2 years
环境温度 Environment temperature	4 ~ 20mA 输出: $-20^{\circ}\text{C} \sim +30^{\circ}\text{C}$ 4 ~ 20mA output: $-20^{\circ}\text{C} \sim +30^{\circ}\text{C}$ 现场液晶显示: $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$ On site LCD display: $-20^{\circ}\text{C} \sim +55^{\circ}\text{C}$
表体材料 Body material	1Cr18Ni9Ti (304) or 0Cr18Ni12Mo2Ti (316)

外形尺寸图

Overall Dimension Drawing



DN	H	L
25	410	200
32	415	200
40	420	200
50	430	200
65	460	230
80	480	230
100	500	230
125	520	250
150	550	300
200	600	300

注: 法兰标准:

Note: flange standard:

DN25 ~ 100 GB/T 9115.1-2000

DN125 ~ 200 GB/T 9115.1-2000

型号选择及说明

Model Selection and Description

型号 Model	基本代码 Basic code			说明 Description
YC-VFZ				智能温压一体化涡街流量计 Intelligent temperature pressure integrated vortex flowmeter
口径标志 Size mark	-XXX			参见下表 See the table below
输出信号 Output signal	N			无信号输出（仅电池供电，现场显示） No signal output (only battery powered, on site display)
	P			三线制脉冲 Three wire pulse
	I			二线制 4 ~ 20mA Two wire system 4 ~ 20mA
	IH			二线制 4 ~ 20mA+HART Two wire system 4 ~ 20mA + HART
供电电源 Power supply	Y			24V DC
	Z			仅内置电池供电（无信号输出） Built in battery only (no signal output)
表体材料 Body material	-C			碳钢 Carbon steel
	-E			0Cr18Ni12Mo2Ti (316)
	-D			1Cr18Ni9Ti (304)
公称压力 Nominal pressure	1			1.6MPa
	2			2.5MPa
	3			4.0MPa
防护等级 Protection level	65			IP65
	66			IP66
	67			IP67
防爆性能 Explosion proof performance	-N			无 No
	-B			本安防爆 Intrinsically safe explosion-proof
	-C			隔爆 Flame proof

例：YC-VFZ -

005 - 公称口径：DN 50mm

I - 输出信号：4 ~ 20mA

Y - 供电电源：24V DC

D - 表体材料：不锈钢304

2 - 公称压力：PN2.5

66 - 防护等级：IP66

B - 防爆要求：本安防爆

Example: YC-VFZ –

- 005 – Nominal diameter: DN 50mm
- II – Output signal: 4 ~ 20mA
- Y – Power supply: 24V DC
- D – Body material: stainless steel 304
- 2 – Nominal pressure: PN2.5
- 66 – Protection level: IP66
- B – Explosion proof requirements: intrinsically safe explosion proof

口径标志表

Size Mark Table

口径 Diameter mm	25	32	40	50	65	80	100	125	150	200
标志 Mark	002	003	004	005	006	008	010	012	015	020

流量仪表Flowmeter

YC-FY 液体涡轮流量计

YC-FY Liquid Turbine Flowmeter

概述

Introduction

YC-FY 液体涡轮流量传感器与显示仪表配套组成涡轮流量计。传感器具有精度高, 重复性好, 寿命长操作简单等特点。可广泛应用于石油, 化工, 冶金, 造纸等行业测量液体的体积瞬时流量和体积总量。

YC-FY liquid turbine flow sensor and display instrument form a turbine flowmeter. The sensor has the features of high precision, good repeatability, long service life and simple operation. It can be widely used in petroleum, chemical, metallurgy, papermaking and other industries to measure the volume, instantaneous flow and total volume of liquid.



特点

Features

- ◆ 压力损失小, 叶轮具有防腐功能。
Small pressure loss, and the impeller has anti-corrosion function.
- ◆ 具有较高的抗电磁干扰和抗震动能力, 性能可靠工作寿命长。
High anti electromagnetic interference and anti-vibration ability, reliable performance and long service life.
- ◆ 采用先进的超低功耗单片微机技术, 整机功能强, 功耗低, 性能优越。具有非线性精度补偿功能的智能流量显示器。修正精度优于 0.02%。
It adopts advanced ultra-low power consumption single chip microcomputer technology, which has strong function, low power consumption and superior performance. Intelligent flow display with nonlinear accuracy compensation function. The correction accuracy is better than 0.02%.
- ◆ 仪表系数可由按键在线设置, 并可显示在 LCD 屏上, LCD 屏直观清晰, 可靠性高。
The instrument coefficient can be set online by the key and can be displayed on the LCD screen. The LCD screen is intuitive and clear with high reliability.
- ◆ 采用 EEPROM 对累积流量、仪表系数进行掉电保护。保护时间大于 10 年。
EEPROM is used to protect the accumulated flow and instrument coefficient from power failure. The protection time is more than 10 years.

主要技术参数

Main technical parameters

◆ 准确度：0.5 级、1.0 级；

Accuracy: grade 0.5 and 1.0;

◆ 使用条件：

- 1) 环境温度：-20°C ~ 50°C；
- 2) 相对湿度：5% ~ 95%；
- 3) 被测介质温度：-20°C ~ 120°C；
- 4) 大气压力：86kPa ~ 106kPa；
- 5) 防爆等级：ib II BT4

Service conditions:

- 1) Environment temperature: - 20 ° C ~ 50 ° C;
- 2) Relative temperature: 5% ~ 95%;
- 3) Temperature of measured medium: - 20 ° C ~ 120 ° C;
- 4) Atmospheric pressure: 86kPa ~ 106kPa;
- 5) Explosion proof grade: ib II BT4

◆ 信号传输距离：传感器至显示器的距离可达 1000m。

Signal transmission distance: the distance from the sensor to the display can reach 1000m.

电气特性

Electrical Features

1、显示方式：

- 1) YC-FY 远传显示：脉冲输出（配显示仪表）；
- 2) YC-FY 现场显示：7 位 LCD 显示累积流量，单位（m³）
7 位 LCD 显示瞬时流量，单位（m³/h）
- 3) LWGB 涡轮流量变送器：（配显示仪表）。

1. Display mode:

- 1) YC-FY remote transmission display: pulse output (with display instrument);
- 2) YC-FY on site display: 7-digit LCD displays cumulative flow, unit (m³)
7-digit LCD displays instantaneous flow, unit (m³/h)
- 3) LWGB turbine flow transmitter: (equipped with display instrument).

2、输出功能：

- 1) YC-FY 脉冲输出，p-p 值由供电电源确定；
- 2) YC-FY 可带脉冲输出或 4~20mA 两线制电流输出；
- 3) YC-FY MODBUS-RTU.485 输出。

2. Output function:

- 1) YC-FY pulse output, p-p value is determined by the power supply;

- 2) YC-FY can have pulse output or 4 ~ 20mA two wire current output;
- 3) YC-FY MODBUS-RTU.485 output.

3、供电电源:

- 1) YC-FYC: DC5~24V;
- 2) YC-FYB: 3V 锂电池安装于仪表内部可连续使用二年以上;
- 3) YC-FYD: DC24V。

3. Power supply:

- 1) YC-FYC: DC5~24V;
- 2) YC-FYB: 3V lithium battery is installed inside the instrument and can be used continuously for more than two years;
- 3) YC-FVD: DC24V.

4、仪表结构Y安装方式

- 1) 仪表安装采用法兰连接、螺纹连接或卫生卡箍安装;
- 2) 安装时液体流动方向应与传感器外壳上指示流向的箭头方向一致, 且上游直管段应大于 5D, 下游直管段应大于 3D (DN 为管道内径)。
- 3) 传感器应远离外界磁场, 如不能避免, 应采取必要的措施;
- 4) 为了检修时不至影响液体的正常输送, 应在传感器两端的直管段外安装旁通管道;
- 5) 传感器露天安装时, 请做好放大器插头的防水处理;
- 6) 传感器与显示仪表的接线, 应根据放大器的电源来选择接线方式, 详见有关使用说明书。

4. Instrument structure and installation method

- 1) The instrument shall be installed with flange connection, threaded connection or sanitary clamp;
- 2) During installation, the liquid flow direction shall be consistent with the arrow indicating the flow direction on the sensor housing, and the upstream straight pipe section shall be greater than 5D and the downstream straight pipe section shall be greater than 3D (DN is the inner diameter of the pipe).
- 3) The sensor shall be far away from the external magnetic field. If it cannot be avoided, necessary measures shall be taken;
- 4) In order not to affect the normal transmission of liquid during maintenance, a bypass pipe shall be installed outside the straight pipe section at both ends of the sensor;
- 5) When the sensor is installed in the open air, please do the waterproof treatment of the amplifier plug;
- 6) For the wiring between the sensor and the display instrument, the wiring mode shall be selected according to the power supply of the amplifier. See the relevant operation manual for details.

选型表

Selection Table

	YC-FY□	□□□	□	□	□	说明 Description			
类型 Type	YC-FYA					流最传感器，脉冲输出三线制，+12V 供电； Current sensor, pulse output three wire system, + 12V power supply;			
	YC-FYB					现场显示型，3.6V 电池供电； On site display type, 3.6V battery power supply;			
	YC-FYC					现场显示带 4 ~ 20mA 两线制电流输出.24V 供电； On site display with 4 ~ 20mA two wire current output. 24V power supply;			
	YC-FYD					变送器:4 ~ 20mA 两线制电流输出,24V 供电； Transmitter: 4 ~ 20mA two wire current output, 24V power supply;			
公称通径 Nominal diameter		4				正常流量 范围 m³/h Normal flow range m³/h	0.04 ~ 0.25	扩展流量范 围 m³/h Extended flow range m³/h	0.04 ~ 0.4
		6					0.1 ~ 0.6		0.06 ~ 0.6
		10					0.2 ~ 1.2		0.15 ~ 1.5
		15					0.6 ~ 6		0.4 ~ 8
		20					0.8 ~ 8		/
		25					1~ 10		0.5 ~ 10
		32					1.5 ~ 15		/
		40					2 ~ 20		1 ~ 20
		50					4 ~ 40		2 ~ 40
		65					7 ~ 70		/
		80					10 ~ 100		5 ~ 100
		100					20 ~ 200		10 ~ 200
		125					25 ~ 250		/
		150					30 ~ 300		15 ~ 300
		200					80 ~ 800		40 ~ 800
防爆 Explosion-proof						无标记，为非防爆型 No marking, non-explosion proof type			
			B			防爆型 Explosion proof type			
精度等级 Accuracy grade				A		精确度 0.5 级 Accuracy grade 0.5			
				B		精确度 1.0 级 Accuracy grade 1.0			
涡轮类型 Turbine type					A	正常流量范围 Normal flow range			
					B	扩展流量范围 Extended flow range			

说明：DN4 ~ DN40 管径的传感器为螺纹连接时，最大工作压力为 6.3MPa。

DN50 ~ DN200 管径的传感器为法兰连接，最大工作压力为 2.5MPa。

DN4 ~ DN10 管径的传感器配有前后直管段和过滤器。

DN15 ~ DN40 管径如需法兰连接, 订货时说明。

高压型及特殊要求订货时说明。

Note: Sensors with DN4 ~ DN40 pipe diameter are threaded connection, the maximum working pressure is 6.3MPa.

Sensors with DN50 ~ DN200 pipe diameter is connected by flange, and the maximum working pressure is 2.5MPa.

Sensors with DN4 ~ DN10 pipe diameter are equipped with upstream and downstream straight pipe sections and filters.

If flange connection is required for DN15 ~ DN40 pipe diameter, it shall be explained when ordering.

High pressure type and special requirements shall be explained when ordering.

流量仪表 Flowmeter

YC-FYQ 气体涡轮流量计

YC-FYQ Gas Turbine Flowmeter

概述

Introduction

YC-FYQ 气体涡轮流量计是吸取了国内外流量仪表先进技术经过优化设计, 综合了气体力学、流体力学、电磁学等理论而自行研制开发的集温度、压力、流量传感器和智能流量积算仪于一体的新一代高精度、高可靠性的气体精密计量仪表, 具有出色的低压和高压计量性能, 多种信号输出方式以及对流体扰动低敏感性, 广泛适用于天然气、煤制气、液化气、轻烃气等气体的计量。

YC-FYQ gas turbine flowmeter is a new generation of high-precision and reliable gas precision metering instrument integrating temperature, pressure, flow sensor and intelligent flow totalizer, which has been developed by absorbing the advanced technology of flow instruments at home and abroad, optimized design and integrating the theories of gas mechanics, hydrodynamics and electromagnetism. It has excellent low-pressure and high-pressure metering performance, various signal output modes and low sensitivity to convective disturbance are widely used in the measurement of natural gas, coal-to-gas, liquefied gas, light hydrocarbon gas and other gases.



产品特点

Product Features

- ◆ 采用新型传感器, 始动流量低、压力损失小、抗振与抗脉动流性能好, 不易腐蚀、可靠性好、使用寿命长。
The new sensor has the advantages of low starting flow, small pressure loss, good anti-vibration and anti-pulsation flow performance, not easy to corrosion, good reliability and long service life.
- ◆ 采用新型微处理器与高性能的集成芯片, 运算精度高, 整机功能强大, 性能优越。
It adopts new microprocessor and high-performance integrated chip, with high operation accuracy, powerful function and superior performance.
- ◆ 采用先进的微功耗高新技术, 整机功耗低,既能用内电池长期供电运行, 又可由外电源供电运行。

Advanced micro power consumption high-tech is adopted, and the power consumption of the whole machine is low. It can not only use internal battery for long-term power supply operation, but also be powered by external power supply.

- ◆ 按流量频率信号，可将仪表系数分八段自动进行线性修正，可根据用户需要提高仪表的计算精度。

According to the flow frequency signal, the instrument coefficient can be divided into eight sections for automatic linear correction, which can improve the calculation accuracy of the instrument according to the needs of users.

- ◆ 采用 EEPROM 数据存贮技术，具备历史数据的存贮与查询功能，三种历史数据记录方式可供用户选择。

EEPROM data storage technology is adopted, which has the function of historical data storage and query. Three historical data recording methods can be selected by users.

- ◆ 流量计表头可 180° 旋转, 安装使用简单方便。

The meter head can rotate 180°, which is easy to install and use.

- ◆ 高精度度，一般可达 $\pm 1.5\%$ 、 $\pm 1.0\%$ 。

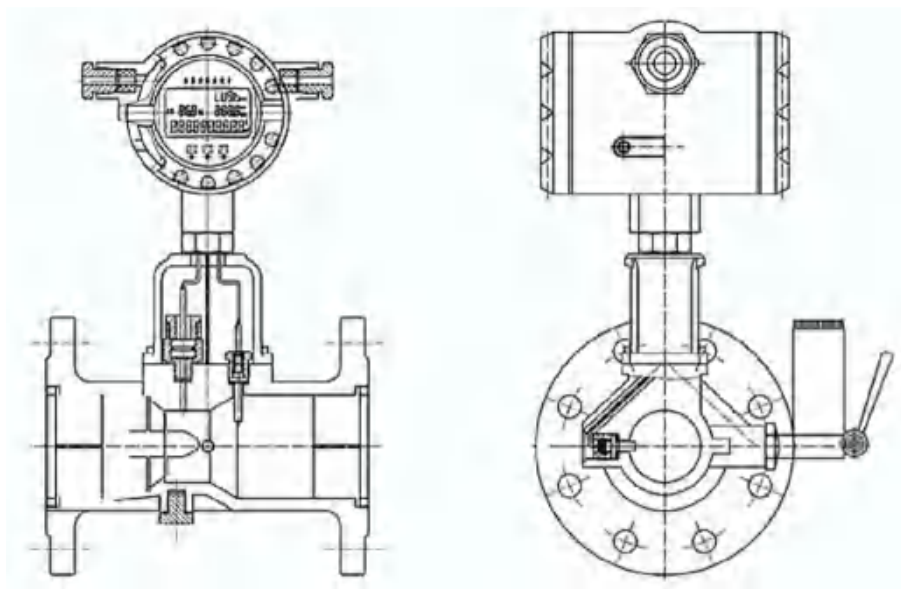
High accuracy, generally up to $\pm 1.5\%$, $\pm 1.0\%$.

- ◆ 重复性好，短期重复性可达 0.05%~0.2%，正是由于具有良好的重复性，在贸易结算中是优先选用的流量计。

The repeatability is good, and the short-term repeatability can reach 0.05% ~ 0.2%. It is precisely because of its good repeatability that it is the preferred flowmeter in trade settlement.

流量计结构

Flowmeter Structure



工作原理

Working Principle

当气流进入流量计时，首先经过独立机芯的前导流体并加速，在流体的作用下，由于涡轮叶片与流体流向成一定角度，此时涡轮产生转动力矩，在涡轮克服阻力矩和摩擦力矩后开始转动。当诸力矩达到平衡时，转速稳定，涡轮转动速度与流量成线性关系，通过旋转的发信盘上的磁体周期性地改变传感器磁阻，从而在传感器两端感应出与流体体积流量成正比的脉冲信号。该信号经前置放大器放大、整形后和压力温度传感器检测到的压力、温度信号同时输给流量积算仪进行处理，直接显示标准体积流量和标准体积总量。

When the air enters the flow meter, it first passes through the leading fluid of the independent movement and accelerates. Under the action of the fluid, the turbine blade forms a certain angle with the fluid flow direction. At this time, the turbine generates rotating torque and starts to rotate after the turbine overcomes the resistance torque and friction torque. When the torques reach equilibrium, the rotating speed is stable, and the rotating speed of the turbine has a linear relationship with the flow. The magnetic resistance of the sensor is periodically changed by the magnet on the rotating transmitting disk, so as to induce a pulse signal proportional to the fluid volume flow at both ends of the sensor. The signal is amplified and shaped by the preamplifier, and the pressure and temperature signals detected by the pressure and temperature sensor are transmitted to the flow integrator for processing, so as to directly display the standard volume flow and the total standard volume.

基本参数

Basic Parameters

表 1

Table 1

执行标准 Executive standard	封闭式管道中气体流量的测量 - 气体涡轮流量计(GB/T18940-2003) Measurement of gas flow in closed pipelines - gas turbine flowmeter (GB/T18940-2003)
仪表口径(mm)及连接方式 Instrument diameter (mm) and connection mode	25、40、50、65、80、100、125、150、200、250、300 采用法兰连接 25、40、50 可采用螺纹连接 25, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300 are connected by flanges. 25, 40, 50 can be connected by thread.
精度等级 Accuracy grade	$\pm 1\% / \pm 1.5\%$ (0.5%R 需特制) * $\pm 1\% / \pm 1.5\%$ (0.5% R needs to be specially)
量程比 Range ratio	1 : 10 ; 1 : 20 ; 1 : 30
仪表材质 Instrument material	表体: 304 不锈钢或铸铝 叶轮: 防腐 ABS 或优质铝合金 转换器: 铸铝 Body: 304 stainless steel or cast aluminum Impeller: anti-corrosion ABS or high-quality aluminum alloy Converter: cast aluminum

使用条件 Service conditions	介质温度: $-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$ 环境温度: $-30^{\circ}\text{C} \sim +60^{\circ}\text{C}$ 相对湿度: $5\% \sim 90\%$ 大气压力: $86\text{kPa} \sim 106\text{kPa}$ Medium temperature: $-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$ Environment temperature: $-30^{\circ}\text{C} \sim +60^{\circ}\text{C}$ Relative humidity: $5\% \sim 90\%$ Atmospheric pressure: $86\text{kPa} \sim 106\text{kPa}$
工作电源 Working power supply	A. 外电源: $+24\text{VDC} \pm 15\%$, 纹波 $\leq 5\%$, 适用于 4-20mA 输出、脉冲输出、RS485 等。 B. 内电源: 1 组 3.0V10AH 锂电池, 电池电压在 2.0V-3.0V 时均可正常工作。 当电压低于 2.0V 时出现欠压指示。 A. External power supply: $+24\text{VDC} \pm 15\%$, ripple wave $\leq 5\%$, suitable for 4-20mA output, pulse output, RS485, etc. B. Internal power supply: 1 set of 3.0V10AH lithium batteries, which can work normally when the battery voltage is 2.0V~3.0V. Undervoltage indication occurs when the voltage is lower than 2.0V.
整机功耗 Overall power consumption	A. 外电源: $< 1\text{W}$ B. 内电源: 平均功耗 $\leq 1\text{W}$, 可连续使用三年以上。 A. External power supply: $< 1\text{w}$ B. Internal power supply: average power consumption $\leq 1\text{W}$, which can be used continuously for more than three years.
信号输出功能 Signal output function	脉冲信号①、4-20mA 电流信号②、控制型号③ Pulse signal ①, 4-20mA current signal ②, Control model ③
通讯输出功能 Communication output function	RS485 通讯④ RS485 communication ④
信号线接口⑤ Real time recording function ⑤	起停记录、日记录、定时间间隔记录 Start stop record, diary record and fixed time interval record
信号线接口 Signal line interface	内螺纹 M20×1.5 或其他 Female thread M20×1.5 or others
防爆等级 Explosion proof grade	Exia II C T6 Ga或Exd II CT6 Gb Exia II C T6 Ga or Exd II CT6 Gb
防护等级 Degree of protection	IP65/IP66/IP67

① 脉冲输出方式(由设定选择以下三种之一)

- A. 工况脉冲信号, 直接将流量传感器检测的工况脉冲信号经光耦隔离放大输出, 高电平 $\geq 20\text{V}$, 低电平 $\leq 1\text{V}$ 。
- B. 与标准体积流量成正比的频率信号, 经光耦隔离放大输出, 高电平 $\geq 20\text{V}$, 低电平 $\leq 1\text{V}$ 。
- C. 定标脉冲信号, 与 IC 卡阀门控制器配套, 高电平幅度 $\geq 2.8\text{V}$, 低电平幅度 $\leq 0.2\text{V}$, 单位脉冲代表体积量可设定范围: $0.01\text{m}^3 \sim 10.00\text{m}^3$ 。但选择该值时必须注意: 定标脉冲信号频率应 $\leq 200\text{Hz}$ 。

① Pulse output mode (select one of the following three by setting)

- A. Working condition pulse signal: the working condition pulse signal detected by the flow sensor is directly isolated and amplified by the optocoupler, with high level $\geq 20\text{V}$ and low level $\leq 1\text{V}$.

- B. The frequency signal proportional to the standard volume flow is isolated and amplified by the optocoupler, with high level $\geq 20V$ and low level $\leq 1V$.
- C. Calibration pulse signal, matched with IC card valve controller, with high-level amplitude $\geq 2.8V$ and low-level amplitude $\leq 0.2V$. The unit pulse represents the volume and can be set within the range: $0.01m^3 \sim 10.00m^3$. However, when selecting this value, it must be noted that the frequency of calibration pulse signal shall be $\leq 200Hz$.

② 4-20mA 电流信号(采用光隔离电流模块)

与标准体积流量成正比, 4mA 对应 $0m^3/h$, 20mA 对应最大标准体积流量(该值可设定), 制式: 两线制或三线制。

② 4-20mA current signal (using optical isolation current module)

It is directly proportional to the standard volume flow. 4mA corresponds to $0m^3/h$ and 20mA corresponds to the maximum standard volume flow (this value can be set). System: two wire system or three wire system.

③ 控制信号

- A. 下限报警信号(LP): 光电隔离开集电极(OC)输出, 正常状态下 OC 门截止, 报警状态 OC 门导通, 最大负载电流 50mA, 工作电压+12VDC ~ +24VDC。
- B. 上限报警信号(UP): 光电隔离开集电极(OC)输出, 正常状态下 OC 门截止, 报警状态 OC 门导通, 最大负载电流 50mA, 工作电压+12VDC ~ +24VDC。
- C. 关阀报警输出(BC 端, IC 卡控制器用): 逻辑门电路输出, 正常输出低电平, 幅度 $\leq 0.2V$, 报警输出高电平, 幅度 $\geq 2.8V$, 负载电阻 $\geq 100K\Omega$ 。
- D. 电池欠压报警输出(BL, IC 卡控制器用): 逻辑门电路输出, 正常输出低电平, 幅度 ≤ 0.2 ; 报警输出高电平, 幅度 $\geq 2.8V$, 负载电阻 $> 100K\Omega$ 。

③ Control signal

- A. Lower limit alarm signal (LP): photoelectric isolation open collector (OC) output, OC gate is cut off in normal state, OC gate is on in alarm state, maximum load current is 50mA, working voltage is + 12VDC ~ + 24VDC.
- B. Upper limit alarm signal (UP): photoelectric isolation open collector (OC) output, OC gate is cut off in normal state, OC gate is on in alarm state, maximum load current is 50mA, working voltage is + 12VDC ~ + 24VDC.
- C. Valve closing alarm output (BC end, for IC card controller); Logic gate circuit output, normal output low level, amplitude $\leq 0.2V$, alarm output high level, amplitude $\geq 2.8V$, load resistance $\geq 100k\Omega$.
- D. Battery undervoltage alarm output (BL, for IC card controller): logic gate circuit output, normal output low level, amplitude ≤ 0.2 ; Alarm output high level, amplitude $\geq 2.8V$, load resistance $\geq 100k\Omega$.

④ RS485 通讯

采用 RS485 接口, 可直接与上位机或二次仪表联网, 远传显示介质的温度、压力和经温度、压力补偿后的标准体积流量和标准体积总量。

④ RS485 communication

With RS485 interface, it can be directly connected with the upper computer or secondary instrument to remotely display the temperature and pressure of the medium and the standard volume flow and total standard volume after temperature and pressure compensation.

⑤ 实时记录功能

流量计为了适应数据管理方面的需要，增加了实时数据存贮功能，由设定以下三者之一：

- 起停记录：最近的 1200 次起停时间、总量、净流量记录。出厂默认项。
 - 日记记录：最近 920 天的日期、零点时间的温度、压力、标准体积和总量记录。
 - 定时间间隔记录：1200 条定时间间隔的日期时间、温度、压力、标准体积和总流量记录。
- 通过笔记本电脑可读取上述存贮数据，形成数据报表、曲线图供分析。

⑤ Real time recording function

In order to meet the needs of data management, the flowmeter adds the function of real-time data storage, which is set by one of the following three:

- Start and stop records: the latest 1200 start and stop time, total amount and net flow records. Plant defaults.
- Diary record: date of last 920 days, temperature at zero time, pressure, standard volume and total volume records.
- Fixed time interval records: 1200 fixed time interval records of date, time, temperature, pressure, standard volume and total flow.

The above stored data can be read through the laptop to form data reports and graphs for analysis.

测量范围及工作压力

Measuring Range and Working Pressure

表 2
Table 2

公称通径 Nominal diameter (mm)	型号 Model	标准量程 Standard range (m ³ /h)		扩展量程 Extended range (m ³ /h)		常规耐压等级 Conventional pressure grade (MPa)	特质高压等级 Special high pressure level (Mpa)	安装方式 Installation mode
DN25	YC-FYQ-25	S	2.5 ~ 25	W	4 ~ 40	1.6	2.5,4.0	法兰(螺纹) Flange (thread)
DN40	YC-FYQ-40	S	5 ~ 50	W	6 ~ 60	1.6	2.5,4.0	法兰(螺纹) Flange (thread)
DN50	YC-FYQ-50	S1	6 ~ 65	W1	5 ~ 70	1.6	2.5,4.0	法兰 Flange
		S2	10 ~ 100	W2	8 ~ 100			
DN65	YC-FYQ-65	S	15 ~ 200	W	10 ~ 200	R6	2.5,4.0	法兰 Flange
DN80	YC-FYQ-80	S1	13 ~ 250	W	10 ~ 160	1.6	2.5,4.0	法兰 Flange
		S2	20 ~ 400					

DN100	YC-FYQ-100	S1	20 ~ 400	W	13 ~ 250	1.6	2.5	法兰 Flange
		S2	32 ~ 650					
DN125	YC-FYQ-125	S	25 ~ 700	W	20 ~ 800	1.6	2.5	法兰 Flange
DN150	YC-FYQ-150	S1	32 ~ 650	W	80 ~ 1600	1.6	2.5	法兰 Flange
		S2	50 ~ 1000					
DN200	YC-FYQ-200	S1	80 ~ 1600	W	50 ~ 1000	1.6	—	法兰 Flange
		S2	130 ~ 2500					
DN250	YC-FYQ-250	S1	130 ~ 2500	W	80 ~ 1600	1.6	—	法兰 Flange
		S2	200 ~ 4000					
DN300	YC-FYQ-300	S	200 ~ 4000	W1	130 ~ 2500	1.6	—	法兰 Flange
				W2	320 ~ 6500			

按仪表功能分类YC-FVQ 系列气体涡轮流量计可分为3 大类，即：

- ◆ 气体涡轮流量传感器/变送器
- ◆ 智能一体化气体涡轮流量计
- ◆ 智能温压补偿一体化气体涡轮流量计

According to the instrument function classification, YC-FVQ series gas turbine flowmeter can be divided into three categories as follows:

Gas turbine flow sensor / transmitter

Intelligent integrated gas turbine flowmeter

Intelligent temperature and pressure compensation integrated gas turbine flowmeter

选型说明

Model Selection Description

用户在选型时，应根据管道公称压力、介质最高压力、介质温度、介质组分情况、流量范围及信号输出要求合理选择流量计的型号规格。

When selecting the type, the user should reasonably select the model and specification of the flowmeter according to the nominal pressure of the pipeline, the maximum pressure of the medium, the medium temperature, the composition of the medium, the flow range and the signal output requirements.

为使流量计的使用性能最佳，流量计的使用流量范围应在（20% ~ 80%）Q_{max} 范围内比较合适。

In order to optimize the service performance of the flowmeter, the service flow range should be within Q_{max} (20% - 80%).

流量计出厂时的信号输出方式：工矿脉冲信号输出（三线制）、标准流量信号（IC 卡）输出或 RS-485 通讯输出。若要求有其它输出功能，请在订货时说明。

The signal output mode of flowmeter when leaving the plant: Industrial and mining pulse signal output (three wire system), standard flow signal (IC card) output or RS-485 communication output. If other output functions are required, please indicate when ordering.

选型谱表

Selection Spectrum

表 3

Table 3

型号 Model									说明 Description	
YC-FYQ-	☐	- ☐	☐	☐	☐	☐	☐	☐		
仪表类型 Instrument type	N								传感器型：+12V 或 24V 供电，输出三线制脉冲信号 Sensor type: + 12V or 24V power supply, output three wire system pulse signal	
	A								变送器型：+24V 供电，输出二线制 4~20mA Transmitter type: + 24V power supply, output two wire system 4~20mA	
	B								智能型：锂电池供电，现场显示无信号输出 Intelligent type: powered by lithium battery, no signal output is displayed on site	
	C								智能型：+24V 供电，现场显示并输出二线制 4~ 20mA Intelligent type: + 24V power supply, on-site display and output two wire system 4~20mA	
	D ₁								全智能型：温压补偿一体化,现场显示并远传信号（方型转换器） Full intelligent type: temperature and pressure compensation integration, on-site display and remote signal transmission (square converter)	
	D ₂								全智能型：温压补偿一体化,现场显示并远传信号（圆型转换器） Full intelligent type: temperature and pressure compensation integration, on-site display and remote signal transmission (circular converter)	
公称通径 Nominal diameter		25~300							25~300	
量程范围 Measuring range			W(X)						扩展量程范围，请参照表 2 选择 Extended range, please refer to table 2 for selection	
			S(X)						标准量程范围，请参照表 2 选择 Standard range, please refer to table 2 for selection	
表体材质 Body material				S						不锈钢 Stainless steel
				L						铸铝

机芯材质 Movement material	S L	N E1 E2	65 66 67	Cast aluminum
				防腐 ABS Anti-corrosion ABS
防爆等级 Explosion proof grade	N E1 E2	65 66 67	N H*	铝合金 Aluminium alloy
				不防爆 Non explosion proof
防护等级 Protection level	65 66 67	N H*	N G*	Exia II C T6 Ga
				Exd II C T6 Gb
耐压等级 Pressure grade	N H*	N G*	N G*	IP65
				IP66
精度等级 Accuracy grade	N G*	N G*	N G*	IP67
				常规 Conventional
				高压参照表 2 Refer to table 2 for high pressure
				常规型, 1.0-1.5 级 Conventional type, grade 1.0-1.5
				客户指定精度 1.0级、0.75级、0.5级 Accuracy specified by the customer is 1.0, 0.75, 0.5

例：选用一台不锈钢材质，温压补偿一体化气体涡轮流量计来测量天然气，用户工况测量范围为 20 ~ 400m³/h，要求本安防爆，型号：YC-FYQ-D1-100S1SLE165NN。

For example, a stainless-steel integrated gas turbine flowmeter with temperature and pressure compensation is selected to measure natural gas. The measurement range of user working condition is 20 ~ 400m³ / h. It is required to be intrinsically safe and explosion-proof. Model: YC-FYQ-D1-100S1SLE165NN.

流量仪表 Flowmeter

YC-LLQ 系列气体腰轮（罗茨）流量计

YC-LLQ Series Gas Lobed Rotor (Roots) Flowmeter

概述

Introduction

YC-LLQ 系列气体腰轮（罗茨）流量计是我公司新研发的第三代气体罗茨流量计，借鉴航空技术的先进理念综合了流体力学、电磁学等理论而自行研制开发的集温度、压力、流量传感器和智能流量积算仪于一体的新一代高精度、高可靠性的气体精密计量仪表，具有出色的低压和中压计量性能，多种信号输出方式，YC-LLQ 系列气体腰轮（罗茨）流量计成为一种特别优秀的能准确计量气体累积量的商业贸易计量仪表。

YC-LLQ series gas lobed rotor (roots) flowmeter is the third generation of gas Roots flowmeter newly developed by our company. It is a new generation of high-precision and reliable gas precision metering instrument integrating temperature, pressure, flow sensor and intelligent flow integrator, which draws lessons from the advanced concept of aviation technology and integrates the theories of hydrodynamics and electromagnetism. It has excellent low and medium pressure metering performance, with a variety of signal output modes. YC-LLQ series gas lobed rotor (Roots) flowmeter has become a particularly excellent commercial and trade metering instrument that can accurately measure gas accumulation.

广泛适用于城市燃气管网的计量、工业燃气的计量、燃气调压站的计量、能源管理等计量，已出口东南亚、中东地区、俄罗斯、印度、巴基斯坦等国家，产品性能达到国际领先水平。

It is widely used in the measurement of urban gas pipe network, industrial gas, gas pressure regulating station and energy management. It has been exported to Southeast Asia, the Middle East, Russia, India, Pakistan and other countries, and the product performance has reached the international leading level.

我公司致力于为广大用户提供高可靠性的产品，YC-LLQ 系列以极低的起始流量、极大的宽量程比、出色的高精度和稳定性获得燃气公司用户的广泛好评，拥有多项专利技术，该产品取得国家防爆合格证，防爆标志为 Exd II C T6 Gb。

Our company is committed to providing high reliability products for the majority of users. YC-LLQ series has been widely praised by the users of gas company with extremely low initial flow, great wide range ratio, excellent high precision and stability, and it has a number of patented technologies. The product has obtained the national explosion-proof certificate and the explosion-proof mark is Exd II C T6 Gb.



优势特点

Advantages and Features

- ◆ 量程宽：根据不同规格、等级，最高范围度可达到 1: 216，国内同行业领先。
Wide range: according to different specifications and grades, the maximum range can reach 1:216, which is leading in the same industry in China.
- ◆ 低始动流量：根据不同规格、等级，最低始动流量可达到 0.04m³/h。
Low starting flow: according to different specifications and grades, the minimum starting flow can reach 0.04m³/h.
- ◆ 高精度、高重复性：普通级可达 1.5 级。高等级可达 1.0 级、0.5 级；具有良好的长期精度稳定性、重复性稳定。
High precision and repeatability: the ordinary level can reach grade 1.5. The high grade can reach grade 1.0 and grade 0.5; It has good long-term accuracy, stability and repeatability.
- ◆ 压力损失小：根据不同规格、等级，压力损失为 0.08kPa ~ 0.58kPa。
Less pressure loss: according to different specifications and grades, the pressure loss is 0.08kPa ~ 0.58kPa.
- ◆ 高度集成、领先科技：采用先进的微机技术与高性能的集成芯片，整机功能强大、稳定，性能优越，长期使用无漂移。
Highly integrated and leading technology: advanced microcomputer technology and high-performance integrated chip are adopted. The whole machine has powerful and stable functions, superior performance and no drift in long-term use.
- ◆ 结构紧凑：压力传感器、温度传感器、流量传感器全部内置，使结构更加紧凑。
Compact structure: pressure sensor, temperature sensor and flow sensor are all built-in to make the structure more compact.
- ◆ 多段折线修正：按流量频率信号，可将仪表系数分十段自动进行线性修正，提高仪表的宽范围高精度。
Multi polyline correction: according to the flow frequency signal, the instrument coefficient can be divided into ten segments for automatic linear correction, so as to improve the wide range and high accuracy of the instrument.
- ◆ 完整数据存储功能：采用世界先进的数据存储芯片，保存用户参数、厂家参数，及时的数据保存功能，可防止突然掉电时数据丢失，在停电状态下，内部参数仍可永久保存。
Complete data storage function: the world's advanced data storage chip is adopted to save user parameters and manufacturer parameters. The timely data storage function can prevent data loss in case of sudden power failure. In case of power failure, the internal parameters can still be saved permanently.
- ◆ 大液晶屏显示瞬时、累计流量、温度、压力、标况值和工况值。
Large LCD screen displays instantaneous and cumulative flow, temperature, pressure, standard condition value and working condition value.
- ◆ 可以与本公司 IC 卡控制器联用实现预付费功能（先缴费后用气）。
It can be used with our company's IC card controller to realize the prepayment function (pay first and then use gas).
- ◆ 可以与本公司智能 LNG / CNG 气站管理系统联用。

It can be used with our company's intelligent LNG / CNG gas station management system.

◆ 多种信号输出形式（根据需要提供）：

- 1) 工况脉冲信号（标配）；
- 2) IC 卡标准体积量信号（连接 IC 卡控制器使用）；
- 3) (4-20) mA 标准模拟信号（标配）；
- 4) RS-485 通讯接口（选配，需要数字通讯或连接本公司网络版远程 IC 卡控制器使用）；
- 5) 根据用户需求，可以提供 GPRS 网络功能，实现低成本、远距离无线数据实时传输，可以实现远程抄表、远程监控流量计运行状态、电池电量等信息，可以远程维护流量计等。

Various signal output forms (provided as required):

- 1) Working condition pulse signal (standard configuration);
- 2) IC card standard volume signal (connected to IC card controller);
- 3) (4-20) mA standard analog signal (standard configuration);
- 4) RS-485 communication interface (optional, which requires digital communication or connection to our company's network version remote IC card controller);
- 5) According to the needs of users, GPRS network function can be provided to realize low-cost and long-distance wireless data real-time transmission, remote meter reading, remote monitoring of flowmeter operation status, battery power and other information, and remote maintenance of flowmeter.

主要技术参数

Main Technical Parameters

- ◆ 仪表口径：25mm、40mm、50mm、80mm、100mm、150mm、200mm
Instrument size: 25mm, 40mm, 50mm, 80mm, 100mm, 150mm, 200mm
- ◆ 公称压力，0.6MPa、1.6MPa
Nominal pressure: 0.6MPa, 1.6MPa
- ◆ 补偿方式：温度压力双补偿
Compensation mode: temperature and pressure double compensation
- ◆ 传感器采集方式：D 型：模拟量输出传感器；B 型和 F 型：数字型输出传感器
Sensor acquisition mode: Type D: analog output sensor; Type B and F: digital output sensor
- ◆ 输出信号：频率、脉冲、4~20mA、RS485、IC 卡信号
Output signal: frequency, pulse, 4 ~ 20mA, RS485, IC card signal
- ◆ 通讯协议：MODBUS-RTU, HART（定制）
Communication protocol: MODBUS-RTU, HART (customized)
- ◆ 供电电源：1、24VDC 直流电源，2、电池供电，3.6V 锂电池
Power supply: 1. 24VDC power supply, 2. Battery power supply, 3.6V lithium battery
- ◆ 使用条件：
介质温度：-20°C ~ 80°C
环境温度：-30°C ~ 60°C
相对湿度：5% ~ 90%
大气压力：86kPa ~ 106kPa

Service conditions:

Medium temperature: $-20^{\circ}\text{C} \sim 80^{\circ}\text{C}$

Environment temperature: $-30^{\circ}\text{C} \sim 60^{\circ}\text{C}$

Relative humidity: $5\% \sim 90\%$

Atmospheric pressure: $86\text{kPa} \sim 106\text{kPa}$

◆ 防护等级: IP65, IP67

Protection grade: IP65, IP67

◆ 防爆等级: Ex d II C T6 Gb

Explosion proof grade: Ex d II C T6 Gb

◆ 使用介质: 燃气、天然气、压缩空气、氮气等中低流速气体

Medium: gas, natural gas, compressed air, nitrogen and other low and medium flow rate gases

◆ 量程比: 1: 20 ~ 1: 50

Range ratio: 1:20 ~ 1:50

◆ 精度: 1.0, 1.5

Accuracy: 1.0, 1.5

◆ 材质: 铝合金

Material: aluminum alloy

◆ 产品标准: JB-T7385-2015

Product standard: JB-T7385-2015

◆ 安装方式: 垂直安装, 上进下出

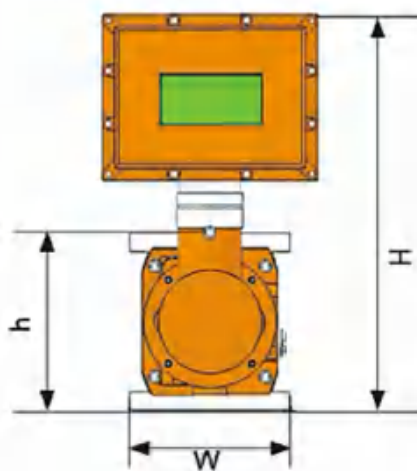
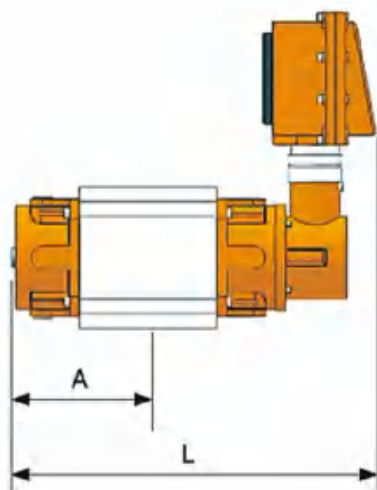
Installation method: vertical installation, top in and bottom out

流量范围和尺寸表

Flow Range and Size Table

口径 Size	流量范围 Flow range (m^3/h)	始动流量 Starting flow (m^3/h)	压力损失 Pressure loss (Pa)	尺寸 Dimension (mm)			
				(L)	(A)	(W)	高 Height (H)
DN25	1~20	≤ 0.4	110	235	108	128	145
DN40	2~40	≤ 0.8	140	307	130	128	145
DN50	3~60	≤ 1.2	120	385	140	185	172
DN50	3~80	≤ 1.3	170	420	156	185	172
DN80	4~100	≤ 2.0	150	460	175	185	172
DN80	4~150	≤ 2.2	180	490	190	185	172
DN80	5~200	≤ 2.8	200	485	185	235	246
DN100	6~300	≤ 3.0	300	565	230	235	246
DN150	6~450	≤ 3.2	400	655	275	235	246
DN150	15~650	≤ 4.0	560	640	293	450	460
DN150	20~1000	≤ 5.0	600	705	352	450	550

DN150	20~1000	≤5.0	600	705	352	450	550
DN150	40~1600	≤8.0	720	760	370	460	510



选型表

Selection table

型号 Model	产品名称 Product name			说明 Description		
YC-LLQ				气体腰轮(罗茨)流量计 Gas lobed rotor (Roots) flowmeter		
型式 Type	D				精密型 Precision type	
	B				高端数字型 High end digital type	
	F				出口数字型 Export digital type	
公称通径 Nominal diameter	25				表示: DN25 Indicates: DN25	
最大流量 Maximum flow	xxx				根据流量范围选择表选择 Select according to the flow range selection table	
工作压力 Working pressure	700				700kPa 绝压量程传感器 700kPa absolute pressure range sensor	
信号输出 Signal output		M				脉冲 Pulse
		RS				RS485
		L				4 ~ 20mA
准确度等级 Accuracy grade		1				1.0; 1.5

- 注： 1、信号输出，脉冲信号和 IC 卡信号为标配信号，可以不填写，如果需要电流输出填写； L：如果需要 485 输出填写； RS；如果两种都需要填写： RS / L
- 2、工作压力，为了更准确的测量管道压力，要更换现场工作压力选择合适量程的压力传感器，例如现场管道压力 (2 ~ 4) 公斤，选择 700kPa 绝压量程的传感器。
- 3、最大流量:例如 80D 直径流量计两个量程(13~250)m/h，和(20~400)m/h，填写 250 或者是 400，供参考填写。
- 4、公称通径：例如 DN25，填写 25 即可，公称通径内径为 25mm。

- Note: 1. Signal output, pulse signal and IC card signal are standard signals, which cannot be filled in. If current output is required, please fill in: L; If 485 output is required, please fill in: RS; If both need to be filled in: please fill in: RS / L.
2. Working pressure: in order to measure the pipeline pressure more accurately, it needs to replace the on-site working pressure and select the pressure sensor with appropriate range, such as the on-site pipeline pressure (2 ~ 4) kg and the sensor with 700kPa absolute pressure range.
3. Maximum flow: for example, two ranges of 80D diameter flowmeter (13 ~ 250) m/h and (20 ~ 400) m/h, fill in 250 or 400 for reference.
4. Nominal diameter: for example, DN25, please fill in 25, and the nominal diameter and inner diameter are 25mm.

流量仪表 Flowmeter

YC-XW 智能旋进旋涡气体流量计

YC-XW Intelligent Swirl Gas Flowmeter

概述

Introduction

YC-XW 系列智能旋进旋涡气体流量计采用先进的微处理技术，具有功能强、流量范围宽、操作维修简单、安装使用方便等优点，主要技术指标达到国外同类产品的先进水平。可广泛应用于石油、化工、电力、冶金、煤炭等行业各种气体、液体流量的计量。

YC-XW series intelligent swirl gas flowmeter adopts advanced microprocessor technology, which has the advantages of strong function, wide flow range, simple operation and maintenance, convenient installation and use. Its main technical indicators have reached the advanced level of similar foreign products. It can be widely used in the measurement of various gas and liquid flows in petroleum, chemical industry, electric power, metallurgy, coal and other industries.



特点

Features

- ◆ 内置式压力、温度、流量传感器，安全性能高，结构紧凑，外形美观。
Built in pressure, temperature and flow sensors, and it has high safety performance, compact structure and beautiful appearance.
- ◆ 就地显示温度、压力、瞬时流量和累积总量。
Local display of temperature, pressure, instantaneous flow and cumulative total amount.
- ◆ 采用先进的信号处理放大器和独特的滤波技术，有效地剔除了压力波动和管道振动所产生的干扰信号，大大提高了流量计的抗干扰能力，使小流量具有出色的稳定性。
The advanced signal processing amplifier and unique filtering technology are adopted to effectively eliminate the interference signals generated by pressure fluctuation and pipeline vibration, which greatly improves the anti-interference ability of the flowmeter and makes the small flow have excellent stability.
- ◆ 特有时间显示及实时数据存储之功能，无论什么情况下，都能保证内部数据不会丢失，可永久性保存。
The unique function of time display and real-time data storage can ensure that the internal data will not be lost and can be saved permanently under any circumstances.

- ◆ 整机功耗极低，能凭内部电池可长期供电运行，是理想的无需外电源就地显示仪表。
Low power consumption of the whole machine. It can operate with long-term power supply by internal battery, and it is an ideal local display instrument without external power supply.
- ◆ 防盗功能可靠，具有密码保护，防止参数改动。
Reliable anti-theft function, with password protection to prevent parameter changes.
- ◆ 表头可 180 度随意旋转，安装方便。
The meter can rotate 180 degrees at will, which is convenient for installation.

主要技术参数

Main Technical Parameters

流量计规格、基本参数和性能指标(见表 1)

Specifications, basic parameters and performance indexes of flowmeter (see table 1)

表 1

Table 1

型号规格 Model and specification	公称通径 Nominal diameter DN (mm)	流量范围 Flow range (m ³ /h)	仪表系数 Instrument coefficient (m ³) ⁻¹	压力等级 Pressure grade (MPa)	准确度 (级) Accuracy (grade)	备注 Notes
YC-XW-25	25	2.5 ~ 30	240000	1.6 2.5 4.0	1.0 1.5	PN ≤ 1.6MPa 为铝合金外壳；PN ≤ 4.0MPa 为铸钢或不锈钢外壳；PN > 4.0MPa 为特殊规格；请在订货时注明。 PN ≤ 1.6MPa is the aluminum housing; PN ≤ 4.0MPa is cast steel or stainless steel housing; PN > 4.0MPa is the special specification; Please indicate when ordering.
YG-XW-32	32	4.5 ~ 60	90000			
YC-XW-50	50	10 ~ 150	24000			
YC-XW-80	80	28 ~ 400	4800			
YC-XW-100	100	50 ~ 800	2800			
YC-XW-150	150	150 ~ 2250	680			
YC-XW-200	200	360 ~ 3600	210			

注：1.表中所列的流量范围为产品出厂时检定的流量范围（常温、常压下介质为空气， $p=1.205\text{kg/m}^3$ ）；
2.随着压力的增大，流量范围也随之扩大。

Note: 1. The flow range listed in the table is the flow range verified when the product leaves the plant (the medium is air under normal temperature and pressure, $P = 1.205\text{kg/m}^3$);
2. With the increase of pressure, the flow range also expands.

- ◆ 标准状态条件: $P=101.325\text{kPa}$, $T=293.15\text{K}$
Standard condition: $P = 101.325\text{kPa}$, $T = 293.15\text{K}$

- ◆ 使用条件:
环境温度: $-20 \sim +60^{\circ}\text{C}$
介质温度: $-20 \sim +80^{\circ}\text{C}$
相对湿度: $5\% \sim 95\%$
大气压力: $86\text{kPa} \sim 106\text{kPa}$
Service conditions:
Environment temperature: $-20 \sim +60^{\circ}\text{C}$
Medium temperature: $-20 \sim +80^{\circ}\text{C}$
Relative humidity: $5\% \sim 95\%$
Atmospheric pressure: $86\text{kPa} \sim 106\text{kPa}$

- ◆ 电气性能指标
工作电源: 外电源; $+24\text{VDC}$
内电源: 3.6V 锂电池, 型号: ER26500
整机功耗: 外电源, $< 1\text{W}$
内电源, $< 0.3\text{mW}$, 锂电池可用二年以上。
输出方式: 脉冲信号
 $4 \sim 20\text{mA}$ 电流信号: 对应流量 $0 \sim Q_{\max}$, 20mA 对应流量可由用户自己设定。
RS485 通讯: 可传输瞬时流量累积流量、压力和温度参数。

Electrical performance index

Working power supply: external power supply: $+24\text{VDC}$

internal power supply: 3.6V lithium battery, model: ER26500

Power consumption of the whole machine: external power supply, $< 1\text{W}$

internal power supply, $< 0.3\text{mW}$, lithium battery can be used for more than two years.

Output mode: pulse signal

$4 \sim 20\text{mA}$ current signal: the corresponding flow is $0 \sim Q_{\max}$, and the corresponding flow of 20mA can be set by the user.

RS485 communication: it can transmit instantaneous flow, cumulative flow, pressure and temperature parameters.

- ◆ 防爆标志: 防爆型: Exd II C T6 Gb
本安型: Exia II C T6 Ga

Explosion proof mark: explosion proof type: Exd II C T6 Gb

Intrinsically safe type: Exia II C T6 Ga

- ◆ 防护等级: IP65/IP66/IP67
Protection grade: IP65/IP66/IP67

流量计的安装

Installation of flowmeter

- 1) 流量计应根据流向标志安装。
- 2) 流量计可水平、垂直或任意角度倾斜安装。
- 3) 上下游直管段要求见图1
- 1) The flowmeter shall be installed according to the flow direction mark.
- 2) The flowmeter can be installed horizontally, vertically or obliquely at any angle.
- 3) See Figure 1 for the requirements of upstream and downstream straight sections.

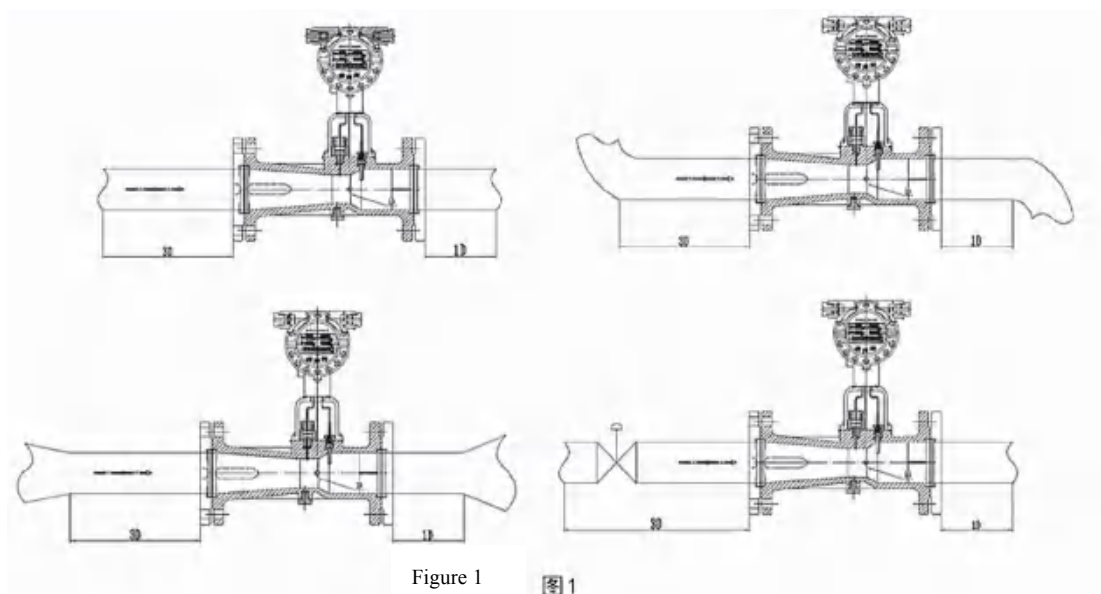


Figure 1

图 1

- 4) 被测介质内除含有较大颗粒或较长纤维性杂质外，一般无需安装过滤器。
- 5) 流量计周围不应有强外磁场干扰及强烈的机械振动。
- 6) 流量计必须可靠接地。
- 4) In addition to containing large particles or long fibrous impurities in the measured medium, there is generally no need to install a filter.
- 5) There should be no strong external magnetic field interference and strong mechanical vibration around the flowmeter.
- 6) The flowmeter must be reliably grounded.

外形尺寸及安装

Overall Dimension and Installation

流量计外形尺寸（见图2和表2）

Overall dimensions of flowmeter (see Figure 2 and table 2)

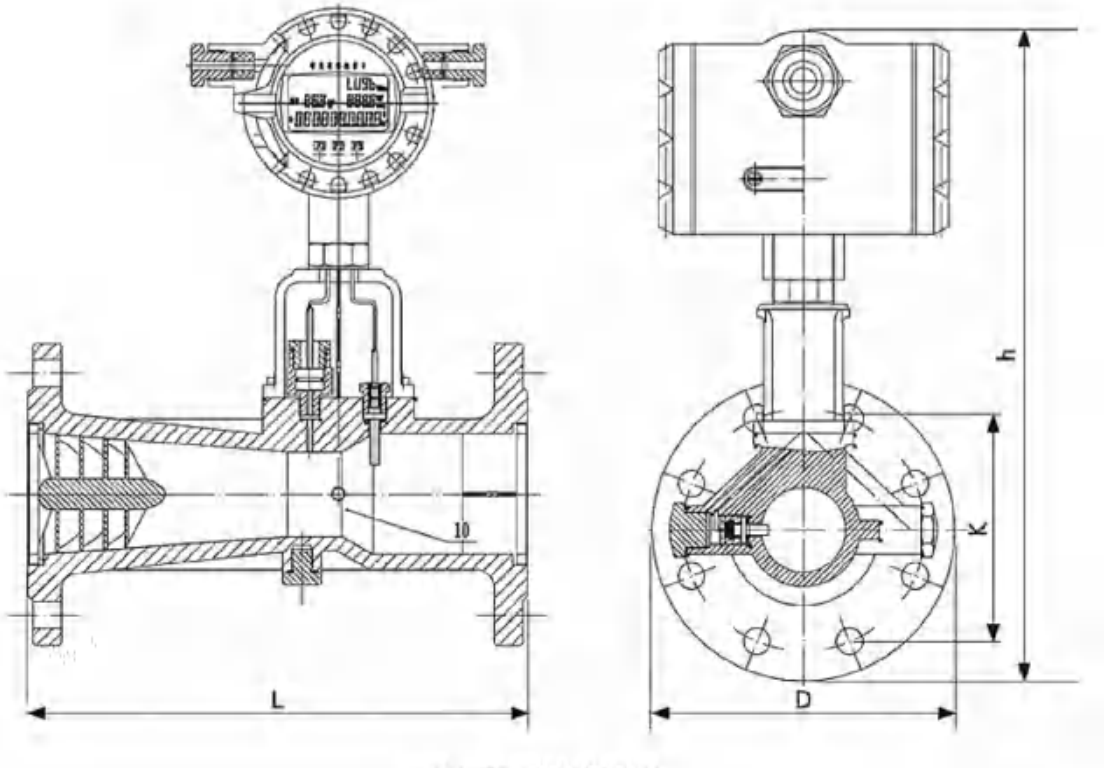


图2 流量计外形图

Figure 2 Flowmeter outline drawing

流量计安装尺寸（1.6MPa）

Installation dimension of flowmeter (1.6MPa)

表 2

Table 2

单位:mm

Unit: mm

型号规格 Model and specification	公称通径 DN Nominal diameter DN	L	H	D	K	n—d
YC-XW-25	25	180	420	115	85	4-Ø14
YC-XW-32	32	200	355	140	100	4-Ø18
YC-XW-50	50	232	440	165	125	4-Ø18
YC-XW-80	80	330	490	200	160	8-Ø18

YC-XW-100	100	410	427	220	180	8-Ø18
YC-XW-150	150	570	476	285	240	8-Ø25
YC-XW-200	200	700	533	340	295	12-Ø22
法兰标准 Flange standard	采用管道法兰标准 GB/T9119 Pipe flange standard GB/T9119 is adopted					

产品选型

Product Selection

- 1) 用户订购本产品时要注意根据管道公称直径、流量范围、公称压力、介质最大压力、介质温度范围、环境条件择合适的规格，在危险场所使用的必须注明防爆等级要求。
 - 2) 流量计一般为基本型，带工况脉冲输出和 RS485 通讯接口，若需其它附件输出功能，请在订货时注明。
 - 3) 配套产品，可配套YC-3100D 型流量积算仪通过RS485 接口实现异地（距离≤120m）显示。
用户在订货时，请按照下列格式，详细正确地填写。
- 1) When ordering this product, users should pay attention to selecting appropriate specifications according to the nominal diameter of the pipeline, flow range, nominal pressure, maximum medium pressure, medium temperature range and environmental conditions. The explosion-proof grade requirements must be indicated for those used in dangerous places.
 - 2) The flowmeter is generally of basic type, with working condition pulse output and RS485 communication interface. If other accessory output functions are required, please indicate them when ordering.
 - 3) Supporting products can be equipped with YC-3100D flow totalizer to realize remote display (distance ≤ 120m) through RS485 interface.
- When ordering, please fill in the following format in detail and correctly.

代号 Code	通径 (mm) Diameter (mm)	流量范围 Flow range
YC-XW-25	DN25	2.5 ~ 30
YC-XW-32	DN32	4.5 ~ 60
YC-XW-50	DN50	10 ~ 150
YC-XW-80	DN80	28 ~ 400
YC-XW-100	DN100	50 ~ 800
YC-XW-150	DN150	150 ~ 2250
YC-XW-200	DN200	360 ~ 3600
代号 Code	功能 1 Function 1	
N	无温压补偿 No temperature and pressure compensation	
Y	带温度、压力自动补偿 With automatic temperature and pressure compensation	

代号 Code	输出信号 Output signal
F1	4 ~ 20mA 输出 (二线制) 4 ~ 20mA output (two wire system)
F2	4~20mA 输出 (三线制) 4 ~ 20mA output (three wire system)
F3	RS485 通讯接口 RS485 communication interface
代号 Code	功能 2 Function 2
E1	1.0 级 Grade 1.0
E2	1.5 级 Grade 1.5
代号 Code	功能 2 Function 2
T1	常温 Normal temperature
T2	高温 High temperature
代号 Code	功能 3 Function 3
P1	1.6 MPa
P2	2.5 MPa
P3	4.0 MPa
代号 Code	功能 4 Function 4
D1	内部3.6V 供电 Internal 3.6V power supply
D2	DC24V 供电 DC24V power supply
代号 Code	功能 5 Function 5
B1	不锈钢 Stainless steel
B2	铝合金 Aluminum alloy
代号 Code	功能 4 Function 4
I	本安型 Intrinsically safe type
D	隔爆 Flame proof
代号 Code	功能 7 Function 7
65	IP65
66	IP66
67	IP67

流量仪表Flowmeter

YC-RF 热式气体质量流量计

YC-RF Thermal Gas Mass Flowmeter

概述

Introduction

热式气体质量流量计是利用热传导原理测流量的仪表。该仪表采用恒温差法对气体质量流量进行准确测量。具有体积小、数字化程度高、安装方便，测量准确等优点。

Thermal gas mass flowmeter is an instrument for measuring flow based on the principle of heat conduction. This instrument uses the constant temperature difference method to accurately measure the gas mass flow. It has the advantages of small volume, high digitization, convenient installation and accurate measurement.

传感器部分由两个基准级铂电阻温度传感器组成。采用桥式环路，一个传感器测量流量温度，另一个传感器维持高于流体温度的恒温差，可以在高温和高压条件下进行流量测量。

The sensor part consists of two primary standard platinum resistance temperature sensors. Using bridge loop, one sensor measures the flow temperature, and the other sensor maintains a constant temperature difference higher than the fluid temperature, which can measure the flow under high temperature and high pressure.



优点:

真正的质量流量计，对气体流量测量无需温度和压力补偿，测量方便、准确。可得到气体的质量流量或者标准体积流量。

宽量程比，可测量流速高至 100m/s，低至 0.5m/s 的气体，可以用于气体检漏。

抗震性能好使用寿命长。传感器无活动部件和压力传感部件，不受震动对测量精度的影响。

安装维修简便。在现场条件允许的情况下，可以实现不停产安装和维护。（请参见安全注意事项）。

数字化设计。整体数字化电路测量，测量准确、维修方便。采用 RS-485 通讯，可以实现工厂自动化、集成化。

Advantages:

The real mass flowmeter can measure the gas flow without temperature and pressure compensation, which is convenient and accurate. The mass flow or standard volume flow of gas can be obtained.

Wide range ratio can measure the gas with flow rate as high as 100m/s and as low as 0.5m/s, and it can be used for gas leak detection.

Good seismic performance and long service life. The sensor has no moving parts and pressure sensing parts, and is not affected by vibration on the measurement accuracy.

Easy installation and maintenance. If the site conditions permit, the installation and maintenance without shutdown can be realized. (See safety precautions).

Digital design. Overall digital circuit measurement, accurate measurement and convenient maintenance. It uses RS-485 communication, plant automation and integration can be realized.

技术参数

Technical Parameters

测量介质 Measuring medium	各种气体（乙炔气除外） Various gases (except acetylene)	
管径范围 Pipe diameter range	DN10 ~ 100mm（满管式） DN10 ~ 100mm (full pipe type)	DN100 ~ 6000mm（插入式） DN100 ~ 6000mm (plug-in type)
流速范围 Velocity range	0.1 ~ 100Nm ³ /s	
准确度 Accuracy	±1.0% ±1.5%	
工作温度 Working temperature	传感器：常温型-10 ~ +200°C 高温型：-10 ~ +350°C 转换器：-20 ~ +45°C Sensor: normal temperature type -10 ~ +200°C High temperature type: -10 ~ +350°C Converter: -20 ~ +45°C	
工作压力 Working pressure	介质压力 ≤ 10MPa Medium pressure ≤ 10MPa	介质压力 ≤ 2.5MPa Medium pressure ≤ 2.5MPa
供电电源 Power supply	一体机（DC 24V 或者 AC220V≤18W） 分体式（AC220V≤19W） Integrated type (DC 24V or AC220V ≤ 18W) Split type (AC220V ≤ 19W)	
响应速度 Response time	1s	
输出信号 Output signal	4 ~ 20mA（光电隔离，最大负载 500Ω） RS-485（光电隔离），HART 协议 4 ~ 20mA (photoelectric isolation, maximum load 500 Ω) RS-485 (photoelectric isolation), HART Protocol	
管道材质 Pipe material	碳钢、不锈钢、塑料等 Carbon steel, stainless steel, plastic, etc.	
显示 Display	一体型：四行 汉字液晶显示 Integrated type: four-line LCD in Chinese	
显示内容 Contents	质量流量、标况体积质量、累积流量、标准时间、累积运行时间、介质温度、标准流速等 Mass flow, volume mass under standard conditions, cumulative flow, standard time, cumulative operation time, medium temperature, standard flow rate, etc.	
一次表防护等级	IP65/IP66/IP67	

Protection grade of primary instrument		
传感器材质 Sensor material	316L	316+PTFE, 316L, 2205, HC

安装与调试

Installation and Commissioning

- ◆ 如果仪表安装在室外，应加仪表遮阳罩，避免日晒、雨淋。
If the instrument is installed outdoors, the sunshade should be added to avoid sunshine and rain.
- ◆ 禁止安装在强烈震动的场合。
It is forbidden to install in the place with strong vibration.
- ◆ 禁止暴露在含有大量腐蚀性气体的环境。
It is forbidden to expose to the environment containing a large amount of corrosive gas.
- ◆ 不要和变频器、电焊机等污染电源的设备共用电源，必要时，为转换器加装净化电源。
Do not share the power supply with frequency converter, electric welding machine and other equipment with polluted power supply. If necessary, install clean power supply for the converter.

1、一体型仪表安装与连接

1. Installation and connection of integrated instrument

外观结构图

Appearance and structure diagram



图1 适用管径DN80以上 DN500以下
精简型热式气体质量流量计

Figure 1 Applicable pipe diameter above DN80 and below DN500
Simplified thermal gas mass flowmeter



图2 适用管径DN15以上DN80以下
满管型热式气体质量流量计

Figure 2 Applicable pipe diameter above DN15 and below DN80
Filled pipe thermal gas mass flowmeter



图3 适用管径DN80以上 DN4000以下
标准型热式气体质量流量计

Figure 3 Applicable pipe diameter above DN80 and below DN4000
Standard thermal gas mass flowmeter

(一) 一体型插入式应插入至被测管路轴心，所以测量杆长度视测管径大小而定。订货时应说明。若不能插入至管道轴心，将有厂方提供标定系数，以完成准确测量。

(1) The integrated plug-in type should be inserted into the axis of the measured pipeline, so the length of the measuring rod depends on the measured pipe diameter. It should be stated when ordering. If it cannot be inserted into the pipe axis, the manufacturer will provide calibration coefficient to complete accurate measurement.

(二) 一体型满管式采用法兰连接, 符合国标 GB/T9119, 见附录 2。

(2) The integrated filled pipe type adopts flange connection, which complies with the national standard GB/T9119. See Appendix 2.

产品型谱

Product Type Spectrum

型号 Model	基本代码 Basic code					说明 Description					
YC-RF-						热式气体质量流量计 Thermal gas mass flowmeter					
传感器 类型 Sensor type	C 型 Type C					插入式 Plug-in type					
	G 型 Type G					管段式 Pipe section type					
口径(mm) Diameter (mm)		管道内径：10～2000(mm) 方管提供边长：25 x 25~2000 x 2000 Pipe inner diameter: 10～2000 (mm) Side length of square pipe: 25 x 25～2000 x 2000				直接输入口径 Direct input size					
材质 Material			A				1Cr18Ni9Ti				
			B				0Cr18Ni9				
			C				OCr17Ni12Mo2				
			D				其他材质 Other materials				
压力 (MPa) Pressure (MPa)			S				<1.0				
			M				1.0～2.5				
温度(°C) Temperature (°C)				1			<200				
				2			<350				
输出信号 Output signal					1		4～20mA				
					2		RS～485				
					3		PULSE				
					4		继电气常开触点 Relay normally open contact				
					5		HART				
电源 Power supply						DC		24V			
						AC		220V			
防爆性能 Explosion proof performance							I		本安型Intrinsically safe type		
							D		隔爆Flame proof		
防护等级 Protection level									65	IP65	
									66	IP66	
									67	IP67	

YC-FC 超声波（单声道、双声道、多声道、液体）流量计

YC-FC Ultrasonic (Single track, Dual track, Multi track, Liquid)

Flowmeter

概述

Introduction

YC-FC 超声波流量计采用先进的超声波超高灵敏度技术和稳定瞬时技术，利用时差法的测量技术，精确、无漂移，对流体流动无阻碍。

The YC-FC ultrasonic flowmeter employs advanced ultrasonic technology with ultra-high sensitivity and stable instantaneous technology. It utilizes the time difference measurement technique, ensuring precision, drift-free measurements with unobstructed fluid flow.

YC-FCF (x) Y 测量液体：水、河水、海水、油等、化学液体等均质液体；

YC-FCF (x) Y is capable of measuring homogeneous liquids such as water, river water, seawater, oil, chemical liquids, and more.

工作原理

Operating Principle

YC-FC 型系列超声波流量计利用了低电压、多脉冲时差原理，采用高精度和超稳定的双平衡信号差分发射、差分接收数字检测技术来测量顺流和逆流方向的声波传输时间，根据时差计算出流速。具有稳定性好、零点漂移小、测量精度高，量程比宽，抗干扰性强等特点。

The YC-FC series ultrasonic flowmeters utilize the low-voltage, multi-pulse time-difference principle. They employ high-precision and ultra-stable differential signal transmission and reception with digital detection technology to measure the transmission time of sound waves in both the downstream and upstream directions. Flow velocity is calculated based on this time difference. These flowmeters offer excellent stability, minimal zero-point drift, high measurement accuracy, wide measurement range, and strong interference resistance.

当超声波波束在流体中传播时，流体的流动将使传播时间产生微小变化，其传播时间的变化正比于流体的流速，零流量时，两个传感器发射和接收声波所需的时间完全相同（唯一可实际测量零流量的技术）；介质流动时，逆流方向的声波传输时间大于顺流方向的声波传输时间。其关系符合下面表达式：

As the ultrasonic beam propagates through the fluid, the fluid's flow induces slight variations in the propagation time. These variations are directly proportional to the fluid's velocity. At zero flow, the time required for two sensors to transmit and receive sound waves is entirely identical (the only practical technology for measuring zero flow). When the medium flows, the transmission time of

sound waves in the upstream direction is less than that in the downstream direction. This relationship can be expressed as follows:

$$V = \frac{MD \sin 2\theta}{T_{up} - T_{down}} \Delta T$$

V: 介质流速

V: Velocity of the medium

θ : 声速与流体流动方向的夹角

θ : Angle between the sound velocity and the direction of fluid flow

M: 声束在流体的直线传播次数

M: Number of straight-line passes of the sound beam through the fluid

D: 管道内径

D: Inside diameter of the pipe

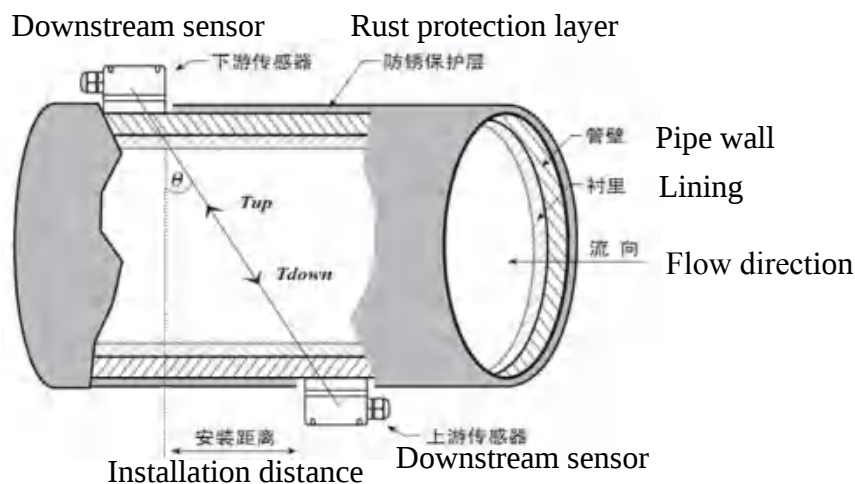
T_{up} : 声束在顺流时的传播时间

T_{up} : Propagation time of the sound beam in the downstream direction

T_{down} : 声束在逆流时的传播时间

T_{down} : Propagation time of the sound beam in the upstream direction

$\Delta T = T_{up} - T_{down}$



内容 Item	技术特点 Technical features	备注 Notes
测量精度 Measurement accuracy	流量计：优于 $\pm 1.0\%$ ；水表：优于 $\pm 2.0\%$ ；热量表：满足 EN1434 标准 Flowmeter: Better than $\pm 1.0\%$; Water meter: Better than $\pm 2.0\%$; Heat meter: Compliant with EN1434 standards	详见产品介绍 See product introduction for details
重复性 Repeatability	流量计：优于 $\pm 0.2\%$ ；水表/热量表：优于 $\pm 0.5\%$ Flowmeter: Better than $\pm 0.2\%$; Water meter/Heat meter: Better than $\pm 0.5\%$	
流体方向 Fluid direction	正、反向双向计量，可计量正、负、净累积流量/热量 Bidirectional measurement in both forward and reverse directions, capable of measuring positive, negative, and net cumulative flow/heat	
最大流速 Maximum flow velocity	64m/s	
测量介质 Measuring media	水、污水、海水、酒精、各种油类等能传导超声波的单一均匀稳定的液体 Water, sewage, seawater, alcohol, various oils, and single homogeneous stable liquids that can conduct ultrasonic waves	外夹式传感器 不适用水泥管材 Excludes cement pipes for external clamp-on sensors
适用管材 Applicable pipe materials	碳钢、不锈钢、铸铁、水泥、铜、PVC、铝等均匀、质密的管道，允许有衬里 Carbon steel, stainless steel, cast iron, cement, copper, PVC, aluminum, and other uniform and dense pipes; allowance for lining	
流体温度 Fluid temperature	$\leq 160^{\circ}\text{C}$	详见产品介绍 See product introduction for details
流体浊度 Fluid turbidity	$\leq 20000\text{ppm}$ 且气泡含量小 $\leq 20000\text{ ppm}$ with low air bubble content	
显示 Display	全中文显示瞬时流量、热量、流速、累积量、信号状态等 Full Chinese display of instantaneous flow, heat, flow velocity, cumulative quantity, signal status, etc.	
输出接口 Output interfaces	4-20mA、脉冲、OCT、频率、HART、RS232、RS485 输出可选 4-20mA, pulse, OCT, frequency, HART, RS232, RS485 outputs optional	
输入接口 Input interfaces	3 路 4-20mA 模拟输入、2 路铂电阻输入可选 3 channels of 4-20mA analog input, 2 channels of platinum resistance input optional	
其它功能 Other functions	日、月、年累积器；上、断电管理功能；工作状态自诊断功能 Daily, monthly, yearly accumulators; power-on and power-off management functions; self-diagnostic function for operational status	

性能指标

Performance Specifications

YC-FC 系列超声波流量计性能特点:

The YC-FC series ultrasonic flowmeter has the following performance specifications:

- ◆ 无阻力、无压力损失, 可节约运行成本, 且无可动部件, 无磨损, 无阻塞隐患。

No resistance and pressure loss, leading to cost savings; no moving parts, no wear, and no risk of blockages.

- ◆ 测量管径范围宽 (DN15~5000mm), 且能精确测量双向流和脉动流。

Wide measurement pipe diameter range (DN15~5000mm), capable of accurate measurement of bidirectional and pulsating flows.

- ◆ 超声传感器正常工作压力在 0~4.2MPa, 最高可达 15MPa。

The normal operating pressure range for ultrasonic sensors is 0~4.2MPa, with a maximum of 15MPa.

- ◆ 重复性好, 精确度高, 线性好 (采用了分布合理的多反射并将声程加长)。

Excellent repeatability, high accuracy, and good linearity (achieved through reasonable multiple reflections and extended sound path).

- ◆ 数码式信号转换, 可获得精确的解析度, 并具有长久的稳定性有强大的自检测功能 (超声波传感器发射功率自动增益控制、测量有效性及采用百分比监测功能)。

Digital signal conversion for precise resolution and long-term stability with robust self-diagnostic functions (automatic gain control of ultrasonic sensor transmission power, measurement validity, and percentage monitoring).

- ◆ 安装维护简便, 可选择停气或现场管道带压安装, 可以不断流拆装维护, 无需重新标定; 防尘抗雷击设计, 适应复杂多变的气候影响; 全中文的操作界面, 使用更简单方便, 全数字式计量系统, 易于实现数字通信。

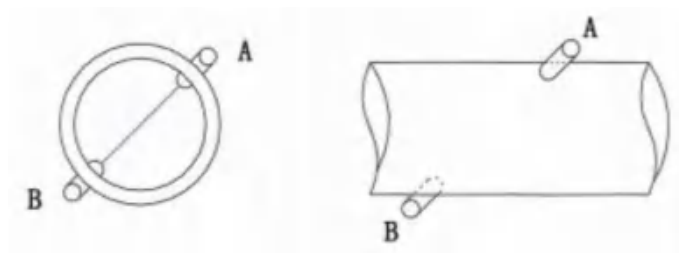
Easy installation and maintenance; options for shutdown or on-site installation with pressurized pipelines; maintenance without interrupting flow, no need for recalibration; dustproof and lightning-resistant design, adaptable to complex and changing weather conditions; full Chinese operation interface for simplicity and convenience; fully digital measurement system for easy digital communication.

- ◆ 通用性强, 可单独工作或联网接入各种能源管理系统, 实现流量科学管理。

Versatility: Operate independently or connect to various energy management systems for scientific flow management.

◆ 外壳材质：不锈钢或其他。

Housing material: Stainless steel or other materials.

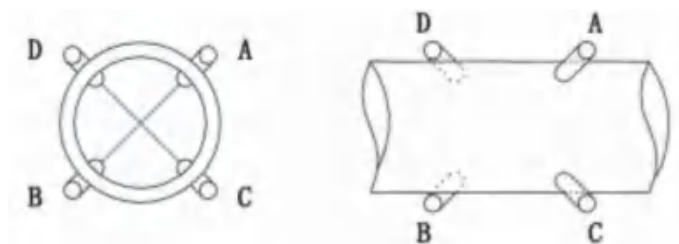


A、B 为声道 A, B: Sound track

1 传感器 1 Sensor

单声道测量示意图

Single track measurement diagram



A、B 为声道 A, B: Sound track

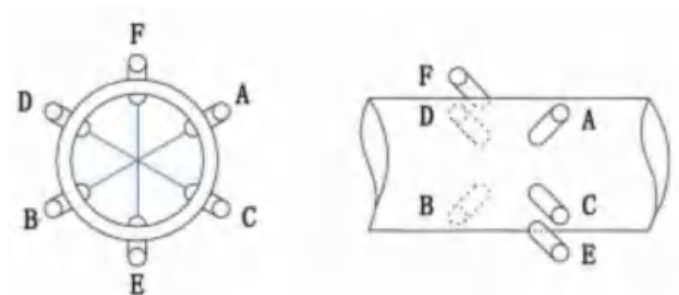
1 传感器 1 Sensor

C、D 为声道 C, D: Sound track

2 传感器 2 Sensor

双声道测量示意图

Dual track measurement diagram



A、B 为声道 A, B: Sound track

1 传感器 1 Sensor

C、D 为声道 C, D: Sound track

2 传感器 2 Sensor

E、F 为声道 E, F: Sound track

3 传感器 3 Sensor

三声道测量示意图

Triple track measurement diagram



液体超声波流量计 YC-FCF (x) Y 系列

Liquid Ultrasonic Flowmeter YC-FCF (x) Y Series

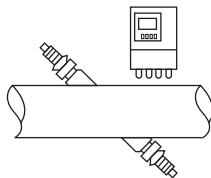
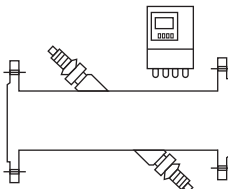
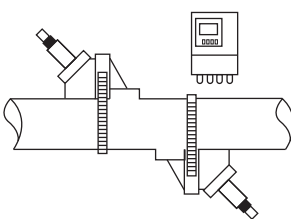
- ◆ 测量精度：一般为 $\pm 1.0\%$ ，可达 $\pm 0.5\%$
Measurement accuracy: Typically $\pm 1.0\%$, up to $\pm 0.5\%$
- ◆ 重复精度：一般为 $\pm 0.3\%$ ，可达 $\pm 0.15\%$
Repeatability: Typically $\pm 0.3\%$, up to $\pm 0.15\%$
- ◆ 测量流速范围宽：0.01~12m/s
Wide flow velocity range: 0.01~12m/s
- ◆ 管径范围大：DN15~5000mm 适用于各种管道材质，管道式、外夹式传感器、插入式传感器可带压安装及维护
Large pipe diameter range: DN15~5000mm suitable for various pipe materials; pipe-mounted, external clamp-on, and plug-in type sensors can be installed and maintained under pressure
- ◆ 转换器：具有两路模拟量输入接口，可做温度、压力等参数
Transmitter: Equipped with two analog input interfaces for measuring temperature, pressure, and other parameters
- ◆ 工作温度：转换器-20~60°C（特定环境请说明）
传感器-40~60°C（常温型）
-40~160°C（高温型）
- ◆ Operating temperature: Transmitter -20~60°C (please specify for specific environments)
Sensor -40~60°C (standard temperature type)
-40~160°C (high-temperature type)
- ◆ 声道类型：可选单声道、双声道、三声道
Track types: Optional single track, dual track, triple track

型号说明

Model Descriptions

YC-FCF (x) Y 液体超声波流量计（完整型号见选型编码表）

YC-FCF (x) Y Liquid Ultrasonic Flowmeter (For complete model numbers, refer to the selection code table).

	插入式 Plug-in type			管道式 Pipeline type			夹装式 Clamping type
图示 Illustration							
公称通径 Nominal diameter (DN)	80~5000mm			15~2000mm			25~5000mm
流速范围 Flow velocity range (m/s)	±0.01~±12						
精度 (%) Precision (%)	单声道 Single track	双声道 Dual track	三声道 Triple track	单声道 Single track	双声道 Dual track	三声道 Triple track	±1.5
	±1.0	±0.5	±0.5	±1.0 (校正可达 ±0.5) (±0.5 after correction)	±0.5	±0.5	
测量介质 Measurement medium	水、河水、海水、油等、化学液体等均质液体 Measurement of homogeneous liquids such as water, river water, seawater, oil, chemical liquids, etc.						
信号输出 Signal output	电流： 4~20mA HART 输出 Current: 4-20mA HART output 累计脉冲输出： 传输距离小于 500m Cumulative pulse output: transmission distance less than 500m RS-485: 传感距离大于 1.6Km RS-232 串口模式 RS-485: sensing distance greater than 1.6Km RS-232 serial port mode						
测量功能 Measurement function	显示瞬时流量、瞬时流速、正累计流量、负累计流量、净累计流量、累计运行时间 Display instantaneous flow rate, instantaneous velocity, positive cumulative flow rate, negative cumulative flow rate, net cumulative flow rate, cumulative operating time						
数据存贮 Data storage	可储存前 720 小时，前 365 天，前 36 个月和前十年的测量数据，包括瞬时流量、累计流量、断电时间等 Storage of measurement data for the first 720 hours, 365 days, 36 months, and 10 years, including instantaneous flow rate, cumulative flow rate, power outage time, etc.						
环境温度 Ambient temperature	转换器： -20~60℃（特定环境请说明） 传感器： -40~60℃（常温型） -40~160℃（高温型） Converter: -20~60 °C (please specify specific environment) Sensor: -40~60 °C (normal temperature type) -40~160 °C (high temperature type)						
传感器材质 Sensor material	不锈钢和陶瓷 Stainless steel and ceramics			不锈钢和普通碳钢 Stainless steel and ordinary carbon steel			常温型为尼龙，高温型为合金铝 Nylon in normal temperature, alloy aluminum in high temperature
传感器承压能力 Sensor pressure capacity	≤2.5MPa			DN15~700mm≤42MPa DN800~2000mm≤1.6MPa (可定制) (Customizable)			与管内压力无关 Not related to the pressure inside the pipe
传感器防护等级 Sensor protection level	IP65、IP68						

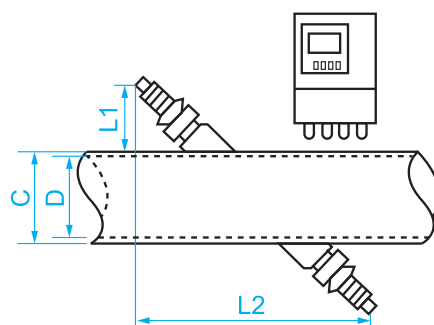
转换器防护等级 Converter protection level	壁挂式转换器: IP65 盘装式转换器: IP52 一体式转换器: IP67 Wall mounted converter: IP65 Disk mounted converter: IP52 Integrated converter: IP67	
防爆等级 Explosion proof level	Exia II C T6 Ga Exd II C T6 Gb	
分体型电缆有效距离 Effective distance of split type cable	≤500m	≤300m
直管段要求 Requirements for straight pipe sections	通常为前 10D 后 5D Usually upstream 10D and downstream 5D	
工作电源 Working power supply	220VAC, 12VDC, 24VDC, 其他可选 220VAC, 12VDC, 24VDC, other options	

尺寸表

Size Table

插入式 (DN80~5000mm)

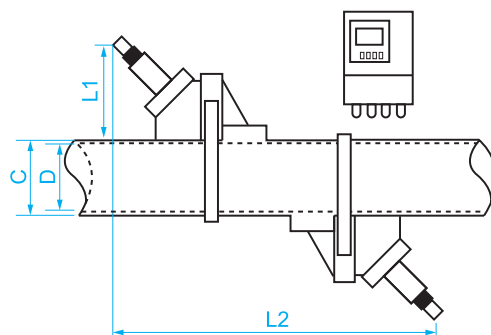
Plug-in type (DN80~5000mm)



公称通径 Nominal diameter (DN)	C (mm)	L1 (mm)	L2 (mm)
80~5000	C	60	C+120

夹装式 (DN25~5000mm)

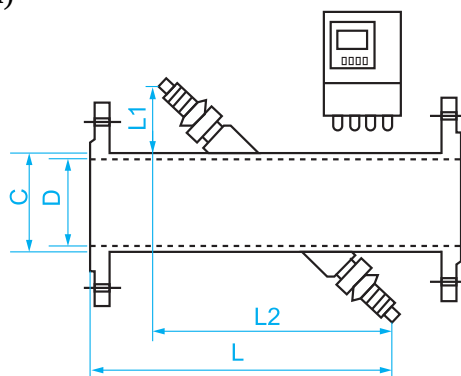
Clamping type (DN25~5000mm)



公称通径 Nominal diameter (DN)	C (mm)	L1 (mm)	L2 (mm)
25~5000	C	60	C+120

管道式 (DN15~2000mm)

Pipeline type (DN15~2000mm)



公称通径 Nominal diameter (DN)	C (mm)	L (mm)	L1 (mm)	L2 (mm)
15	22	200	60	135
20	25	200	60	140
25	32	200	60	145
32	38	200	60	152
40	45	200	60	160
50	57	200	60	170
65	76	200	60	185
80	89	250	60	200
100	108	250	60	220
125	133	250	60	245
150	159	300	60	270
200	219	350	60	320
250	273	450	60	370
300	325	500	60	420
350	377	550	60	470
400	426	600	60	520
450	478	700	60	570
500	520	800	60	620
600	620	1000	60	720
700	720	1100	60	820
800	820	1200	60	920
900	920	1300	60	1020
1000	1020	1400	60	1120
1200	1220	1500	60	1320
1400	1420	1600	60	1520
1600	1620	1800	60	1720

1800	1820	2000	60	1920
2000	2020	2200	60	2120

安装

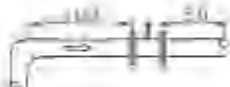
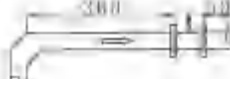
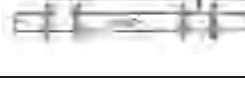
Installation

YC-FC 超声波流量计可以水平安装，垂直或倾斜管道上安装，在管道圆周方向上可任意角度安装，但要考虑操作，维护的方便。

YC-FC ultrasonic flow meter can be installed horizontally, vertically or obliquely on pipelines, and can be installed at any angle in the circumferential direction of the pipeline, but consideration should be given to convenient operation and maintenance.

直管段要求

Requirements for straight pipe sections

1 个 90 度圆角弯管 One 90-degree rounded bend	
2 个 90 度圆角弯管（同平面） Two 90-degree fillet bends (same plane)	
2 个 90 度圆角弯管（不同平面） Two 90-degree fillet bends (different planes)	
同心渐缩管 Concentric reducing pipe	
同心渐扩管 Concentric increasing pipe	
调节阀 Regulating valve	
三通 Three-way pipe	

YC-FCH 手持式超声波流量计

YC-FCH Handheld Ultrasonic Flowmeter

概述

Introduction

YC-FCH 型手持式超声波流量计适用于各种工业现场中液体流量的在线标定和巡检测量。具有测量精度高、一致性好、电池供电、操作简单、携带方便等特点，是目前国内体积最小、质量最轻，真正意义上的便携式超声波流量计，受到了客户广泛好评。

The YC-FCH handheld ultrasonic flowmeter is suitable for online calibration and inspection measurement of liquid flow in various industrial field applications. It features high measurement accuracy, good consistency, battery power supply, ease of operation, and portability. It is currently the smallest and lightest portable ultrasonic flowmeter in China, earning wide acclaim from customers.



性能指标

Performance Specifications

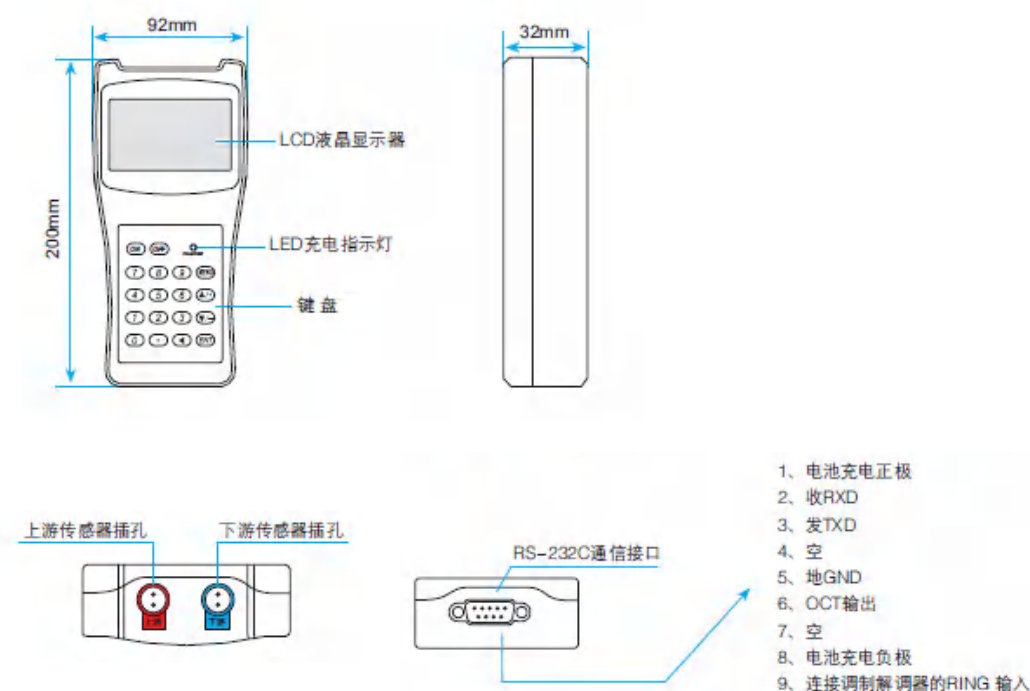
- ◆ 测量精度：优于 $\pm 1\%$
Measurement accuracy: Better than $\pm 1\%$
- ◆ 重复性：优于 $\pm 0.2\%$
Repeatability: Better than $\pm 0.2\%$
- ◆ 工作电源：90~230VAC（内置镍氢充电电池，充足后可持续工作 12 小时）
Power supply: 90~230VAC (with built-in nickel-hydrogen rechargeable battery, sustain operation for 12 hours after sufficient charging)
- ◆ 安装方式：外敷式安装
Installation method: External installation
- ◆ 显示：4 行汉字同屏显示（瞬时流量、流速、累积流量、信号状态等）
Display: 4-line simultaneous display of Chinese characters (instantaneous flow, flow velocity, cumulative flow, signal status, etc.)
- ◆ 信号输出：非隔离 RS232/1 路隔离 OCT 输出
Signal output: Non-isolated RS232/1-channel isolated OCT output
- ◆ 其它功能：内置数据记录器可记录时间、累积流量、信号状态、工作时间等标准 RS232

数据接口，用于联网检测或导出记录数据自诊断，提示当前工作状态是否正常

Other Functions: Built-in data recorder records time, cumulative flow, signal status, working time, and other standard RS232 data interfaces for networking, diagnostics, and exporting recorded data. It provides real-time diagnostics to indicate whether the current working status is normal.

主机机械尺寸图

Mechanical Dimension Diagram of the Main Unit



标准配置

Standard Accessories



可选配的传感器 Optional Sensors



标准小支架传感器 HB 型
Standard small bracket sensor HB type



标准中支架传感器 HN 型
Standard medium bracket sensor HN type



高温小型传感器 B1H 型
High temperature small sensor B1H type



高温中型传感器 N1H 型
High temperature medium sensor N1H type



标准小型传感器 B1 型
Standard small sensor B1 type



标准中型传感器 N1 型
Standard medium sensor N1 type



标准大型传感器 D1 型
Standard large sensor D1 type

传感器参数

Sensor Parameters



技术参数 Technical parameter	支架 HB 型 Bracket HB type	支架 HN 型 Bracket HN type	标准 B1 型 Standard B1 type	标准 N1 型 Standard N1 type	标准 D1 型 Standard D1 type	高温 B1H 型 High temperature B1H type	高温 N1H 型 High temperature N1H type
适用管径 Applicable pipe diameter (mm)	15~100	50~700	15~100	50~700	300~6000	15~100	50~700
材质 Material quality	铝合金 Aluminum alloy		ABS			特殊高温材料 Special high temperature materials	
工作频率 Working frequency	1MHz						
常用安装方法 Common installation methods	V（N、W）法 V(N,W) method	V、Z 法 V,Z method	V（N、W）法 V(N,W) method	V、Z 法 V,Z method	Z 法 Z method	V（N、W）法 V(N,W) method	V、Z 法 V,Z method
标定 Calibration	整机配对标定 Complete machine pairing calibration						
磁性 Magnetic	有 Yes				无 No		
适用温度 Applicable temperature	0℃~70℃					0℃~160℃	
防护等级 Protection level	IP65 IP68						
外形尺寸 Overall dimensions	200×25×25	280×40×40	45×30×30	60×45×45	80×70×55	90×85×24	90×82×29
质量（克） Mass (g)	250	1080	75	250	650	94	150
介质种类 Media type	水、海水、污水、酒精、各种油类等能传导超声波的单一、均匀、稳定的液体 A single, uniform, and stable liquid that can transmit ultrasonic waves, such as water, seawater, sewage, alcohol, and various oils						
介质浊度 Medium turbidity	≤20000ppm 且气泡含量小 ≤ 20000ppm with low bubble content						
适用管材 Applicable pipes	碳钢、不锈钢、铸铁、铜、PVC、铝、玻璃钢等均匀质密的管道，允许有衬里 Carbon steel, stainless steel, cast iron, copper, PVC, aluminum, fiberglass, and other uniformly dense pipelines are allowed to have lining						
管道衬材 Pipeline lining material	环氧沥青、橡胶、灰浆、聚丙烯、聚苯乙烯、胶木、聚四氟乙烯等 Epoxy asphalt, rubber, mortar, polypropylene, polystyrene, bakelite, polytetrafluoroethylene, etc.						
信号电缆 Signal cable	标准配置：5 米×2，可选配 10 米×2 或 15 米×2 Standard configuration: 5 meters × 2. Optional 10 meters × 2 or 15 meters × 2						

手持式超声波流量计选型编码:

Selection and Coding of Handheld Ultrasonic Flow Meters

YC-FCH—¹□+²□+³□+⁴□+⁵□+⁶□+⁷□—⁸□

基本型号

Basic models

字母 Letter	流量计组件/参数 Flowmeter components/parameters	选项 Options
1	标准配置传感器 Standard configuration sensor	N1 标准中型传感器 N1 standard medium sensor
2	可选配传感器（可多选） Optional sensor (multiple options available)	HN 标准中支架传感器 HN standard medium bracket sensor
3		HB 标准小支架传感器 HB standard small bracket sensor
4		B1 标准小型传感器 B1 standard small sensor
5		D1 标准大型传感器 D1 standard large sensor
6		B1H 高温小型传感器 B1H high temperature small sensor
7		N1H 高温中型传感器 N1H High temperature medium sensor
8	电缆长度 Cable length	___米×2 （标配 5 米×2） ___M × 2 (standard configuration of 5 meters × 2)

举例：YC-FCH-B1+N1+D1-5

Example: YC-FCH-B1+N1+D1-5

解释：手持式超声波流量计，配标准小型、中型、大型传感器，电缆长度 5 米×2。

Explanation: Handheld ultrasonic flow meter, equipped with standard small, medium, and large sensors, with a cable length of 5 meters × 2.

YC-FCB 便携式超声波流量计

YC-FCB Portable Ultrasonic Flowmeter

概述

Introduction

YC-FCB 型便携式超声波流量计，适用于各种工业现场中液体流量的在线标定和巡检测量。具有操作简单、测量精度高、一致性好、可在线打印、电池供电时间长等特点，被广泛应用于石油化工、冶金、电力、自来水、水利、能源监测等行业。

The YC-FCB portable ultrasonic flowmeter is designed for online calibration and inspection measurement of liquid flow in various industrial field applications. It is known for its ease of operation, high measurement accuracy, good consistency, online printing capability, and long battery life. It finds widespread use in industries such as petrochemicals, metallurgy, power generation, water supply, hydraulic engineering, and energy monitoring.



性能指标

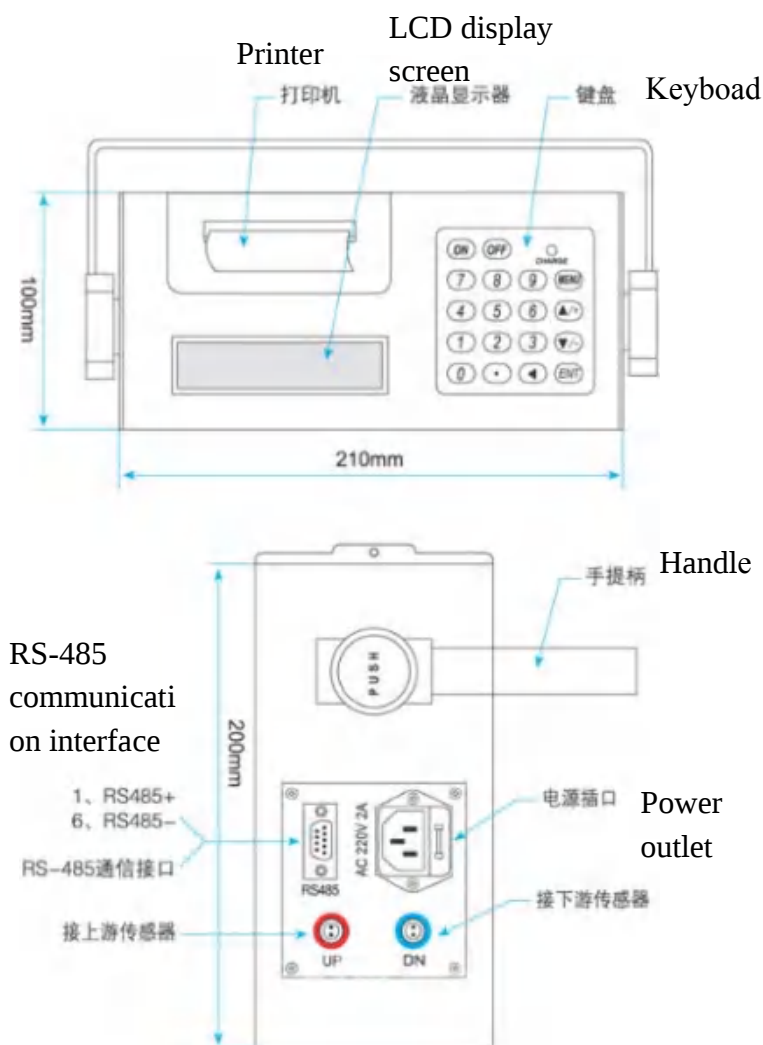
Performance Specifications

- ◆ 测量精度：优于 $\pm 1\%$
Measurement accuracy: Better than $\pm 1\%$
- ◆ 重复性：优于 $\pm 0.2\%$
Repeatability: Better than $\pm 0.2\%$
- ◆ 工作电源：220VAC（标配），110VAC（可选）
Power supply: 220VAC (standard), 110VAC (optional)
- ◆ 测量周期：500ms（每秒2次，每个周期采集128组数据）
Measurement cycle: 500ms (2 measurements per second, collecting 128 sets of data per cycle)
- ◆ 电池：内置镍氢充电电池可持续工作24小时
Battery: Built-in nickel-hydrogen rechargeable battery for continuous operation for 24 hours
- ◆ 安装方式：外敷式安装
Installation method: External installation

- ◆ 显示：2行汉字同屏显示（瞬时流量、累积流量、信号状态等）
Display: 2-line simultaneous display of Chinese characters (instantaneous flow, cumulative flow, signal status, etc.)
- ◆ 信号输出：隔离 RS485
Signal output: Isolated RS485
- ◆ 打印输出：内置热敏一体式打印机，实现实时或定时打印
Printing output: Built-in thermal integrated printer for real-time or scheduled printing
- ◆ 其它功能：自诊断，提示当前工作状态是否正常
Other functions: Self-diagnostics to indicate whether the current working status is normal

主机外形尺寸图

Outline Dimension Diagram of the Main Unit



标准配置

Standard Accessories



主机 (2.5kg)
Main unit (2.5kg)



信号电缆 5 米×2
Signal cable 5
meters×2



标准中型传感器 N1 型
Standard medium
sensor N1 type



铝合金保护箱
Aluminum alloy
protection box



标准小支架传感器 B1 型
Standard small bracket sensor B1 type



标准中型传感器 N1 型
Standard medium sensor N1 type



标准大型传感器 D1 型
Standard large sensor D1 type



高温小型传感器 B1H 型
High temperature small sensor B1H type



高温中型传感器 N1H 型
High temperature medium sensor N1H type

传感器参数

Sensor Parameters

传感器名称 Sensor name	标准 B1 型 Standard B1 type	标准 N1 型 Standard N1 type	标准 D1 型 Standard D1 type	高温 B1H 型 High temperature B1H type	高温 N1H 型 High temperature N1H type
适用管径 Applicable pipe diameter	DN15~DN100	DN50~DN700	DN300~DN6000	DN15~DN100	DN50~DN700
材质 Material quality	ABS			特殊高温材料 Special high-temperature materials	
工作频率 Working frequency	1MHz				
安装方法 Installation methods	V（N、W）法 V(N,W) method	V、Z 法 V,Z method	Z 法 Z method	V（N、W）法 V(N,W) method	V、Z 法 Z method
标定 Calibration	整机配对标定 Complete machine pairing calibration				
磁性 Magnetic	有 Yes		无 No		
适用温度 Applicable temperature	0℃~70℃			0℃~160℃	
防护等级 Protection level	IP65				
外形尺寸 Overall dimensions	45×30×30	60×45×45	80×70×55	90×85×24	90×82×29
质量（克/对） Mass (g/pair)	75	250	650	94	150
介质种类 Media type	水、海水、污水、酒精、各种油类等能传导超声波的单一、均匀、稳定的液体 A single, uniform, and stable liquid that can transmit ultrasonic waves, such as water, seawater, sewage, alcohol, and various oils				
介质浊度 Medium turbidity	≤20000ppm 且气泡含量小 ≤20000ppm with low bubble content				
适用管材 Applicable pipes	碳钢、不锈钢、铸铁、铜、PVC、铝、玻璃钢等均匀质密的管道，允许有衬里 Carbon steel, stainless steel, cast iron, copper, PVC, aluminum, fiberglass, and other uniformly dense pipelines are allowed to have lining				
管道衬材 Pipeline lining material	环氧沥青、橡胶、灰浆、聚丙烯、聚笨乙烯、胶木、聚四氟乙烯等 Epoxy asphalt, rubber, mortar, polypropylene, polystyrene, bakelite, polytetrafluoroethylene, etc.				
信号电缆 Signal cable	标准配置： 5 米×2，可选配 10 米×2 或 15 米×2 Standard configuration: 5 meters × 2. Optional 10 meters × 2 or 15 meters × 2				

选型编码

Selection Code

YC-FCB-1-2-3-4-5-6-7

基本型号

Basic models

字母 Letters	流量计组件/参数 Flowmeter components/parameters	选项 Options
1	标准配置传感器 Standard configuration sensor	N1 标准中型传感器 N1 standard medium sensor
2	可选配传感器（可多选） Optional sensor (multiple options available)	B1 标准小型传感器 B1 standard small sensor
3		D1 标准大型传感器 D1 standard large sensor
4		B1H 高温小型传感器 B1H High temperature small sensor
5		N1H 高温中型传感器 N1H High temperature medium sensor
6	电缆长度 Cable length	米×2 （标配 5 米×2） M × 2 (Standard configuration of 5 meters × 2)

举例：YC-FCB-N1+B1+D1-5

Example: YC-FCB-N1+B1+D1-5

解释：便携式超声波流量计，配标准中型、小型、大型传感器，电缆长度 5 米×2

Explanation: Portable ultrasonic flow meter, equipped with standard medium, small, and large sensors, with a cable length of 5 meters×2

固定式超声波流量计

Fixed Ultrasonic Flowmeter

YC-FCG 一体式超声波流量计

YC-FCG Integrated Ultrasonic Flowmeter

概述

Introduction

YC-FCG 型超声波流量计是将主板连续一个 20 线 4 键并口键盘显示器封装到一个密封的机壳中, 实现在线显示与操作。该款产品避免了外缚式和插入式传感器在安装过程中由于人为和管道因素产生的误差。具有精度高、量程比宽、无压力损失、安装简单等优点。

The YC-FCG ultrasonic flowmeter integrates the mainboard and a 20-line 4-key parallel keyboard display into a sealed casing, allowing for online display and operation. This product eliminates errors caused by human factors and pipeline issues during the installation of external and plug-in type sensors. It offers advantages such as high precision, wide measurement range, no pressure loss, and simple installation.



卫生型
Hygienic type
(DN25-DN100)



π 形管段式
 π shaped pipe section type
(DN15-DN40)



标准管段式
Standard pipe section type
(DN50-DN1000)

性能指标

Performance Specifications

- ◆ 测量精度: 优于 $\pm 1\%$, 重复性: 优于 $\pm 0.2\%$
Measurement accuracy: Better than $\pm 1\%$, Repeatability: Better than $\pm 0.2\%$
- ◆ 测量周期: 500ms (每秒 2 次, 每个周期采集 128 组数据)
Measurement cycle: 500ms (2 measurements per second, collecting 128 sets of data per cycle)
- ◆ 工作电源: 隔离 DC8~36V 或 AC85~264V 可选
Power supply: Isolated DC 836V or AC 85264V optional
- ◆ 最大流速: 64m/s (流速分辨率 0.001m/s)



Maximum flow velocity: 64m/s (Flow velocity resolution: 0.001m/s)

- ◆ 显示: 2×10 汉字型背光显示器 (中英文双语可选择)

Display: 2×10 Chinese character-type backlight display (Chinese and English bilingual option)

- ◆ 操作: 磁性 4 按键窗口化操作

Operation: Magnetic 4-button windowed operation

- ◆ 信号输入: 3 路 4-20mA 模拟输入, 精度 0.1%, 可输入压力、液位、温度等信号 2 路三线制 PT100 铂电阻

Signal Input: 3 channels of 4-20mA analog input, accuracy 0.1%, capable of receiving pressure, liquid level, temperature, and other signals; 2 channels of three-wire PT100 platinum resistance

- ◆ 信号输出:

1 路隔离 RS485 输出

1 路隔离 OCT (脉冲宽度 6~1000ms 之间可编程, 默认 200ms)

1 路继电器输出 (脉冲宽度 200ms)

1 路 4-20mA 输出 (有源/无源输出可选)

1 路双向串行外设通用接口, 可直接通过串联的形式连接多个外部设备 (如海量数据存贮模块、打印机等)

Signal Output:

1 channel isolated RS485 output

1 channel isolated OCT (pulse width programmable between 6~1000ms, default 200ms)

1 channel relay output (pulse width 200ms)

1 channel 4-20mA output (active/passive output optional)

1 channel bidirectional serial peripheral interface, multiple external devices can be directly connected in series (such as mass data storage modules, printers, etc.)

- ◆ 连接方式: 螺纹式/法兰式/活接式 (卫生型) 可选

Connection method: Threaded/flange/loose joint (sanitary type) optional

- ◆ 其它功能:

自动记忆前 512 天, 前 128 个月, 前 10 年正/负/净累积流量

自动记忆前 30 次上、断电的时间和流量并可实现自动或手动补加

可通过 MODBUS 协议读出

可通过 E-mail 传送来的代码文件实现软件升级

Other Functions:

Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow;

Automatically records the last 30 power-on and power-off times and flow values and can be added automatically or manually;

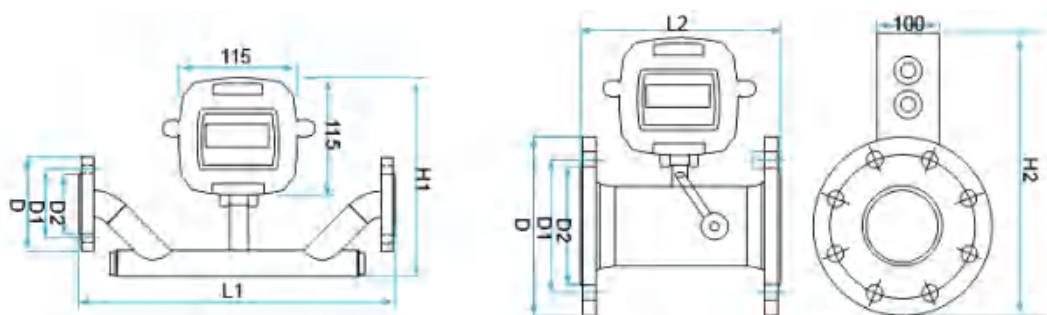
Can be read through the MODBUS protocol;

Support software upgrades through code files sent via E-mail

- ◆ 断电保护：断电 10 万小时数据不丢失
Power failure protection: Data retention for up to 100,000 hours in case of power failure
- ◆ 防护等级：IP65
Protection level: IP65
- ◆ 电气接口：M16×1.5
Electrical interface: M16×1.5

法兰式机械尺寸图

Flange Type Mechanical Dimension Diagram



*材质不锈钢/碳钢可选

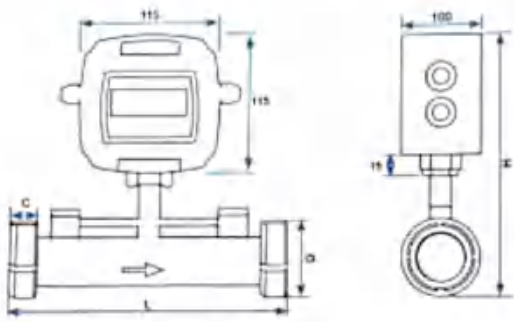
*Material available in stainless steel/carbon steel

公称通径 Nominal Diameter DN (mm)	额定压力 Rated pressure (MPa)	π 形管段外形尺寸 (mm) Outline dimensions of π shaped pipe section (mm)		标准管段外形尺寸 (mm) Standard pipe section outline dimensions (mm)		法兰尺寸(mm) Flange size (mm)			
		L1	H1	L2	H2	D	D1	D2	Φ-N
15	2.5	320	136			95	65	46	14×4
20		360	142			105	75	56	14×4
25		390	151			115	85	65	14×4
32		450	157			140	100	76	18×4
40		500	169			150	110	84	18×4
50	1.6			200	260	165	125	99	18×4
65				200	280	185	145	118	18×4
80				225	295	200	160	132	18×8
100				250	314	220	180	156	18×8
125				250	347	250	210	184	18×8
150				300	372	285	240	211	22×8
200				350	430	340	295	266	22×12
250				450	489	405	355	319	26×12

300				500	543	460	410	370	26×12
350				550	599	520	470	429	26×12
400				600	653	580	525	480	26×16
450				700	708	640	585	548	30×20
500	1.0			800	771	670	620	585	25×20
600				1000	884	780	725	685	30×20
700	0.6			1100	964	860	810	775	24×25
800				1200	1072	975	920	880	24×30
900				1300	1172	1075	1020	980	24×30
1000				1400	1287	1175	1120	1080	28×30

活接式（卫生型）机械尺寸

Loose Joint (Sanitary Type) Mechanical Dimensions



公称通径 Nominal Diameter DN (mm)	额定压力 Rated pressure (MPa)	活接式外形尺寸 Outline dimensions of loose joint type				材 质 Material
		L	H	D	C	
25	4.0	300	282	51	19	不锈钢 Stainless steel
40		300	300	74	23	
50		300	310	84	24	
65		350	330	100	28	
80		400	345	114	30	
100		450	365	128	31	

YC-FCF 分体式超声波流量计

YC-FCF Split-type Ultrasonic Flowmeter

概述

Introduction

YC-FCF 系列固定分体式超声波流量计广泛应用于工业现场中各种液体的在线流量计量。主机分为壁挂标准型、壁挂防爆型、盘装型和本地显示型；传感器分为外缚式、插入式、管段式等。

The YC-FCF series of fixed split-type ultrasonic flowmeters are widely used for online flow measurement of various liquids in industrial field applications. The main unit is divided into wall-mounted standard type, wall-mounted explosion-proof type, panel-mounted type, and local display type, while the sensors come in external clamp-on, plug-in type, and pipe-section type configurations.

可选配主机系列

Optional Main Unit Series



YC-FCF1 壁挂标准型
YC-FCF1 wall
mounted standard type



YC-FCF2 壁挂防爆型
YC-FCF2 wall mounted
explosion-proof type



YC-FCF3 盘装标准型
YC-FCF3 disk mounted
standard model



YC-FCF4 本地显示型
YC-FCF4 local display type

性能指标

Performance Specifications

- ◆ 测量精度：优于 $\pm 1\%$ 重复性：优于 $\pm 0.2\%$
Measurement accuracy: Better than $\pm 1\%$, Repeatability: Better than $\pm 0.2\%$
- ◆ 测量周期：500ms（每秒2次，每个周期采集128组数据）
Measurement cycle: 500ms (2 measurements per second, collecting 128 sets of data per cycle)
- ◆ 工作电源：85~264VAC/隔离24VDC（F4型8~36VDC）
Power supply: 85~264VAC / Isolated 24VDC (F4 type: 8~36VDC)
- ◆ 最大流速：64m/s（流速分辨率0.001m/s）
Maximum flow velocity: 64m/s (Flow velocity resolution: 0.001m/s)
- ◆ 显示：2×10汉字背光液晶可显示瞬时流量及正、负、净累积流量、流速等
Display: 2×10 Chinese character-type backlight LCD for displaying instantaneous flow, positive/negative/net cumulative flow, flow velocity, etc.
- ◆ 操作：4×4轻触键盘（F4主机磁性4按键）操作
Operation: 4×4 touch keypad (F4 main unit with magnetic 4-button operation)
- ◆ 信号输入：
3路4~20mA模拟输入，精度0.1%，可输入压力、液位、温度等信号
2路三线制PT100铂电阻
Signal Input:
3 channels of 4~20mA analog input, accuracy 0.1%, capable of receiving pressure, liquid level, temperature, and other signals;
2 channels of three-wire PT100 platinum resistance
- ◆ 信号输出：
1路隔离RS485输出或HART输出
1路4-20mA或0-20mA输出
1路隔离OCT（脉冲宽度6~1000ms之间可编程，默认200ms）
1路继电器输出（脉冲宽度200ms）
Signal Output:
1 channel isolated RS485 output or HART output
1 channel 4-20mA or 0-20mA output
1 channel isolated OCT (pulse width programmable between 6~1000ms, default 200ms),
1 channel relay output (pulse width 200ms)

◆ 其它功能:

自动记忆前 512 天、前 128 个月、前 10 年正/负/净累积流量

自动记忆前 30 次上、断电时间和流量并可实现流量的自动或手动补加

可通过 MODBUS 协议读出

可编程批量（定量）控制器，故障自诊断功能

可通过 E-mail 传送来的代码文件实现软件升级

Other functions:

Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow

Automatically records the last 30 power-on and power-off times and flow values and can automatically or manually add flow

Support MODBUS protocol for reading data

Programmable batch (quantitative) controller, self-diagnostic function for faults

Support software upgrades through code files sent via E-mail

◆ 防护等级: 传感器 IP68 , F4 主机 IP68, 其余主机 IP65

Protection level: Sensor IP68, F4 main unit IP68, other main units IP65

◆ 防爆等级: Exia II C T6 Ga Exd II C T6 Gb (YC-CF2 型)

Explosion-proof Level: Exia II C T6 Ga, Exd II C T6 Gb (YC-CF2 type)

可选配传感器

Optional Sensors



标准 B1 型传感器
Standard B1 sensor



标准 N1 型传感器
Standard N1 sensor



标准 D1 型传感器
Standard D1 sensor



高温 B1H 型传感器
High temperature B1H sensor



高温 N1H 型传感器
High temperature N1H sensor



标准插入 R 型
Standard plug-in R type



加长插入 R 型
Extended plug-in R type



卫生型管段传感器
Sanitary section sensor



π 型管段式传感器
π shape section sensor

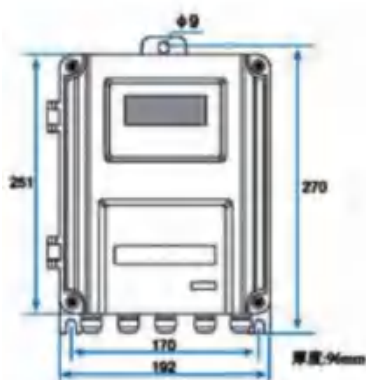


标准管段式传感器
Standard section pipe sensor

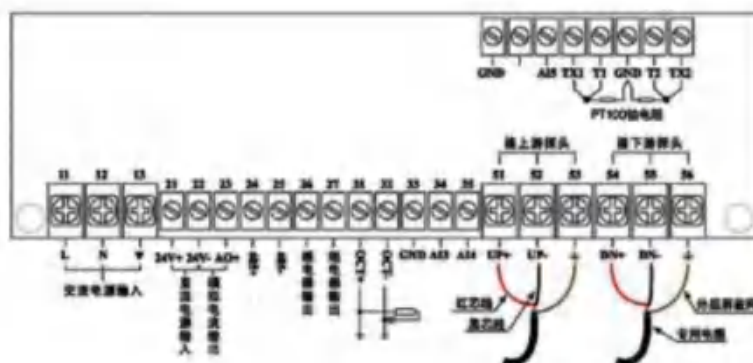
主板外形尺寸图及主板接线图（单位 mm）

Outline dimension diagram and wiring diagram of the motherboard (unit: mm)

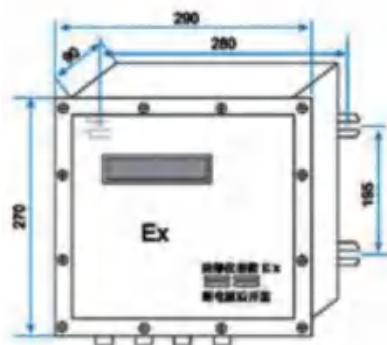
YC-FCF1 型
YC-FCF1type



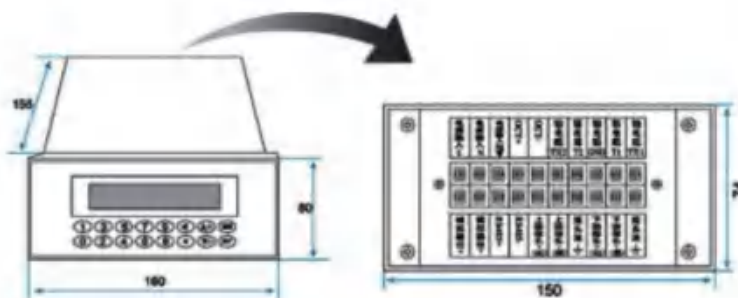
15 版主板接线图
Version 15 main board wiring diagram



YC-FCF2 型
YC-FCF2 type



YC-FCF3 型
YC-FCF3 type



YC-FCM 超声波流量模块

YC-FCM Ultrasonic Flow Module

概述

Introduction

YC-FCM 型超声波流量模块适用于系统集成商的配套工程、水利水资源或供热系统等联网监控项目的流量计量，具有体积小、价格低、操作简单、输出接口功能齐全等特点。

The YC-FCM ultrasonic flow module is designed for flow measurement in networked monitoring projects for system integrators, water resources, or heating systems. It is characterized by its small size, low cost, ease of operation, and comprehensive output interface functions.



性能指标

Performance Specifications

- ◆ 测量精度：优于 1%
Measurement accuracy: Better than 1%
- ◆ 重复性：优于 0.2%
Repeatability: Better than 0.2%
- ◆ 工作电源：隔离 8~36VDC
Power supply: Isolated 8~36VDC
- ◆ 显示：2×10 背光汉字液晶显示器可显示瞬时流量、流速及正负净累积流量等
Display: 2×10 backlit Chinese character LCD display for showing instantaneous flow, flow velocity, and positive/negative/net cumulative flow
- ◆ 操作：4 键轻触键盘操作
Operation: 4-key touch keypad operation
- ◆ 信号输入：
3 路 4-20mA 模拟输入，精度 0.1%，可输入压力、液位、温度等信号
2 路 3 线制 PT100 铂电阻
Signal input:
3 channels of 4-20mA analog input, accuracy 0.1%, capable of receiving pressure, liquid level, temperature, and other signals;
2 channels of three-wire PT100 platinum resistance

◆ 信号输出:

1 路隔离 RS485 输出

1 路隔离 OCT (脉冲宽度 6~1000ms 之间可编程, 默认 200ms)

1 路继电器输出 (脉冲宽度 200ms)

1 路 4-20mA 输出 (有源、无源输出可选)

Signal Output:

1 channel isolated RS485 output

1 channel isolated OCT (pulse width programmable between 6~1000ms, default 200ms)

1 channel relay output (pulse width 200ms)

1 channel 4-20mA output (active/passive output optional)

◆ 其它功能:

自动记忆前 512 天, 前 128 个月, 前 10 年正/负/净累积流量

自动记忆前 30 次上、断电时间和流量并可实现自动或手动补加

可通过 E-mail 传送来的代码文件实现软件升级

Other functions:

Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow

Automatically records the last 30 power-on and power-off times and flow values and can automatically or manually add flow

Supports software upgrades through code files sent via E-mail

◆ 防护等级: IP57

Protection level: IP57

◆ 安装方式: 导轨式 (主机)

Installation method: Rail-mounted (main unit)

可选配传感器

Optional Sensors



标准 S1 型传感器
Standard S1 type
sensor



标准 M1 型传感器
Standard M1 type
sensor



标准 L1 型传感器
Standard L1 type
sensor



高温 S1H 型传感器
High temperature S1H type
sensor



高温 M1H 型传感器
High temperature M1H type
sensor



标准插入 R 型
Standard plug-in R type



加长插入 R 型
Extended plug-in R type



卫生型管段传感器
Sanitary section
sensor



π 型管段式传感器
 π type section
sensor



标准管段式传感器
Standard pipe section
sensor

YC-FCS 超声波工业水表

YC-FCS Ultrasonic Industrial Water Meter

概述

Introduction

新型 YC-FCS 电池供电型超声波水表使用了具有 50 分贝动态范围的前置接收放大器，可选配外夹式、插入式、管段式等传感器，解决了原有产品小流量漂移问题。与机械水表相比具有无活动部件，始动流量低，量程比宽，测量精度高，使用寿命长等特点。

The new YC-FCS battery-powered ultrasonic water meter features a front-end receiver amplifier with a dynamic range of 50 decibels. It can be equipped with external clamp-on, plug-in type, and pipe section sensors, effectively addressing the issue of small flow rate drift in previous products. Compared to mechanical water meters, it has the advantages of no moving parts, low starting flow, wide measurement range, high measurement accuracy, and long service life.



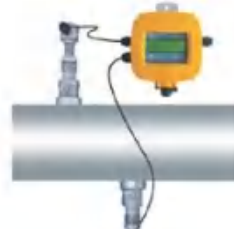
螺纹连接
Threaded connection
(DN15~50)



外夹式
Clamp-on type
(DN15~800)



法兰连接
Flange connection
(DN50~1000)



分体插入式
Split plug-in type
(DN80~800)

性能指标

Performance Specifications

- ◆ 测量精度：优于 2%，重复性：优于 0.5%
Measurement accuracy: Better than 2%, Repeatability: Better than 0.5%
- ◆ 工作电源：3.6V/19AH 锂电池供电（电压 $\geq 2.6V$ 时工作正常）
Power supply: 3.6V/19AH lithium battery (normal operation when voltage $\geq 2.6V$)
- ◆ 测量周期：500ms~49 秒（出厂默认 10 秒）
Measurement cycle: 500ms~49 seconds (factory default: 10 seconds)
- ◆ 采样次数：每个测量周期采样次数 32 组~128 组可选（出厂默认 64 组）
Sampling times: 32 to 128 sets per measurement cycle (factory default: 64 sets)

- ◆ 显示：本地 96 段 LCD 显示器，可显示 44 个不同的窗口内容
Display: Local 96-segment LCD display, capable of showing 44 different window contents
- ◆ 操作：使用专用二次仪表或 PC 设参软件，能过 RS485 设置参数，可浏览 44 个窗口内容
Operation: Using dedicated secondary instruments or PC parameter software, parameters can be set through RS485 and 44 window contents can be browsed
- ◆ 可选输出：
 - 1 路 USART (TTL) 输出
 - 1 路 RS485 输出 (可选内部锂电池供电或外部直流电源供电)
 - 双路隔离 OCT 输出 (脉冲宽度 6~1000ms 间可编程，默认 200ms)
 - 1 路双向串行外设通用接口，可以直接通过串联的形式连接多个外部设备：4—20 毫安模拟输出板、频率信号输出板、热敏打印机等 (需外接电源，不推荐使用，如需建议选用一体式流量计)
 Optional outputs:
 - 1 channel USART (TTL) output
 - 1 channel RS485 output (can be powered by internal lithium battery or external DC power supply)
 - Dual-isolated OCT output (pulse width programmable between 6~1000ms, default 200ms),
 - 1 channel bidirectional serial peripheral interface, multiple external devices can be directly connected in series: 4-20mA analog output board, frequency signal output board, thermal printer, etc. (requires external power supply, not recommended for use; consider using an integrated flow meter if necessary)
- ◆ 可选输入：两路 PT1000 铂电阻
Optional inputs: Two channels of PT1000 platinum resistance
- ◆ 其它功能：
 - 自动记忆前 512 天，前 128 月，前 10 年正/负净累积流量
 - 自动记忆前 30 次上、断电时间和流量并可实现自动或手动补加并可通过 MODBUS 协议读出
 - 可通过 E-mail 传送来的代码文件实现软件升级
 Other functions:
 - Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow
 - Automatically records the last 30 power-on and power-off times and flow values and can automatically or manually add flow
 - Supports data reading via the MODBUS protocol
 - Supports software upgrades through code files sent via E-mail
- ◆ 防护等级：IP68

Protection level: IP68

- ◆ 管段长度：与普通机械水表相同，可直接更换安装

Pipe section length: Same as ordinary mechanical water meters, can be directly replaced and installed

- ◆ 传感器：管段式、外缚式、插入式

Sensor types: Pipe section type, external clamp-on type, plug-in type

可选配传感器

Optional Sensors



标准 B1 型传感器
Standard B1 type
sensor



标准 N1 型传感器
Standard N1 type
sensor



标准 D1 型传感器
Standard D1 type
sensor



高温 B1H 型传感器
High temperature
B1H type sensor



高温 N1H 型传感器
High temperature
N1H type sensor



标准插入 R 型
Standard plug-in R type



加长插入 R 型
Extended plug-in R type



卫生型管段传感器
Sanitary section sensor



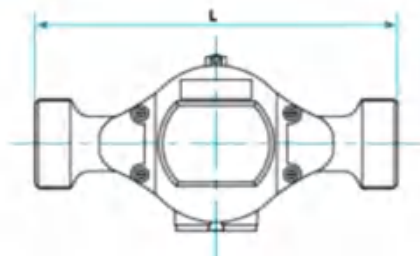
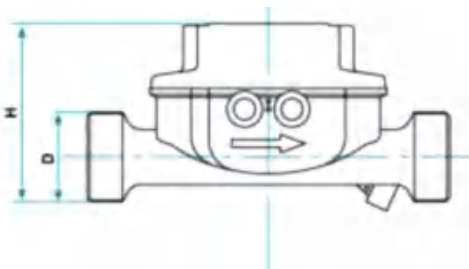
π 型管段式传感器
 π type section sensor



标准管段式传感器
Standard pipe section sensor

小口径水表机械尺寸（材质：精铸不锈钢 316L）

Mechanical dimensions of small size water meters (Material: precision cast stainless steel 316L)



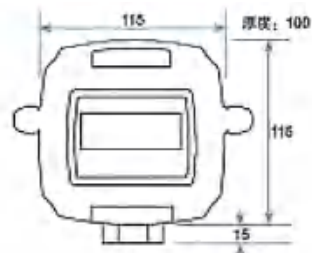
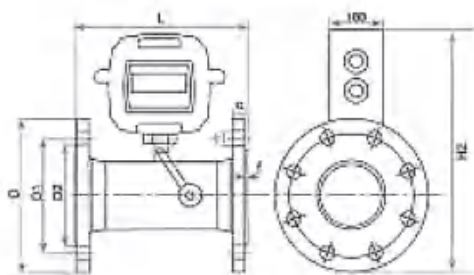
单位: mm

Unit: mm

公称通径 Nominal diameter (DN)	长度(L) Length (L)	宽度(W) Width (W)	高度(H) Height (H)	连接螺纹 Connecting thread	质量(kg) Mass (kg)	压力 Pressure (MPa)
15	165	96	97	G3/4B	1.25	4.0
20	195	96	101	G1B	1.7	
25	225	96	110	G1 1/4B	2.4	
32	230	96	113	G1 2/2B	2.7	
40	245	96	120	G2B	4.8	
50		96	170			

大口径水表机械尺寸 (单位: mm)

Mechanical dimensions of large size water meters (unit: mm)



YC-CS 表头尺寸

YC-CS meter head size

公称通径 Nominal diameter DN	压力 Pressure (MPa)	长度 Length L	高度 Height		法兰外径 Flange outer diameter D	螺栓孔中 心圆直径 D1 Bolt hole center circle diameter D1	螺栓孔 径×数量 Φ×n Bolt size × quantity Φ× N	密封面 Sealing surface		法兰厚度 Flange thickness C
			H1	H2				D2	f	
50	1.6	200	234	255	165	125	18×4	99	3	20
65		200	254	275	185	145	18×4	118	3	20
80		225	268	289	200	160	18×8	132	3	20
100		250	287	308	220	180	18×8	156	3	22
125		250	315	336	250	210	18×8	184	3	22
150		300	345	366	285	240	22×8	211	3	24
200		350	403	424	340	295	22×12	266	3	24
250		450	462	483	405	355	26×12	319	3	26
300		500	516	537	460	410	26×12	370	4	28



350		550	572	593	520	470	26×12	429	4	30
400		600	626	647	580	525	26×16	480	4	32
450		700	682	703	640	585	30×20	548	4	34
500	1.0	800	745	766	670	620	30×20	585	4	32
600		1000	858	879	780	725	36×20	685	5	36
700	0.6	1100	938	959	860	810	36×24	775	5	32
800		1200	1046	1067	975	920	39×24	880	5	32
900		1300	1146	1167	1075	1020	39×28	980	5	34
1000		1400	1261	1282	1175	1120	42×28	1080	5	36

超声波冷/热量表

Ultrasonic Cold/Heat Meter

固定式超声波流量计自身带有热量积算功能，加配一对铂电阻，采用国际标准热焓值热量计算公式（焓差法）即可实现冷量/热量的测量，为满足用户不同工况的现场需要，该系列产品分为一体式、分体式、模块式和电池供电型，适用于空调的冷量/热量计量和单元、楼栋、换热站及热力公司管网的热量计算。

Fixed-type ultrasonic flow meters come with their own heat accumulation function and can be equipped with a pair of platinum resistance sensors. By using the international standard enthalpy value heat calculation formula (enthalpy difference method), cold/heat measurement can be achieved. To meet the on-site needs of different working conditions, this series of products is available in integrated, split, module, and battery-powered types. They are suitable for measuring cold/heat in air conditioning systems and heat calculations for units, buildings, heat exchange stations, and heat network companies.

YC-FCG 一体式超声波冷/热量表

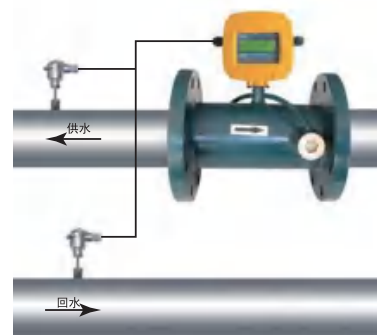
YC-FCG Integrated Ultrasonic Cold/Heat Meter

概述

Introduction

YC-FCG 型一体式超声波冷/热量表避免了外缚式和插入式传感器在安装过程中由于人为和管道因素产生的误差。具有精度高、量程比宽、无压力损失、安装简单等优点。

The YC-FCG integrated ultrasonic cold/heat meter avoids errors caused by external clamp-on and plug-in type sensors during installation due to human and pipeline factors. It has the advantages of high precision, wide measurement range, no pressure loss, and easy installation.



性能指标

Performance Specifications

- ◆ 测量精度：满足 EN1434 标准
Measurement accuracy: Complies with EN1434 standard
- ◆ 测量周期：500ms （每秒 2 次，每个周期采集 128 组数据）
Measurement cycle: 500ms (2 times per second, collects 128 sets of data per cycle)
- ◆ 工作电源：隔离 DC8~36V 或 AC85~264V 可选
Power supply: Isolated DC836V or AC85264V optional



- ◆ 最大流速: 64m/s (流速分辨率 0.001m/s)
Maximum flow rate: 64m/s (flow velocity resolution 0.001m/s)
- ◆ 热量单位: 吉焦尔、千卡、BTU 可选
Heat unit: Joule, kilocalorie, BTU optional
- ◆ 显示: 2×10 汉字背光显示器 (中英文双语可选择)
Display: 2×10 Chinese character backlit display (bilingual in Chinese and English)
- ◆ 操作: 磁性 4 按键窗口化操作
Operation: Magnetic 4-key windowed operation
- ◆ 铂电阻: PT100 三线制铂电阻
Platinum resistance: PT100 three-wire platinum resistance
- ◆ 信号输入: 3 路 4-20mA 模拟输入, 精度 0.1%, 可输入压力、液位、温度等信号
Signal Input: 3 channels of 4-20mA analog input, accuracy 0.1%, capable of receiving pressure, liquid level, temperature, and other signals
- ◆ 信号输出:
 - 1 路隔离 RS485 输出
 - 1 路隔离 OCT (脉冲宽度 6~1000ms 之间可编程, 默认 200ms)
 - 1 路继电器输出 (脉冲宽度 200ms)
 - 1 路 4-20mA 输出 (有源/无源输出可选)
 - 1 路双向串行外设通用接口, 可直接通过串联的形式连接多个外部设备 (如海量数据存储模块, 打印机等)Signal Output:
 - 1 channel isolated RS485 output
 - 1 channel isolated OCT (pulse width programmable between 6~1000ms, default 200ms)
 - 1 channel relay output (pulse width 200ms)
 - 1 channel 4-20mA output (active/passive output optional)
 - 1 channel bidirectional serial peripheral universal interface, which can directly connect multiple external devices in series (such as mass data storage modules, printers, etc.)
- ◆ 其它功能:
 - 自动记忆前 512 天, 前 128 个月, 前 10 年正/负净累积流量
 - 自动记忆前 30 次上、断电时间和流量并可实现自动或手动补加
 - 可通过 E-mail 传送来的代码文件实现软件升级Other functions:

Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow

Automatically records the last 30 power-on and power-off times and flow values and can automatically or manually add flow

Support software upgrades through code files sent via E-mail

- ◆ 断电保护：断电 10 万小时数据不丢失
Power failure protection: No data loss after 100,000 hours of power outage
- ◆ 防护等级：IP68
Protection level: IP68
- ◆ 电气接口：M16×1.5
Electrical interface: M16×1.5

YC-FCF 分体式超声波冷/热量表 YC-FCF Split Ultrasonic Cold/Heat Meter

概述

Introduction

YC-FCF 系列固定分体式超声波冷/热量表广泛应用于供热管网的在线计量。主机分为壁挂标准型、壁挂防爆型、盘装型和本地显示型，传感器分为外缚式、插入式、管段式等。

The YC-FCF series of fixed split-type ultrasonic cold/heat meters are widely used for online measurement in district heating networks. The main unit comes in wall-mounted standard, wall-mounted explosion-proof, panel-mounted, and locally displayed types, while the sensors come in external clamp-on, plug-in, and pipe section types.

性能指标

Performance Specifications

- ◆ 测量精度：满足 EN1434 标准
Measurement accuracy: Complies with EN1434 standard
- ◆ 测量周期：500ms（每秒 2 次，每个周期采集 128 组数据）
Measurement cycle: 500ms (2 times per second, collects 128 sets of data per cycle)
- ◆ 工作电源：85~264VAC/隔离 24VDC（F4 型 8~36VDC）
Power supply: 85~264VAC/isolated 24VDC (F4 type: 8~36VDC)
- ◆ 最大流速：64m/s（流速分辨率 0.001m/s）
Maximum flow rate: 64m/s (flow velocity resolution 0.001m/s)



- ◆ 热量单位：吉集尔、千卡、BTU 可选
Heat unit: Joule, kilocalorie, BTU optional
- ◆ 显示：2×10 汉字背光液晶，可显示瞬时热量及正、负、净累积热量等
Display: 2×10 Chinese character backlit LCD, capable of displaying instantaneous heat and positive/negative/net cumulative heat.
- ◆ 操作：4×4 轻触键盘或磁性 4 按键（F4 主机）操作
Operation: 4×4 touch keyboard or magnetic 4 keys (F4 main unit)
- ◆ 铂电阻：PT100 三线制铂电阻
Platinum Resistance: PT100 three-wire platinum resistance
- ◆ 信号输入：3 路 4-20mA 模拟输入，精度 0.1%，可输入压力、液位等信号
Signal Input: 3 channels of 4-20mA analog input, accuracy 0.1%, can input pressure, liquid level, etc.
- ◆ 信号输出：
 - 1 路隔离 RS485 输出
 - 1 路 4-20mA 或 0-20mA 输出
 - 1 路隔离 OCT（脉冲宽度 6~1000ms 之间可编程，默认 200ms）
 - 1 路继电器输出（脉冲宽度 200ms）Signal Output:
 - 1 channel of isolated RS485 output
 - 1 channel of 4-20mA or 0-20mA output
 - 1 channel of isolated OCT (pulse width programmable between 6~1000ms, default 200ms)
 - 1 channel of relay output (pulse width 200ms)
- ◆ 其它功能：
 - 自动记忆前 512 天、前 128 个月、前 10 年正/负净累积流量
 - 自动记忆前 30 次上、断电时间和流量并可实现自动或手动补加
 - 可编程批量（定量）控制器，故障自诊断功能
 - 可通过 E-mail 传送来的代码文件实现软件升级Other Functions:
 - Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow
 - Automatically stores the last 30 power-on and power-off times and flow values and can automatically or manually add flow
 - Programmable batch (quantitative) controller, fault self-diagnosis function
 - Software upgrades can be achieved through code files sent via email

- ◆ 防护等级：传感器 IP68，F4 主机 IP68，其余主机 IP65
Protection level: Sensor IP68, F4 main unit IP68, other main units IP65
- ◆ 防爆等级：Exia II C T6 Ga Exd II C T6 Gb（YC-CF2 型）
Explosion-proof Level: Exia II C T6 Ga, Exd II C T6 Gb (YC-CF2 type)

可选配传感器 Optional Sensors



标准插入 R 型
Standard plug-in R
type



加长插入 R 型
Extended plug-in R
type



高温 B1H 型传感器
High temperature B1H type
sensor



高温 N1H 型传感器
High temperature N1H type
sensor



π 型管段式传感器
 π type section
sensor



标准管段式传感器
Standard pipe section
sensor

YC-FCM 模块式超声波冷/热量表 YC-FCM Modular Ultrasonic Heat/Cold Meter

概述

Introduction

YC-FCM 型超声波冷/热量模块是专为热网联网监控项目而设计的产品，具有体积小、价格低、操作简单、输出接口功能齐全等特点。

The YC-FCM modular ultrasonic heat/cold meter is designed for heat network monitoring projects, offering compact size, cost-effectiveness, easy operation, and a comprehensive range of output interfaces.





性能指标

Performance Specifications

- ◆ 测量精度：满足 EN1434 标准
Measurement accuracy: Compliant with EN1434 standards
- ◆ 工作电源：隔离 8~36VDC
Power supply: Isolated 8~36VDC
- ◆ 显示：2×10 背光汉字液晶显示器可显示瞬时热量、流量及正负净累积热量等
Display: 2×10-character backlit LCD display for instantaneous heat, flow, and positive/negative/net cumulative heat
- ◆ 操作：4 键轻触键盘设参
Operation: 4-key touch keyboard for parameter setting
- ◆ 铂电阻：PT100 三线制铂电阻
Platinum resistance: PT100 three-wire platinum resistance
- ◆ 热量单位：吉焦尔、千卡、BTU 可选
Heat units: Joules, kilocalories, BTU (selectable)
- ◆ 信号输入：3 路 4-20mA 模拟输入，精度 0.1%，可输入压力、液位、温度等信号
Signal Input: 3 channels of 4-20mA analog input with 0.1% accuracy, capable of accepting signals such as pressure, liquid level, and temperature
- ◆ 信号输出：
 - 1 路隔离 RS485 输出
 - 1 路隔离 OCT（脉冲宽度 6~1000ms 之间可编程，默认 200ms）
 - 1 路继电器输出（脉冲宽度 200ms）
 - 1 路 4-20mA 输出（有源/无源输出可选）Signal output:
 - 1 channel of isolated RS485 output
 - 1 channel of isolated OCT (programmable pulse width between 6~1000ms, default 200ms)
 - 1 channel of relay output (pulse width 200ms)
 - 1 channel of 4-20mA output (active/passive output selectable)
- ◆ 其它功能：
 - 自动记忆前 512 天，前 128 个月，前 10 年正/负净累积流量
 - 自动记忆前 30 次上、断电时间和流量并可实现自动或手动补加
 - 可通过 E-mail 传送来的代码文件实现软件升级

Other functions:

Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow

Automatically stores the last 30 power-on and power-off times and flow values and can automatically or manually add flow

Supports software upgrades through code files sent via email

◆ 防护等级: IP57 IP65
Protection level: IP57, IP65

◆ 安装方式: 导轨式 (主机)
Installation method: Rail-mounted (for the main unit)

可选配传感器

Optional Sensors



标准插入 R 型
Standard plug-in R-
type



加长插入 R 型
Extended plug-in R-
type



高温 B1H 型传感器
High temperature B1H type



高温 N1H 型传感器
High temperature N1H type



π 型管段式传感器
 π type section
sensor



标准管段式传感器
Standard pipe section
sensor

电池供电型超声波冷/热量表

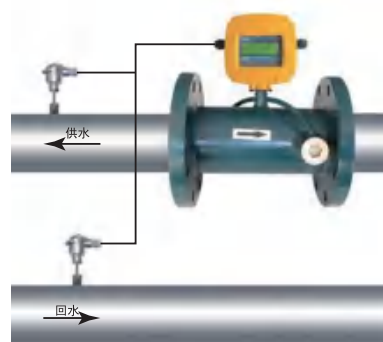
Battery-Powered Ultrasonic Heat/Cold Meter

概述

Introduction

电池供电型超声波冷/热量表适用于无电源现场的热量计算。主板采用具有 50 分贝动态范围的前置接收放大器，可选配外夹式、插入式、管段式等传感器。

The battery-powered ultrasonic heat/cold meter is designed for heat calculation in locations without a power source. The mainboard features a front-end receiver amplifier with a dynamic range of 50 dB and can be paired with external-clamp, plug-in type, or pipe section type sensors.



性能指标

Performance Specifications

- ◆ 测量精度：满足 EN1434 标准，重复性：优于 0.5%
Measurement accuracy: Compliant with EN1434 standards, Repeatability: Better than 0.5%
- ◆ 工作电源：3.6V/19AH 锂电池供电（电压 $\geq 2.6V$ 工作正常）
Power Supply: 3.6V/19AH lithium battery (Normal operation when voltage is $\geq 2.6V$)
- ◆ 测量周期：500ms~49 秒（出厂默认 10 秒）
Measurement cycle: 500ms~49 seconds (default 10 seconds at the factory)
- ◆ 采样次数：每个测量周期采样次数 32 组~128 组可选（出厂默认 64 组）
Sampling count: 32 to 128 groups per measurement cycle (default 64 groups at the factory)
- ◆ 显示：本地 96 段 LCD 显示器可显示 44 个不同的窗口内容
Display: Local 96-segment LCD display capable of showing 44 different window contents
- ◆ 操作：使用专用二次仪表或 PC 设参软件
通过 RS485 设置参数，可浏览 44 个窗口内容
Operation: Using dedicated secondary instruments or PC parameter software
44 window contents can be browsed by setting parameters through RS485
- ◆ 铂电阻：PT1000 铂电阻
Platinum resistance: PT1000 platinum resistance
- ◆ 热量单位：吉焦尔、千卡可选
Heat units: Joules, kilocalories (selectable)

◆ 可选输出:

1 路 USART (TTL) 输出

1 路非隔离 RS485 输出

双路隔离 OCT 输出 (脉冲宽度 6~1000ms 间可编程, 默认 200ms)

1 路双向串行外设通用接口, 可直接通过串联的形式连接多个外部设备: 4-20mA 模拟输出板、频率信号输出板、热敏打印机等

Optional Outputs:

1 channel of USART (TTL) output

1 channel of non-isolated RS485 output

Dual-channel isolated OCT output (programmable pulse width between 6~1000ms, default 200ms)

1 channel of bidirectional serial peripheral interface, enabling direct connection of multiple external devices, such as 4-20mA analog output boards, frequency signal output boards, thermal-sensitive printers, etc.

◆ 其它功能:

自动记忆前 512 天, 前 128 个月, 前 10 年正/负净累积流量

自动记忆前 30 次上、断电时间和流量并可实现自动或手动补加

可通过 E-mail 传送来的代码文件实现软件升级

Other functions:

Automatically stores the last 512 days, 128 months, and 10 years of positive/negative/net cumulative flow

Automatically stores the last 30 power-on and power-off times and flow values and can automatically or manually add flow

Support software upgrades through code files sent via email.

◆ 防护等级: IP68

Protection level: IP68

◆ 传感器: 管段式、外缚式、插入式

Sensor types: Pipe section type, external clamp-on, plug-in type

可选配传感器

Optional Sensors



标准插入 R 型
Standard plug-in R
type



加长插入 R 型
Extended plug-in R
type



高温 B1H 型传感器
High temperature B1H type
sensor



高温 N1H 型传感器
High temperature N1H type
sensor



π 型管段式传感器
 π type section
sensor



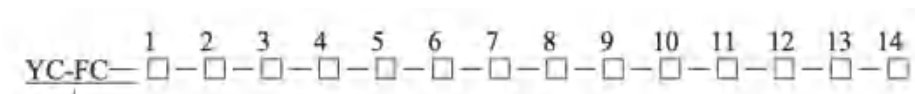
标准管段式传感器
Standard pipe section
sensor

超声波选型表

Ultrasonic Selection Table

选型编码

Selection code



基本型号

Basic models

字母 Letters	组件/参数 Components/parameters	可选项 Options
1	主机类型 Main unit type	G) 一体式 (带本地操作) G) Integrated type (with local operation)
		F1) 分体壁挂型 F2) 分体壁挂防爆型 F1) Split wall F2) Split wall mounted explosion-proof type
		mounted type F4) 分体本地显示型 F3) 分体盘装型 F4) Split local display type
		F3) Split panel type

		M1) 模块型 (带本地操作) M1) Modular type (with local operation)
		S) 水表 (电池供电, 磁性按键可浏览窗口) S) Water meter (battery powered, magnetic key to view window)
2	测量介质 Measurement medium	Y) 液体 Q) 气体 Y) Liquid Q) Gas
3	声道数 Channels	S) 单声道 D) 双声道 T) 三声道 S) Single track D) Dual track T) Triple track
4 ^{注1}	工作电源 Working power supply	A) 交流 (85-264V) B) 电池 (3.6V 锂电池) A) AC (85-264V) B) Battery (3.6V lithium battery) D) 直流 (24VDC/8-36VDC) D) DC (24VDC/8-36VDC)
5	热量功能 Thermal function	N) 无 R) 有 N) No R) Yes
6 ^{注2}	传感器类型 Sensor type	S1) 标准 B1 型 S2) 标准 N1 型 S3) 标准 D1 型 S1) Standard B1 type S2) Standard N1 type S3) Standard D1 type S4) 高温 B1H 型 S5) 高温 N1H 型 S4) High temperature B1H type S5) High temperature N1H type C1) 标准插入式 C2) 水泥插入式 C3) 水表插入式 C1) Standard plug-in type C2) Cement plug-in type C3) Water meter plug-in type G1) 管段式 (法兰连接) G2) 管段式 (活接连接, 卫生型) G1) Pipe section type (flanged connection) G2) Pipe section type (Union connection, sanitary type)
7	管径 Pipe diameter	DN (mm)
8 ^{注3}	管材 Pipe material	0) 碳钢 1) 不锈钢 2) 铸铁 0) Carbon steel 1) Stainless steel 2) Cast iron 3) 玻璃钢 4) PVC 5) 水泥 3) FRP 4) PVC 5) Cement
9	公称压力 Nominal pressure	___MPa
10 ^{注4}	流量累积单位 Flow accumulation unit	M) 立方米 L) 升 M) Cubic meter L) Liter
	最小读数 (水表) Minimum reading (water meter)	1 (m ³) 0.1 (0.1m ³) 0.01 (0.01m ³) 0.01 (L) 0.0001 (0.1L)
11	热量累积单位 Heat accumulation unit	N) 无 K) Kc (千卡) G) GJ (吉焦) B) BTU
12 ^{注5}	信号输出 Signal output	R) 4-20mA+HART 输出 R) MA+HART output N) 脉冲输出 N) Pulse output A) 4-20mA 输出 (注明量程及有源或无源) A) 4-20mA output (indicate range and active or passive) T) OCT 输出 T) OCT Output F) 频率输出 4) RS485 输出 (请注明波特率、通讯校验仪等) F) Frequency output 4) RS485 output (please specify baud rate, communication verifier, etc.)

13	信号输入 Signal input	N) 无输入 N) No input 2) 2 路 4-20mA 模拟输入 2) Dual track 4-20mA analog input 1) 1 路 4-20mA 模拟输入 1) Single track 4-20mA analog input 3) 3 路 4-20mA 模拟输入 3) Triple track 4-20mA analog input
14	单根电缆长度 Single cable length	___米 (管段式传感器为单根四芯电缆, 其余传感器为双根两芯电缆) ___m (single four-core cable for section sensor and double two-core cable for other sensors)

选型举例: YC-FCF1-Y-D-A-S2-200-0-1.6-M-4-10

Example: YC-FCF1-Y-D-A-S2-200-0-1.6-M-4-10

解释: 壁挂主机, 液体、双声道, 交流供电, 标准插入式探头, DN200 管径, 碳钢管材, 压力 1.6MPa, 流量单位立方米, 485 输出, 10 米电缆线。

Explanation: wall-mounted main unit, liquid, dual track, AC power supply, standard plug-in probe, DN200 pipe diameter, carbon steel pipe, pressure 1.6MPa, flow in cubic meters, 485 output, 10m cable.

超声波传感器系列

Ultrasonic Sensor Series

外缚式传感器

External Clamp-On Sensors

安装时将传感器直接捆绑在被测管道的外壁，无需断管、无需停产，具有安装简单、无压力损失等特点。

These sensors are installed by directly binding them to the exterior surface of the measured pipe, without the need for pipe cutting or production stoppage. They are characterized by simple installation and no pressure loss.



标准 B1 型传感器
Standard B1 type
sensor



标准 N1 型传感器
Standard N1 type
sensor



标准 D1 型传感器
Standard D1 type
sensor



高温 B1H 型传感器
High temperature B1H type
sensor



高温 N1H 型传感器
High temperature N1H type
sensor

传感器参数（适用固定分体式、经济型、模块式、流量计/热量表）

Sensor parameters (applicable to fixed split type, economical type, modular type, flowmeter/heat meter)

单位：mm

Unit: mm

技术参数 Technical parameters	标准 B1 型 Standard B1 type	标准 N1 型 Standard N1 type	标准 D1 型 Standard D1 type	高温 B1H 型 High temperature B1H type	高温 N1H 型 High temperature N1H type
适用管径 Applicable pipe diameter	DN15~DN100	DN50~DN700	DN300~DN6000	DN15~DN100	DN50~DN700
材质 Material quality	ABS			特殊高温材料 Special high temperature materials	
工作频率 Working frequency	1MHz				
安装方法	V（N、W）法	V、Z 法 V,Z method	Z 法 Z method	V（N、W）法	V、Z 法 V, Z method

Installation method	V(N, W) method			V(N, W) method	
标定 Calibration	整机配对标定 Complete machine matching calibration				
磁性 Magnetic	有 Yes		无 No		
适用温度 Applicable temperature	0℃~70℃			0℃~160℃	
防护等级 Protection class	IP68（可浸水工作，水深≤3 米） P68 (able to work in water, with a depth of ≤ 3 meters)				
外形尺寸 Overall dimensions	45×30×30	60×45×45	80×70×55	90×85×24	90×82×29
质量（克/对） Mass (g/pair)	75	250	650	94	150
介质种类 Type of medium	水、海水、污水、酒精、各种油类等能传导超声波的单一、均匀、稳定的液体 A single, uniform, and stable liquid that can transmit ultrasonic waves, such as water, seawater, sewage, alcohol, and various oils				
介质浊度 Medium turbidity	≤20000ppm 且气泡含量小 ≤20000ppm with low bubble content				
适用管材 Applicable pipe materials	碳钢、不锈钢、铸铁、铜、PVC、铝、玻璃钢等均匀质密的管道，允许有衬里 Carbon steel, stainless steel, cast iron, copper, PVC, aluminum, fiberglass, and other uniformly dense pipelines are allowed to have lining				
管道衬材 Pipe lining material	环氧沥青、橡胶、灰浆、聚丙烯、聚苯乙烯、胶木、聚四氟乙烯等 Epoxy asphalt, rubber, mortar, polypropylene, polystyrene, bakelite, polytetrafluoroethylene, etc.				
信号电缆 Signal cable	SEYV75-2 型专用屏蔽电缆，单根可加长到 500 米，尽量避开变频、高压等干扰源 SEYV75-2 special shielded cable can be lengthened to 500m for a single cable to avoid frequency conversion, high voltage and other interference sources as far as possible				

插入式传感器

Plug-in Sensors

安装时在被测管道上使用专用开孔工具打孔, 将传感器和被测介质直接接触测量, 可带压不停产安装。该款传感器解决了外缚式传感器在测量结垢较厚的管道时不易接收到信号及长时间测量信号衰减的问题, 具有不停产安装、免维护、与管径无关、无压力损失等特点。

During installation, these sensors are used with a dedicated hole-making tool to create an opening in the measured pipe. The sensor is then placed in direct contact with the measured medium for measurement, allowing installation under pressure without production interruption. This type of sensor addresses issues with external clamp-on sensors, such as difficulty receiving signals in heavily scaled pipes and signal attenuation during extended measurements. It offers features like installation without production stoppage, maintenance-free operation, independence from pipe diameter, and no pressure loss.



标准插入 R 型
Standard plug-in R type



加长插入 R 型（水泥管
管用）
Extended plug-in R type
(for cement pipe)



水表插入 R 型
Water meter plug-in R type

管道材质为碳钢或不锈钢时可直接焊接安装，对于不可直接焊接的管道，如铸铁、玻璃钢、PVC、水泥管等需配备厂家制作的专用管箍方可安装，为防止漏水，用户订货时请提供被测管道的准确外径或周长。

For pipes made of carbon steel or stainless steel, you can directly weld the sensor for installation. However, for pipes that cannot be directly welded, such as cast iron, fiberglass-reinforced plastic (FRP), PVC, and concrete pipes, you will need specially designed clamps provided by the manufacturer for installation. To prevent leaks, it's essential to provide the manufacturer with the accurate outer diameter or circumference of the pipe when placing your order.

技术参数 Technical parameter	标准插入 R 型（直插式） Standard plug-in R type (straight insertion)	加长插入 R 型（水泥管用） Extended plug-in R type (for cement pipe)	水表插入 R 型 Water meter plug-in R type
适用管径 Applicable pipe diameter	DN80mm 以上 DN80mm above		
材质 Material quality	球阀与探杆：不锈钢 316L；球阀底座：普通碳钢（不锈钢选配） Ball valve and feeler rod: stainless steel 316L; Ball valve base: ordinary carbon steel (optional stainless steel)		
工作频率 Working frequency	1MHz		
适用管材 Applicable pipe materials	碳钢、不锈钢、铸铁、铜、PVC、铝、玻璃钢、水泥管等管道，允许有衬里 Carbon steel, stainless steel, cast iron, copper, PVC, aluminum, glass fiber reinforced plastics, cement pipes and other pipes, with lining allowed		
安装方式 Installation mode	Z 法 Z method		
适用温度 Applicable temperature	-40°C~160°C		
开孔尺寸 Hole size	Φ19mm（使用厂家提供的专用开孔器，可实现带压不停产安装） Φ19mm (The special taper provided by the manufacturer can be used for installation under pressure without shutdown)		Φ23mm
压力等级 Pressure rating	1.6MPa（安装时压力<0.8MPa） 1.6MPa (pressure<0.8MPa during installation)		
防护等级	IP68（可浸水工作，水深≤3 米） IP68 (able to work in water, with a depth of ≤ 3 meters)		

Protection class			
安装空间 Installation space	井壁到管壁 $\geq 550\text{mm}$ Well wall to pipe wall $\geq 550\text{mm}$	井壁到管壁 $\geq 700\text{mm}$ Well wall to pipe wall $\geq 700\text{mm}$	井壁到管壁 $\geq 600\text{mm}$ Well wall to pipe wall $\geq 600\text{mm}$
长度 Length	186mm	330mm	228mm
介质种类 Type of medium	水、海水、污水、酒精、各种油类等能传导超声波的单一、均匀、稳定的液体 Water, seawater, sewage, alcohol, various oils and other single, uniform and stable liquid that can conduct ultrasonic wave		
介质浊度 Medium turbidity	$\leq 20000\text{ppm}$ 且气泡含量小 $\leq 20000\text{ppm}$ with low bubble content		
信号电缆 Signal cable	SEYV75-2 型专用屏蔽电缆，单根可加长到 500 米（水表插入式电缆长度不能超过 5 米），布线时电缆应外加金属套管以增加抗干扰性，并注意电缆不要与高压电缆并行，尽量避开变频器等干扰源。 SEYV75-2 type specialized shielded cable, a single cable can be extended up to 500 meters (for water meter plug-in cable, the length should not exceed 5 meters). When wiring, the cable should be enclosed in a metal conduit to enhance interference resistance. Also, ensure that the cable does not run parallel to high-voltage cables and try to avoid interference sources like inverters.		

管段式传感器

Pipe Section Sensor

管段式传感器是采用法兰将管段传感器与被测管路直接连接的一种测量方式，该款传感器解决了外缚式和插入式传感器在安装过程中由于人为或被测管道参数不准确引起的误差而造成测量精度下降的问题，具有测量精度高、稳定性好、免维护等特点。

Pipe section sensors are a measurement method where the sensor is directly connected to the measured pipeline using a flange. This type of sensor solves the problem of reduced measurement accuracy that can occur during the installation of external clamp-on and plug-in sensors due to human error or inaccuracies in the parameters of the measured pipeline. It features high measurement accuracy, good stability, and maintenance-free operation.



卫生型管段传感器
Sanitary section sensor



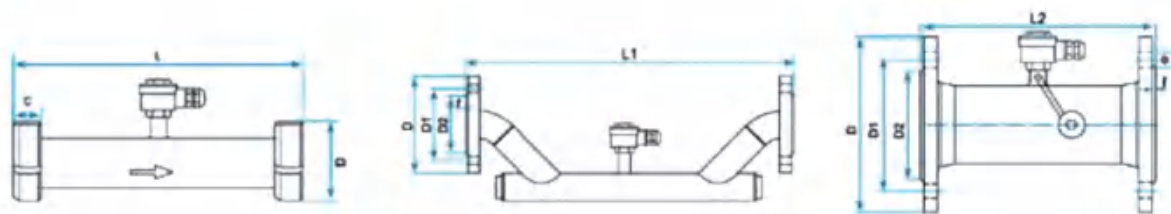
π 型管段式传感器
 π type section sensor



标准管段式传感器
Standard pipe section sensor

技术参数 Technical parameter	卫生型管段式 Sanitary section type	π 型管段式 π -shaped section type	标准管段式 Standard section type
适用管径 Applicable pipe diameter	DN25~DN80	DN15-DN40	DN50-DN1000
材质 Material quality	不锈钢 Stainless steel		碳钢（不锈钢） Carbon steel (stainless steel)

工作频率 Working frequency	1MHz		
连接方式 Connection mode	活接连接 Loose joint connection	法兰连接 Flanged connection	法兰连接 Flanged connection
适用温度 Applicable temperature	-40°C~160°C		
标定 Calibration	整机在线标定 Complete machine online calibration		
防护等级 Protection class	IP68 (可潜水工作, 水深≤3 米) IP68 (able to work in water, with a depth of ≤ 3 meters)		
外形尺寸 Overall dimensions	见下表 See the table below		
公称压力 Nominal pressure	见下表 See the table below		
介质种类 Type of medium	水、海水、污水、酒精、各种油类等能传导超声波的单一、均匀、稳定的液体 Water, seawater, sewage, alcohol, various oils and other single, uniform and stable liquid that can conduct ultrasonic wave		
介质浊度 Medium turbidity	≤20000ppm 且气泡含量小 ≤20000ppm with low bubble content		
管道衬材 Pipe lining material	无 No		
信号电缆 Signal cable	SEYV75-2 型专用屏蔽电缆, 单根可加长到 500 米, 尽量避开变频、高压等干扰源。 SEYV75-2 special shielded cable can be lengthened to 500m for a single cable to avoid frequency conversion, high voltage and other interference sources.		



卫生型管段式管道参数

Sanitary section pipe parameters

公称通径 DN Nominal diameter (mm)	额定压力 Rated pressure (MPa)	材质 Material	活接式外形尺寸 Dimension of loose joint type			
			L	H	D	C
25	4.0	不锈钢 Stainless steel	300	282	51	19
40			300	300	74	23
50			300	310	84	24
65			350	330	100	28
80			400	345	114	30

π 型管段式/标准管段式传感器

π -shaped pipe section/standard pipe section sensor

公称 通径 Nominal diameter DN (mm)	额定 压力 Rated pressure (MPa)	π 形管段 π -shaped pipe section	标准管段 Standard pipe section	法兰尺寸(mm) Flange Size (mm)					
		L1	L2	D	D1	D2	f	N- Φ	法兰厚度 Flange thickness
25	2.5	390		115	85	65	3	14×4	16
32		450		140	100	76	3	18×4	18
40		500		150	110	84	3	18×4	18
50	1.6		200	165	125	99	3	18×4	20
65			200	185	145	118	3	18×4	20
80			225	200	160	132	3	18×8	20
100			250	220	180	156	3	18×8	22
125			250	250	210	184	3	18×8	22
150			300	285	240	211	3	22×8	24
200			350	340	295	266	3	22×12	24
250			450	405	355	319	3	26×12	26
300			500	460	410	370	4	26×12	28
350			550	520	470	429	4	26×12	30
400			600	580	525	480	4	26×16	32
450			700	640	585	548	4	30×20	34
500	1.0		800	670	620	585	4	25×20	32
600			1000	780	725	685	5	30×20	36
700	0.6		1100	860	810	775	5	24×25	32
800			1200	975	920	880	5	24×30	32
900			1300	1075	1020	980	5	24×30	34
1000			1400	1175	1120	1080	5	28×30	36

安装工况要求

Installation Conditions and Requirements

安装点选择

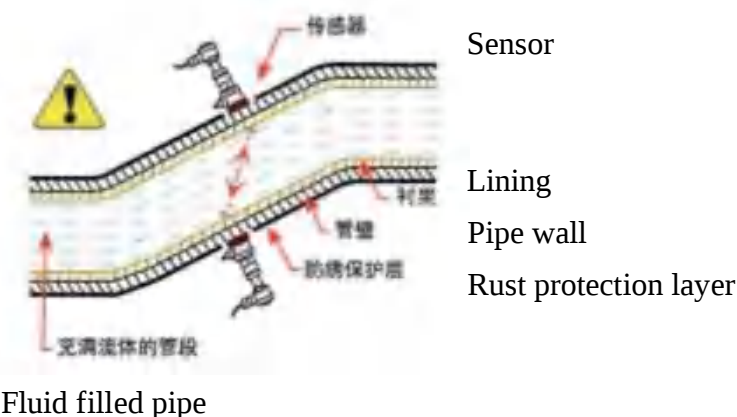
Choice of Installation Point

为保证测量精度和稳定性，传感器的安装点要选择在流场分布均匀的直管段部分。

To ensure measurement accuracy and stability, the installation point of the sensor should be selected in a straight pipe section with uniform flow distribution.

1. 选择充满流体的材质均匀质密、易于超声波传输的管段，如垂直管段（流体向上流动）或水平管段。

Choose a pipe section made of a material that is uniform, dense, and conducive to ultrasound transmission, such as a vertical pipe section (with fluid flowing upwards) or a horizontal pipe section.



2. 安装距离应选择上游大于 10 倍直管径、下游大于 5 倍直管径以内无任何阀门、弯头、变径等均匀的直管段，安装点应充分远离阀门、泵、高压电和变频器等干扰源。

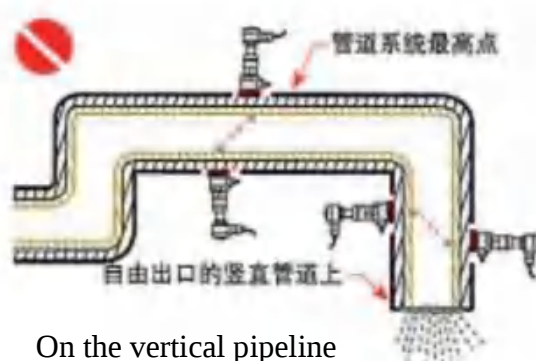
The installation distance should be selected such that there are at least 10 times the pipe diameter upstream and 5 times the pipe diameter downstream of a straight pipe section with no obstructions like valves, elbows, or reducers. The installation point should be sufficiently far away from sources of interference such as valves, pumps, high-voltage electricity, and variable frequency drives.



Pipe section larger than 10 times the straight pipe diameter

3. 避免安装在管道系统的最高点或带有自由出口的竖直管道上（流体向下流动）。

Avoid installing the flowmeter at the highest point of the pipeline or on vertical pipes with free outlets (fluid flowing downwards).



The highest point of the pipeline system

On the vertical pipeline of the free outlet

4. 对于开口或半满管的管道，流量计应安装在 U 型管段处。

For open-ended or partially filled pipes, the flowmeter should be installed at a U-shaped section of the pipe.

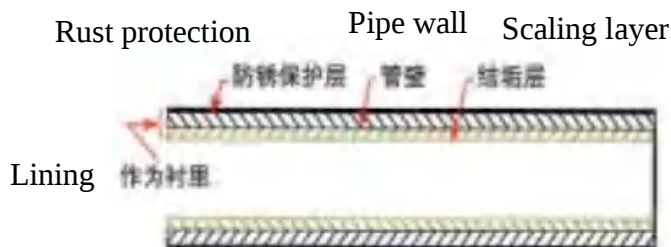


5. 安装点的温度、压力应在传感器可工作的范围以内。

The temperature and pressure at the installation point should be within the operating range of the sensor.

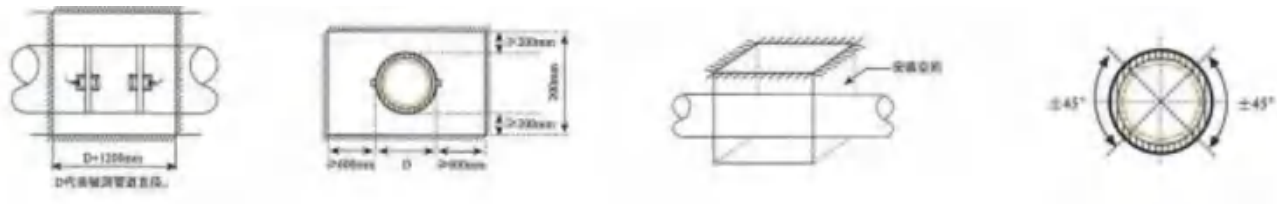
6. 充分考虑管内壁结垢状态；尽量选择无结垢的管道进行安装，如不能满足时，可把结垢考虑为衬里以求较好的测量精度。

Consider the condition of pipe wall fouling; choose pipes with minimal fouling for installation. If this is not possible, consider fouling as a lining to achieve better measurement accuracy.



安装测试井的建筑施工要求

Construction Requirements for Installing Test Wells



注意事项:

Notes:

- ◆ 请在管道轴线水平位置 $\pm 45^\circ$ 范围内安装传感器
Install the sensor within $\pm 45^\circ$ of the horizontal axis of the pipeline.
- ◆ 请将主机壳体接地
Ground the housing of the main unit.
- ◆ 传感器安装位置应避开法兰、焊缝、变径
Avoid installing the sensor near flanges, welds, or reductions.
- ◆ 请留足够空间便于人能直立工作
Ensure there is enough space for personnel to work in an upright position.

YC-FCT 超声波探伤仪

YC-FCT Ultrasonic Flaw Detector

概述

Introduction

最新推出 YC-FCT 型全数字智能型超声波探伤仪，该仪器可用于检测各种材料内部的缺陷，如钢、铜、铝、硬质合金、铸件、有机玻璃、复合材料和焊缝等等，可有效检测出气孔、裂纹、疏松、夹杂、未焊透等缺陷，功能全面实用，是真正的笔记本式数字超声波探伤仪。应用领域涉及航天、军工、化工、电力、钢铁、冶金、铁道、火车、汽车、摩托车、机械、安检、管道、建筑等行业。

The latest YC-FCT fully digital intelligent ultrasonic flaw detector is designed for detecting internal defects in various materials, including steel, copper, aluminum, hard alloys, castings, organic glass, composite materials, and welds, among others. It effectively detects defects such as porosity, cracks, looseness, inclusions, and incomplete welds. This versatile and practical instrument represents a true portable digital ultrasonic flaw detector. It finds applications in aerospace, military, chemical, power, steel, metallurgy, railway, automotive, motorcycle, machinery, security inspection, pipeline, construction, and other industries.



性能指标

Performance Specifications

- ◆ 高速扫描，超低噪声，性能优异
High-speed scanning, ultra-low noise, excellent performance
- ◆ 铝镁合金外壳，美观坚固，抗干扰性能极佳
Aluminum-magnesium alloy casing, attractive and robust, outstanding anti-interference capability
- ◆ 丰富的智能化探伤工具，简单易用
Rich intelligent flaw detection tools, easy to use
- ◆ 强大的 PC 软件，可以导出 Excel 格式的探伤报告
Powerful PC software for exporting flaw detection reports in Excel format

- ◆ 5 个测值显示区，1 个为主显示区用于放大显示，17 种测值类型可供选择
5 measurement display areas, 1 primary display area for magnified display, with 17 measurement types to choose from
- ◆ 2 个独立闸门，可以独立测量，也可以联合测量
2 independent gates for separate or combined measurements
- ◆ 探头自动校准功能：“零点”、“K 值”、“前沿”及材料的“声速”
Automatic calibration for the probe: "zero," "K-value," "front," and material "sound velocity"
- ◆ 探伤重复发射频率可分五档调节
Adjustable flaw detection repetition frequency with five levels
- ◆ 探伤过程实时录像功能
Real-time video recording of flaw detection process
- ◆ 5 种菜单颜色方案供用户选择，可公英制选择
5 menu color schemes for user selection, with options for metric or imperial units
- ◆ B 扫描功能，清晰显示缺陷纵截面形状
B-scan functionality for clear display of flaw cross-sectional shapes
- ◆ 采用文件管理系统，动态存储数据，10 个独立探伤通道，300 个包含 A 扫图像探伤报告
File management system for dynamic data storage, 10 independent flaw detection channels, and storage for 300 flaw detection reports, including A-scan images
- ◆ 智能 DAC 曲线：任意顺序标定，自动生成并可以分段制作，可进行修正与补偿；考虑了材料衰减和表面补偿因素；偏置曲线可任意调节，符合国内、国外各种探伤标准
Intelligent DAC curve: Arbitrary sequence calibration, automatic generation with segmentation capability, correction, and compensation; considers material attenuation and surface compensation factors; adjustable bias curve to comply with various domestic and international flaw detection standards
- ◆ AVG 曲线自动生成，找准缺陷最高波自动换算孔径 Φ 值
Automatic generation of AVG curve, automatically converts highest flaw echo into aperture Φ value
- ◆ 自动增益、回波包络、峰值记忆功能提高了探伤效率

Automatic gain control, echo envelope, peak memory functions improve flaw detection efficiency

- ◆ 闸门内声、光报警、DAC 报警
Sound and light alarms within gates, DAC alarms
- ◆ IP65 标准铝镁合金外壳，坚固耐用，防水防尘，抗干扰能力极佳
IP65 standard aluminum-magnesium alloy casing, sturdy and durable, waterproof, dustproof, excellent anti-interference capability
- ◆ 大容量安全环保锂离子电池，超长待机时间，持续工作 7 小时以上
Large-capacity, environmentally friendly lithium-ion battery, ultra-long standby time, continuous operation for over 7 hours
- ◆ 与计算机通讯，实现计算机数据管理，并可导出 Excel 格式、A4 纸张的探伤报告
Communication with a computer for data management, and the ability to export flaw detection reports in Excel format and A4 paper size

YC-FCE 超声波测厚仪

YC-FCE Ultrasonic Thickness Gauge

概述

Introduction

YC-FCE 型超声波测厚仪，采用超声波测量原理，适用于能使超声波以一恒定速度在其内部传播，并能从其背面得到反射的各种材料厚度的测量。

The YC-FCE ultrasonic thickness gauge utilizes the principle of ultrasonic measurement and is suitable for measuring the thickness of various materials that allow ultrasonic waves to propagate at a constant speed within them and can reflect from their backside.

此仪器可对各种板材和各种加工零件作精确测量，另一重要方面是可以对生产设备中各种管道和压力容器进行监测，监测它们在使用过程中受腐蚀后的减薄程度。可广泛应用于石油、化工、冶金、造船、航空、航天等各个领域。

This instrument can accurately measure various sheets and processed parts, and it is also important for monitoring various pipes and pressure vessels in production equipment, measuring their thinning degree after corrosion during use. It finds wide applications in various fields such as petroleum, chemical industry, metallurgy, shipbuilding, aerospace, and more.

1) 探头自动校准功能 (4mm)

Automatic calibration function of the probe (4mm)

2) 探头频率选择功能 (2M、5M、10M、高温)

Probe frequency selection function (2MHz, 5MHz, 10MHz, high-temperature)

3) 两点校准功能

Two-point calibration function

4) 耦合状态指示功能

Coupling state indication function

5) 电池电量指示功能

Battery level indication function

6) 自动关机功能

Automatic shutdown function

7) 后台数据处理功能

Background data processing function

8) 支持打印机功能

Supports printer function



性能指标

Performance Specifications

- ◆ 显示: 128×64LCD 带 LED 背光调节
Display: 128×64 LCD with adjustable LED backlight
- ◆ 测量范围: 0.75mm~225.0mm (0.03inch~8.85inch)
Measurement range: 0.75mm to 225.0mm (0.03 inch to 8.85 inches)
- ◆ 声速范围: 1000m/s~9999m/s (0.039~0.394in/μs)
Sound velocity range: 1000m/s to 9999m/s (0.039 to 0.394 inch/μs)
- ◆ 显示分辨率: 0.01mm or 0.1mm (低于 100.0mm) 0.1mm (高于 99.99mm)
Display Resolution: 0.01mm or 0.1mm (below 100.0mm), 0.1mm (above 99.99mm)
- ◆ 测量精度:
Measurement accuracy

	显示分辨率 Display resolution	显示分辨率 Display resolution	备注 Notes
10.0mm 以下 10.0mm below	±0.05mm	±0.1mm	H 为标准厚度块 的实际值
10.0mm 以上 10.0mm above	±0.05mm	± (1%H+0.1) mm	
高温探头 High temperature probe	± (1%H+0.1) mm		H is the actual value of the standard thickness block
管 材 Pipe material	±0.1mm		

- ◆ 测量单位: 公制/英制
Measurement units: Metric/imperial units
- ◆ 供电电源: 5 号干电池两节, 正常工作时间 100 小时 (不开背光灯)
Power supply: Two No. 5 dry batteries, normal working time of 100 hours (without backlight)
- ◆ 通信口: RS232 串口
Communication port: RS232 serial port
- ◆ 外形尺寸: 150mm×74mm×32mm
Dimensions: 150mm×74mm×32mm

- ◆ 重量: 238g
Weight: 238g
- ◆ 测量速度: 20 次/秒
Measurement speed: 20 measurements per second
- ◆ 数据存储: 500 组数据; 5 个文件 (每个文件 100 组数据)
Data Storage: 500 sets of data; 5 files (each file can store 100 sets of data)

流量仪表 Flowmeter

超声波明渠流量计

Ultrasonic Open Channel Flowmeter

连续监测渠中污水的流量，并累计流量，仪表内置 EEPROM, 停电时保存累计流量。仪器配有专门为石油、化工部门设计的防爆、耐腐蚀型探头，特别适用于具有腐蚀性废水的流量测量。

Continuously monitor the flow of sewage in the channel and accumulate the flow. The instrument has built-in EEPROM to save the accumulated flow in case of power failure. It is also equipped with explosion-proof and corrosion-resistant probes specially designed for petroleum and chemical departments, in particular suitable for flow measurement of corrosive wastewater.

我们可以为用户提供明渠流量计配套的巴歇儿槽、三角堰、矩形堰、显示表头，或免费设计堰板尺寸。

We can provide users with Parshall flume, triangular weir, rectangular weir, display gauge outfit, or design the size of weir plate for free.

仪表型号 Instrument model 参数 Parameters		YC56-MQ1	YC56-MQ2	YC56-MQ3	YC56-MQ4
仪表图片 Instrument picture					
制式 Standard		三/四线制 Three / four wire system			
安装方式 Installation mode		—体/分体 Integrated / split	分体壁挂 Split wall hanging		
分体距离 Split distance		≤ 400m			
基本参数 Basic parameter	测量范围 Measuring range	0.1 升/秒 ~ 10 米 ³ /秒 0.1L / s ~ 10m ³ / s			
	累计流量 Cumulative flow	99999999 米 ³ /秒 99999999m ³ / s			
	测距范围 Ranging range	0 ~ 3m			



	盲区 Blind area	0.2 ~ 0.35m	
	流量精度 Flow accuracy	1% ~ 5% (视堰板类型而定) 1% ~ 5% (depending on the type of weir plate)	
	液位精度 Liquid level accuracy	±0.3%FS	
	分辨率 Resolving power	±1mm	
输入 Input	电源电压 Supply voltage	DC12 36V/AC85~ 265V	
	电流 Electric current	> 100mA	
	纹波要求 Ripple requirements	小于±20mV Less than ± 20mV	
输出 Output	模拟电流 Analog current	4 ~ 20m A/ 负载 5000Ω 4 ~ 20m A / load 5000 Ω	
	数字接口 Digital interface	RS485 接口 /Modbus RTU 协议 RS485 interface / Modbus RTU protocol	
	频率输出 Frequency output	无 No	有 Yes
	开关量 Switching value	4 路 4-way	6 路 6-way
材质 Material	变送器 Transmitter	压铸铝合金 Aluminum die casting alloys	ABS 公称塑料 ABS nominal plastic
	防爆等级 Explosion proof grade	Exia(d) II C T6 Ga	无 No
	探头 Probe	防水 ABS/耐腐蚀 聚四氟乙烯 Waterproof ABS / corrosion resistant PTFE	
	法兰 Flange	防水 ABS 螺母/聚四氟乙烯螺母/DN32 碳钢法兰 也可定制各种 PVC、PP、聚四氟乙烯、碳钢、不锈钢法兰 Waterproof ABS nut / PTFE nut / DN32 carbon steel flange Customize various PVC, PP, PTFE, carbon steel and stainless steel flanges	
环境条件 Environmental conditions	环境温度 Environment temperature	-20°C ~ +60°C, 温度小于 -20°C, 液晶显示收到限制; 室外工作的仪表, 如果受阳光直射, 需加防紫外线的保护罩。 -20°C ~ + 60°C, the temperature is less than - 20 °C, and the LCD is limited; For instruments working outdoors, if they are exposed to direct sunlight, they need to be covered with ultraviolet protection.	
	防护等级	IP67	IP65

	Degree of protection					
	过程温度 Process temperature	-40℃ ~ +100℃,超过 60℃ 需要使用高温探头 -40℃ ~ +100 ℃, high temperature probe is required for more than 60℃				
	过程压力 Process pressure	0.8 ~ 3 bar 或 0.08 ~ 0.3Mbar abs/海拔 3000 米以下 0.8 ~ 3 bar or 0.08 ~ 0.3Mbar abs/altitude below 3000m				
产品特点 Product features	交直流电源输入可共有，模拟、数字输出可共有。 AC and DC power input can be shared, and analog and digital output can be shared.					
	抗干扰能力 强 防护等级高 外观高档 Strong anti-interference ability High protection level High grade appearance	操作简便 性价比高 Easy operation High cost performance	抗干扰能力强 美观大配置齐全 Strong anti-interference ability Beautiful and complete configuration	抗干扰能力强 功能全面、图形液晶 Strong anti-interference ability Fully functional, graphic LCD		

*标准条件：温度 20°C ± 5°C，湿度 45% ~ 75%，周围无风，1bar 的空气中。

*Standard conditions: temperature 20 ° C ± 5 ° C, humidity 45% ~ 75%, no wind around, in the air of 1 bar.

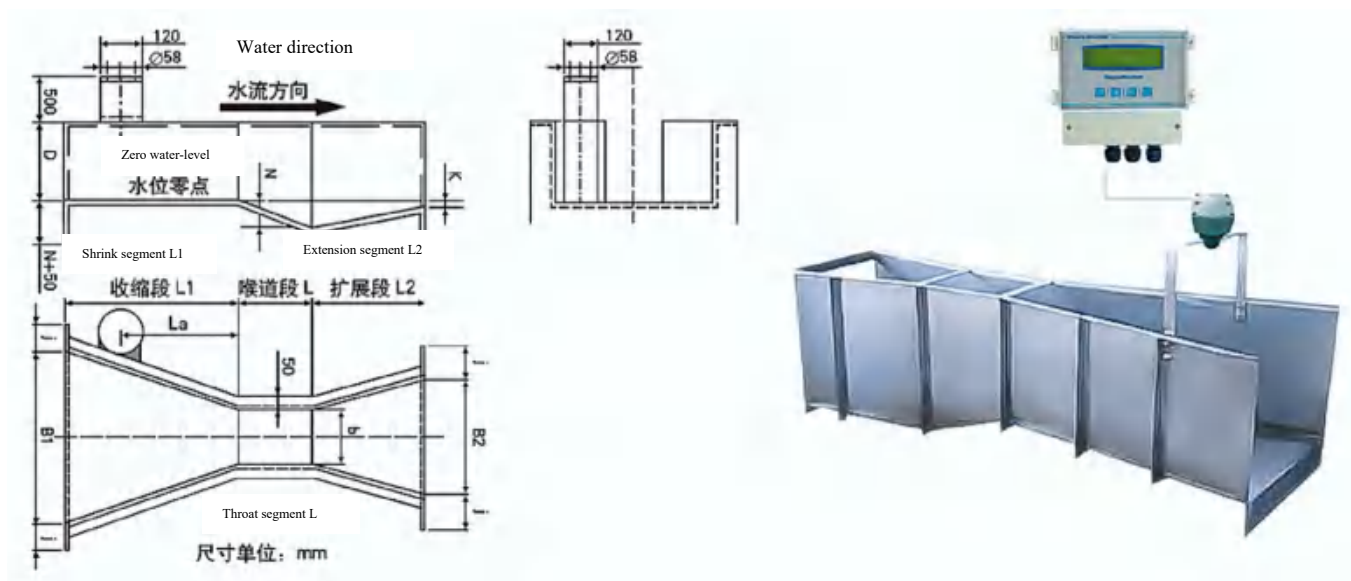
流量仪表 Flowmeter

巴歇儿槽（又称巴氏槽）

Parshall Flume

材质：玻璃钢 OR 不锈钢

Material: FRP or stainless steel



Dimension: mm

常用型号规格明渠流量计安装尺寸

Common Models and Specifications and Installation Dimensions of Open Channel Flowmeter

(单位: mm)

(Unit: mm)

序号 No.	喉道段 Throat segment			收缩段 Shrink section			扩散段 Extension section			增高 Increase	流量参数 Flow parameters	
	b	L	N	B1	L1	La	B2	L2	K	D	C	n
1	25	76	29	167	356	237	93	203	19	230	217	1.55
2	51	114	43	214	406	271	135	254	22	260	435	1.55
3	76	152	57	259	457	305	178	305	25	460	638	1.55
4	152	305	114	400	610	407	394	610	76	610	1372	1.54
5	228	305	114	575	864	576	381	457	76	770	1927	1.53

6	250	600	230	780	1325	900	550	920	80	800	2020	1.518
7	300	600	230	780	1350	902	600	920	80	800	2444	1.521
8	450	600	230	840	1425	948	750	920	80	950	3737	1.537
9	600	600	230	1020	1500	1000	900	920	80	950	5051	1.548
10	750	600	230	1380	1575	1074	1050	920	80	950	6379	1.557

*标准条件：温度 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ，湿度 45% ~ 75%，周围无风，1bar 的空气中。

*Standard conditions: temperature $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$, humidity 45% ~ 75%, no wind around, in the air of 1 bar.

流量仪表 Flowmeter

YC-A 系列气体超声波流量计

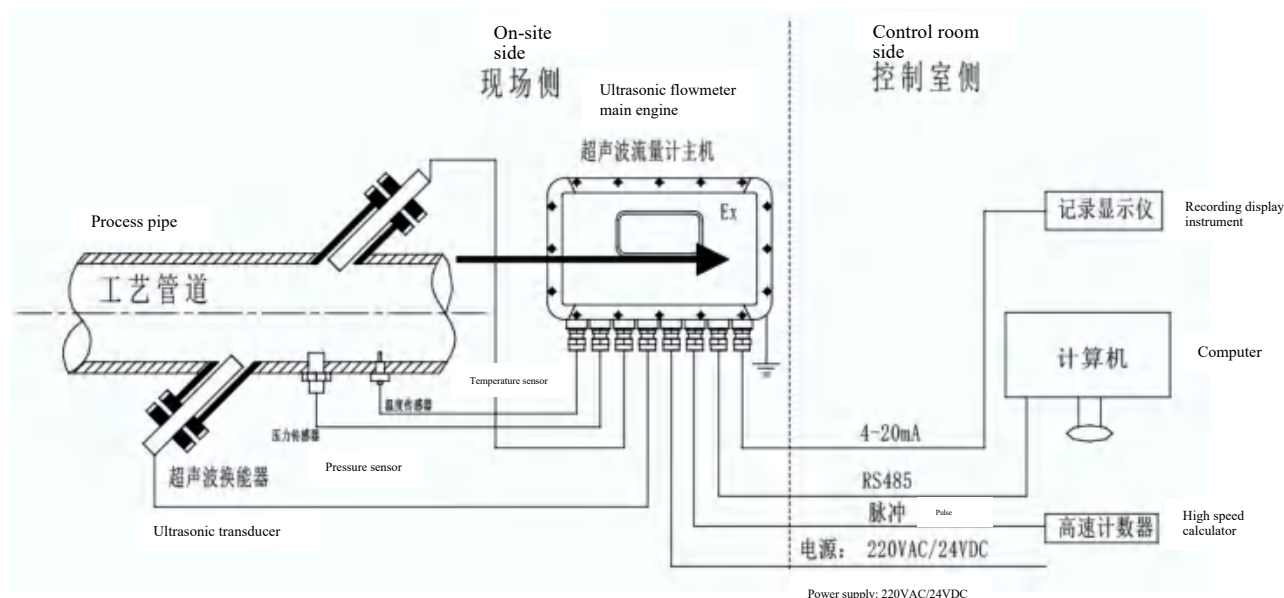
YC-A Series Gas Ultrasonic Flowmeter

组成及简介

Composition and introduction

YC-A 系列气体超声波流量计是一种适合复杂工况气体计量的分体式流量计产品。气体超声波流量计由流量计主机，流量计表体，超声波换能器、压力变送器、温度变送器、及安装附件组成。

YC-A series gas ultrasonic flowmeter is a split flowmeter product suitable for gas measurement under complex working conditions. The gas ultrasonic flowmeter is composed of flowmeter main engine, flowmeter body, ultrasonic transducer, pressure transmitter, temperature transmitter and installation accessories.



优点与特点

Advantages and Features

- ◆ 计量不受组分影响，粉尘水分影响小，适合测量多组分气体或组分变化的气体。
The measurement is not affected by components, and the influence of dust moisture is small. It is suitable for measuring multi-component gases or gases with component changes.
- ◆ 换能器全金属设计，高可靠、耐脏污，可测煤气、烟气等脏污气体，使用寿命长。
The transducer is all metal design, highly reliable, dirt resistant. It can measure dirty gases such as coal gas and flue gas, and has a long service life.
- ◆ 采用专业数字信号处理器，运行速度快，算法可靠性高，流量响应实时，能满足温度、压力、湿度迅速变化的复杂工况气体计量。
Professional digital signal processor is adopted, with fast running speed, high algorithm reliability and real-time flow response, which can meet the gas metering under complex working conditions with rapid changes of temperature, pressure and humidity.
- ◆ 始动流速小，始动流速 0.2m/s, 适合测量低速流量。
The starting velocity is small with 0.2m/s, which is suitable for measuring low-speed flow.
- ◆ 大量程比，量程比 60:1，测量流速从 0.5 ~ 30m/s。
Large range ratio with 60:1, measuring flow rate is 0.5 ~ 30m/s.
- ◆ 可测量脉动流、双向流。
Pulsating flow and bidirectional flow can be measured.
- ◆ 无可动部件，无压损，减少使用维护成本。
No movable parts, no pressure loss, reduce the use and maintenance cost.
- ◆ 支持在线不停气安装维护。
Support on-line non-stop gas installation and maintenance.
- ◆ 支持波形实时显示与调试，操作界面菜单化，方便用户使用。
Support real-time waveform display and debugging, operation interface is menu oriented, which is convenient for users.
- ◆ 支持智能报警，方便客户维护。
Support intelligent alarm, simple maintenance for customers.
- ◆ 测量口径范围大，支持 DN50 ~ DN5000 管段计量。
Large measuring diameter range with measurement of DN50 ~ DN5000 pipe section.

命名规则及选型

Naming Rules and Selection

YC-A-□1-□2-□3-□4，具体命名如下表

YC-A - □ 1 - □ 2 - □ 3 - □ 4. The specific names are as follows:

编码	内容	含义
----	----	----

Code	Content	Meaning
□ 1	D: 管段式安装 S: 单杆插入式安装 C: 两侧插入式安装 J: 同侧插入式安装 D: Pipe section installation S: Single side plug-in installation C: Two side plug-in installation J: Plug in installation on the same side	安装形式 Installation form
□ 2	S: 单声道 D: 双声道 S: Single track D: Dual track	声道数 Track number
□ 3	DN50 DN80 DN100 DN150 DN200 DN5000	口径 Size
□ 4	A: 氨气、氮气、氦气、氩气、空气等非腐蚀性气体。 B: 煤层气、天然气、油气、乙醇蒸发气、甲烷、乙烷、丙烷、其他烷烃、烯烃类等气体。 C: 高炉煤气、转炉煤气、焦炉煤气、一氧化碳、矿井气等气体。 D: 烟道气、火炬气、乏气、尾气、废气等气体。 E: 沼气、发酵气、生物质燃气等气体。 F: 其他类型的气体。 A: Ammonia, nitrogen, neon, argon, air and other non-corrosive gases. B: Coalbed methane, natural gas, oil gas, ethanol evaporated gas, methane, ethane, propane, and other alkanes, olefins gases. C: Blast furnace gas, converter gas, coke oven gas, carbon monoxide, mine gas and others. D: Flue gas, flare gas, exhaust gas, tail gas, waste gas and others. E: Biogas, fermentation gas, biomass gas and others. F: Other types of gases.	应用领域 Application area

举例: YC-A-SS600D 表示 YC-A 分体单杆插入式安装流量计, 测量管段 DN600, 使用介质为 D 类气体。

Example: YC-A-SS600D represents YC-A split single rod plug-in flowmeter, measuring pipe section DN600, and the medium used is class D gas.

分类介绍

Classification Introduction

根据现场不同的安装形式可以分为 YC-A-D、YC-A-S、YC-A-C、YC-A-J 等 4 种型号。

According to different installation forms on site, it can be divided into four models: YC-A-D, YC-A-S, YC-A-C and YC-A-J.

YC-A-D 型流量计

YC-A-D flowmeter

简介

Introduction

YC-A-D 为管段式气体超声波流量计，采用单或双声道模式，超声波换能器声道设计考虑了各种工况需求，适合各种气质较为恶劣的环境下测量，适合低流速条件测量，适合低频脉动流流量测量。

YC-A-D is a tubular gas ultrasonic flowmeter, which adopts single or dual channel mode. The sound channel design of ultrasonic transducer takes into account the requirements of various working conditions. It is suitable for measurement in various harsh environments, low velocity conditions and low-frequency pulsating flow measurement.



应用领域

Application Area

- ◆ 煤气（焦炉煤气、高炉煤气、转炉煤气、发生炉煤气、兰炭气）等气体的计量。
Measurement of coal gas (coke oven gas, blast furnace gas, converter gas, producer gas, blue carbon gas) and other gases.
- ◆ 沼气、生物发酵气、生物质燃气、垃圾填埋气、水处理工厂的曝气等气体的计量。
Measurement of biogas, bio fermentation gas, biomass gas, landfill gas, aeration of water treatment plant and other gases.
- ◆ 火炬气、烟气、废气、乏气、尾气等排放气体的计量。
Measurement of flare gas, flue gas, waste gas, exhaust gas and tail gas.
- ◆ 空气、氧气、氮气、氩气、氦气等非腐蚀气体的计量。
Measurement of non-corrosive gases such as air, oxygen, nitrogen, argon and helium.
- ◆ 天然气、液化石油气、煤层气、油气、矿井气、井口气等气体的计量。
Measurement of natural gas, liquefied petroleum gas, coalbed methane, oil gas, mine gas, well gas and others.
- ◆ 氢气、乙炔气、氨气等化工气体的计量。

Measurement of hydrogen, acetylene, ammonia and other chemical gases.

流量范围表

Flow Range Table

YC-A-D 气体超声波流量计流量范围表

Flow range of YC-A-D gas ultrasonic flowmeter

公称直径 Nominal diameter		量程比 Range ratio	始动流量 Starting flow	Qmax	Qmin
公制 Metric system[mm]	英制 Imperial System[inch]		[m ³ /h]	[m ³ /h]	[m ³ /h]
50	2"	30: 1	1.4	212	7
80	3"	33: 1	3.6	400	12
100	4"	50: 1	5.6	700	14
150	6"	60: 1	12.7	1900	32
200	8"	60: 1	22.6	3400	56
250	10"	60: 1	35.3	5298	88
300	12"	60: 1	50.8	7630	127
350	14"	60: 1	69.2	10386	173
400	16"	60: 1	90.4	13565	226

技术规格

Technical Specifications

技术参数 Technical parameters	
参数类别 Parameter category	参数规格 Parameter specification
结构类型 Structure type	直射型 Direct type
适用口径 Applicable caliber	DN50 ~ DN200 (其他口径可定制) DN50 ~ DN200 (other sizes can be customized)
声道数量 Track number	单声道、双声道 Single track, dual track
流速范围 Velocity range	0.5 ~ 30m/s
准确度等级 Accuracy grade	单声道 1.5%, 双声道 1.0% Single track 1.5%, dual track 1.0%
分辨率 Resolving power	0.001 m/s

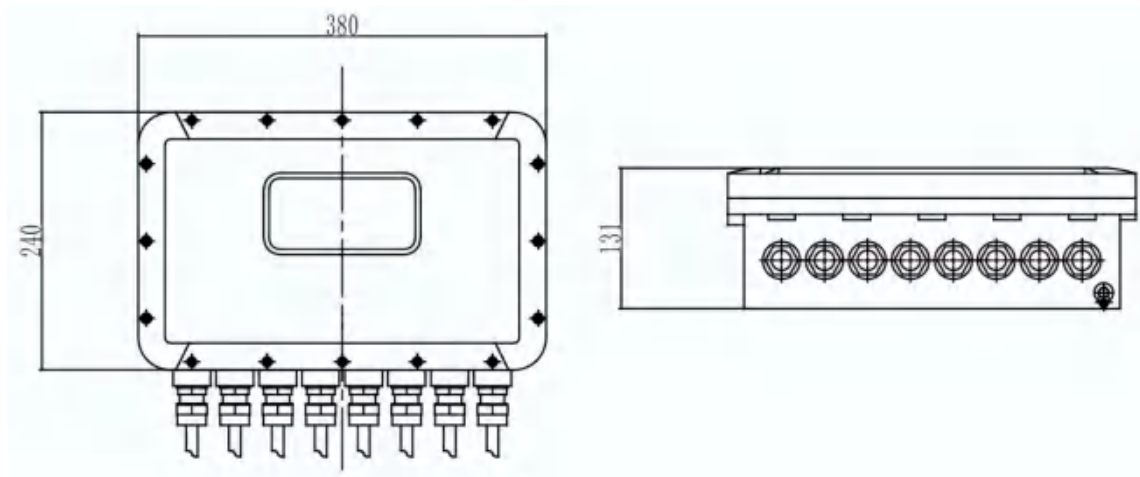
流量分界点 Flow dividing point	$Q_t=0.2Q_{max}$
重复性 Repeatability	1.0 级: Q_t-Q_{max} 0.2%; $Q_{min}-Q_t$ 0.4% 1.5 级: Q_t-Q_{max} 0.3%; $Q_{min}-Q_t$ 0.6% Grade 1.0: Q_t-Q_{max} 0.2%; $Q_{min}-Q_t$ 0.4% Grade 1.5: Q_t-Q_{max} 0.3%; $Q_{min}-Q_t$ 0.6%
工作压力 Working pressure	0 ~ 1.0MPa (默认表压传感器, 如需绝压传感器, 需要定制) 0 ~ 1.0MPa (default gauge pressure sensor, customized if absolute pressure sensor is required)
测量方向 Measurement direction	单向或双向测量 Unidirectional or bidirectional
测量要求 Measurement requirements	
介质温度 Medium temperature	-20°C ~ 60°C (极限温度 - 40°C ~ 85°C) -20 ° C ~ 60 ° C (limit temperature - 40 ° C ~ 85 ° C)
环境温度 Environment temperature	-25°C ~ +55°C
信号、通讯及其他功能 Signal, communication and other functions	
输出信号 Output signal	4-20mA, 频率 (脉冲) 4-20mA, frequency (pulse)
通讯接口 Communication interface	RS-485
工作电压 Working voltage	24VDC
功耗 Power consumption	启动电流应 $\geq 2A$, 稳态运行功率 $< 15W$ Starting current $\geq 2A$, steady-state operating power $< 15W$
数据存储 Data storage	18 个月 18 months
前后直管段 Upstream and downstream straight pipe sections	前 10D 后 5D Upstream 10D, downstream 5D
使用操作 Operation	支持波形实时显示与调试, 通过仪表菜单设置运行参数。 Support real-time waveform display and debugging, and set operation parameters through instrument menu.
报警功能 Alarm function	在压力、温度、超声波信号、仪表自身硬件等异常时, 产生告警, 并可以通过上位机软件获取告警信息, 方便维护。 When the pressure, temperature, ultrasonic signal and the hardware of the instrument are abnormal, an alarm will be generated, and the alarm information can be obtained through the upper computer software, which is easy for maintenance.
信号、通讯及其他功能 Signal, communication and other functions	
防爆等级 Explosion proof grade	Exia II C T6 Ga/Exd II C T6 Gb
防护等级 Degree of protection	IP65/IP66

主机安装

Installation of Main Engine

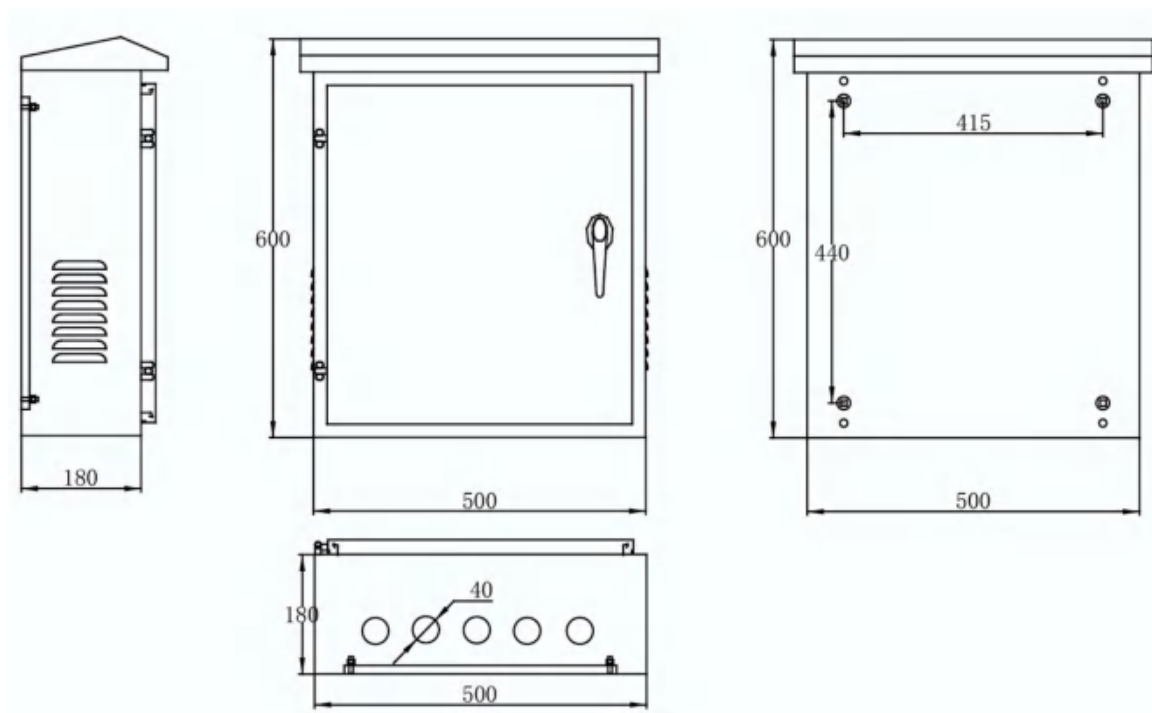
气体超声波流量计主机尺寸图

Dimension drawing of YC-A gas ultrasonic flowmeter main engine



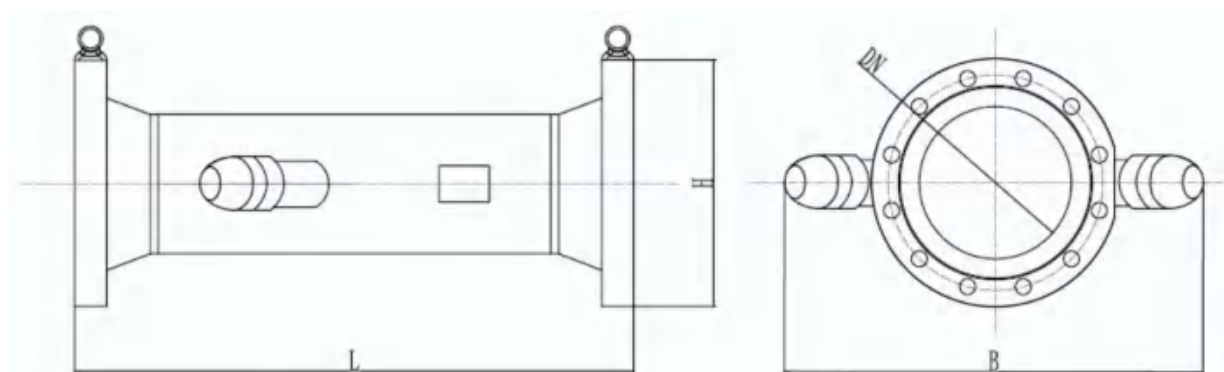
主机配套不锈钢箱子尺寸图

Dimension drawing of supporting stainless steel box for main engine



管段安装

Installation of pipe section



公称口径 Nominal diameter	公称压力 Nominal pressure	法兰标准 Flange standard	测量管内径 Diameter of meter pipe	表体长度 Body length	表体宽度 Body width	表体高度 Body height
[DN]	[MPa]		[mm]	L[mm]	B[mm]	H[mm]
DN50	1.0	GB/T9119	50	520	400	165

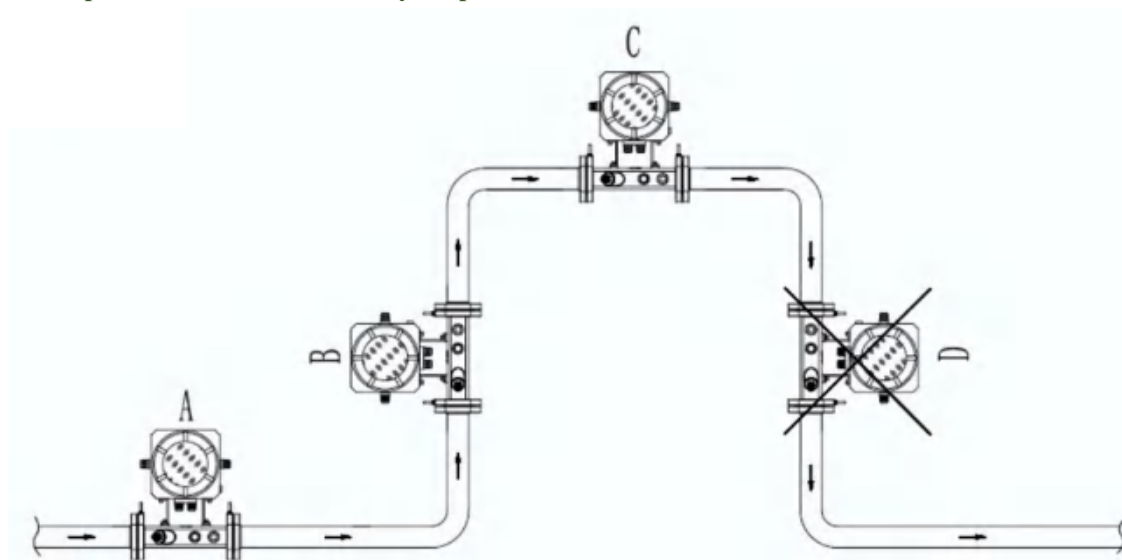
DN80	1.0	GB/T9119	80	550	430	200
DN100	1.0	GB/T9119	100	550	450	220
DN150	1.0	GB/T9119	150	600	500	285
DN200	1.0	GB/T9119	200	700	550	340
DN250	1.0	GB/T9119	250	750	594	405
DN300	1.0	GB/T9119	300	900	650	460
DN350	1.0	GB/T9119	350	1050	686	520
DN400	1.0	GB/T9119	400	1200	750	580

安装位置

Installation Position

流量计安装布置位置说明

Description of installation and layout position of flowmeter



安装位置 Installation position	安装情况说明 Installation description
A、C	水平安装，若含水偏高则推荐 C 安装位。 Horizontal installation. If the water content is high, C installation position is recommended.
B	适用于含水含尘较少的情况，但不推荐使用。 It is applicable to the situation with less water and dust, but it is not recommended.
D	不推荐使用。 Not recommended.

流量仪表 Flowmeter

科氏质量流量计

Coriolis Mass Flowmeter

概述

Introduction

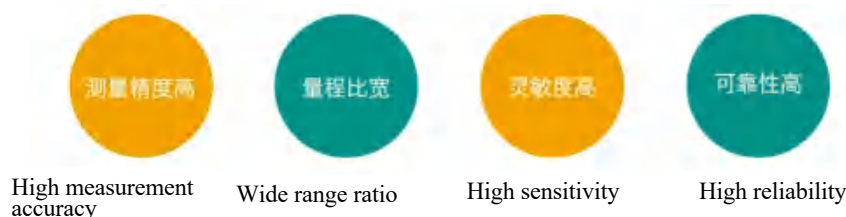
YC-MF-1 系列质量流量计是根据科里奥利 (Coriolis Force) 原理, 实现流体质量流量的直接精密测量, 而无需任何压力、温度、粘度、密度等换算或修正。其结构是由传感器单元和变送器单元两部分组成。仪表按本质安全防爆型的国家标准设计与制造, 防爆标志为 Exia II C T6 Ga/Exd II C T6 Gb。

YC-MF-1 series mass flowmeter is based on Coriolis Force principle, which can realize the direct and precise measurement of fluid mass flow without any conversion or correction of pressure, temperature, viscosity and density. Its structure is composed of sensor unit and transmitter unit. The instrument is designed and manufactured according to the national standard of intrinsically safe explosion-proof, and the explosion-proof mark is Exia II C T6 Ga/Exd II C T6 Gb.



YC-MF-1 系列质量流量计采用了纯数字化自适应驱动核心处理器, 全闭环 DSP 信号处理, 特殊结构, 具有稳定性高, 抗震性能强, 响应时间快, 高精度 (0.1% ~ 0.2%), 低压损, 同步、多参数的测量 (包括: 质量流量、密度、温度、百分比含量), 应用范围广 (可测量各种非牛顿流体、各种浆液、悬浮液、高粘度流体、蒸汽、气液固三相混流体等), 对仪表的前后直管段无要求, 维修率低等特点。

YC-MF-1 series mass flowmeter adopts pure digital adaptive drive core processor, full closed-loop DSP signal processing, special structure, high stability, strong anti-seismic performance, fast response time, high precision (0.1% ~ 0.2%), low pressure loss, synchronous and multi-parameter measurement (including mass flow rate, density, temperature and percentage content), and has a wide application range (can measure all kinds of non-Newtonian fluids, all kinds of slurry, suspension, high viscosity fluid, steam, gas-liquid-solid three-phase mixture, etc.). There are no requirements for the upstream and downstream straight pipe sections of the instrument, and the maintenance rate is low.



工作原理

Principle of Operation

当一个位于以 P 点为旋转中心做旋转运动的管子内的质点做朝向或远离旋转中心的运动时，将产生一惯性力，原理如图 1:

When a particle in a pipe rotating around point P moves towards or away from the center of rotation, it will produce a consistency force. The principle is shown in Figure 1:

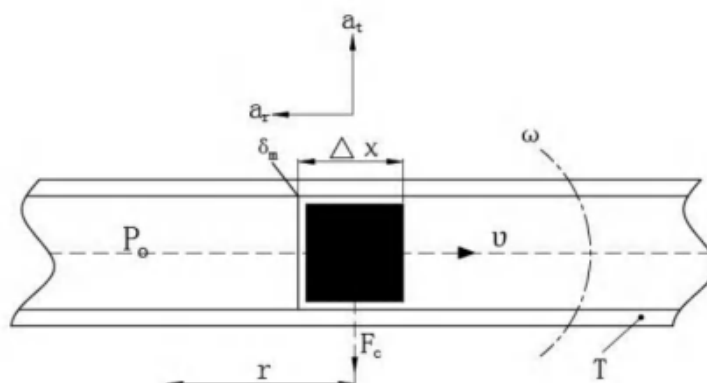


图1

Figure 1

图中质量为 δm 的质点以匀速 v 围绕一个固定点 P 并以角速度 ω 旋转的管道内移动时，这个质点将获得两个加速度分量:

In the figure, when a particle with a mass of δm moves around a fixed point P at a uniform speed v and rotates at an angular speed of ω in a pipe, the particle will obtain two acceleration components:

1. 法向加速度 α_r (向心加速度), 其量值等于 $\omega^2 r$, 方向朝向 P 点;

Normal acceleration α_r (centripetal acceleration), its magnitude is equal to $\omega^2 r$, and the direction is toward point P;

2. 切向加速度 α_t (科里奥利加速度), 其量值等于 $2\omega v$, 方向与 α_r 垂直。

The tangential acceleration α_t (Coriolis acceleration), whose magnitude is equal to $2\omega v$, is perpendicular to α_r .

根据牛顿第二运动定律 (力=质量×加速度), 产生科里奥利加速度 α_t , 必定在 α_t 的方向上施加一个相应的力, 其大小等于 $2\omega v \delta m$, 这个力来自向上转动的管道。反向作用于管道上的力, $F_c = 2\omega v \delta m$ (简称科氏力)。图中, 流体 $\delta m = \rho A \Delta x$, 因此科氏力可表示为:

According to Newton's second law of motion (force = mass×acceleration), when Coriolis acceleration α_t is generated, a corresponding force equal to $2\omega v \delta m$ must be applied in the direction of α_t , and this force comes from the upward rotating pipe. The force acting on the pipeline in the opposite direction, $F_c = 2\omega v \delta m$ (Coriolis force for short). In the figure, the fluid $\delta m = \rho A \Delta x$, so the Coriolis force can be expressed as:

$$AF_c = 2\omega v \delta m = 2\omega v \rho A \Delta x = 2\omega \delta q m \Delta x$$

式中: A 为管道内截面积

Where: A is the internal cross-sectional area of the pipeline

$$\delta q m = \delta m / dt = v \rho A$$

对于特定的旋转管道, 其频率特性是一定的, AF_c 取决于 $\delta q m$, 因此, 直接或间接测得在旋转的管道中的流动的流体所施加的科氏力就可以测得质量流量, 这就是质量流量计的基本原理。

For a specific rotating pipeline, its frequency characteristics are certain, and AF_c depends on $\delta q m$. Therefore, the mass flow rate can be measured by directly or indirectly measuring the Coriolis force exerted by the flowing fluid in the rotating pipeline, which is the basic principle of mass flowmeter.

科氏质量流量计系列

Coriolis Mass Flowmeter Series



U型质量流量计

U-shaped mass flowmeter



三角型质量流量计

Triangle mass flowmeter



微弯质量流量计

Micro-bending mass flowmeter

产品特性

Product Features

01

通过流体力学、热力学研究，精准设计了差动结构，仪表真实零点根据需求自己设定小信号切除范围，确保了高灵敏度高质量比，非线性振动抑制技术，平滑的流道设计抗干扰能力极强。

Through the research of fluid mechanics and thermodynamics, the differential structure is precisely designed, and the true zero point of the instrument sets its own small signal cutting range according to the requirements, which ensures high sensitivity and high range ratio, nonlinear vibration suppression technology, smooth flow channel design and strong anti-interference ability.

02

经典的 U 型管，精致三角型管，体积十分流畅，超微弯型管道，稳定性高，压损小。

Classic U-shaped pipe, exquisite triangular pipe, very smooth volume, ultra-micro bent pipe, high stability, less pressure loss.

03

工程师密码与操作员密码，让仪表的调整最简单化。可重新设定响应时间，稳定系数，可用于物联网所需的 485 通讯或 HART 通讯。

Engineer's and operator's password simplify the adjustment of the instrument. The response time and stability coefficient can be reset, which can be used for 485 communication or HART communication required by the Internet of Things.

04

通用电源 220VAC 或 24VDC 也可 220VAC 与 24VDC 自由转换, 自适应 (需现场供电稳定)。

The general power supply 220VAC or 24VDC can also be freely converted from 220VAC to 24VDC, and can be self-adaptive (stable power supply on site is required).

05

全数字闭环控制功能和 DSP 数字处理电路, 实现了高稳定性和良好的两相流及三相流的精准计量。

Full digital closed-loop control function and DSP digital processing circuit realize high stability and good accurate measurement of two-phase and three-phase flow.

06

提供动态的振动平衡匹配技术, 提供动态精度修正, 提供响应时间自设定, 提高提高间歇工作时的系统误差。

It provides dynamic vibration balance matching technology, dynamic accuracy correction and self-setting of response time functions, and it can also improve the system error during intermittent work.

07

流量变送器直接具备批控功能, 精准的控制, 适用于装车等批量控制场合, 可直接接受静电溢油信号。

The flow transmitter has batch control function directly and can be controlled accurately. It is suitable for batch control occasions such as loading and can directly accept electrostatic oil spill signal.

08

由于测量管的精致设计工艺流量计零点的超稳定性, 目前可直接订购最小 $0 \sim 0.2\text{g/s}$ 的流量范围。

Due to the exquisite design of the measuring pipe and the super stability of the zero point of the flowmeter, the minimum flow range of $0 \sim 0.2\text{g/s}$ can be ordered directly at present.

09

超低温 -200°C , 超高压 100Mpa, 超高温 350°C , 超量程比同管径可根据需求订购任意段的高精度区。

Ultra-low temperature -200°C , ultra-high pressure 100Mpa, ultra-high temperature 350°C , over-range ratio of the same pipe diameter can be ordered for any section of high-precision area according to requirements.

标校管线

Calibration Pipeline



技术指标及性能参数

Technical Indicators and Performance Parameters

通用技术指标

General technical index

适用介质：适用于液体、气体、固体、液固、气固、气液固（气体以气泡形式存在）等。

Applicable medium: suitable for liquid, gas, solid, liquid-solid, gas-solid, gas-liquid-solid (gas exists in the form of bubbles), etc.

测量管材质：316L、HC276、HC22、C4 钢、双向钢、HB、TI 合金、喷衬 PTFE 或其他客户要求材质。

Measuring material: 316L, HC276, HC22, C4 steel, bidirectional steel, HB, TI alloy, sprayed PTFE or other materials required by customers.

压力等级：标准出货 1.6MPa 4MPa 或用户要求压力等级，可高至 100MPa。

Pressure grade: the standard product pressure is 1.6MPa, 4MPa or the pressure grade required by the user, which can be as high as 100MPa.

显示：瞬时量小数点前四位后二位，量程量小数点前六位后二位。

Display: four digits before the decimal point of instantaneous quantity and two digits after the decimal point of range quantity.

电源：24VDC 或 220VA、24VDC 和 220VA 通用电源（电源稳定）。

Power supply: 24VDC or 220VA, 24VDC and 220VA universal power supply (stable power supply).

输出信号：4 ~ 20mA 0 ~ 10KHz 脉冲当量输出。

Output signal: 4 ~ 20mA 0 ~ 10KHz pulse equivalent output.

通讯信号：Modbus RTU HART

Communication signal: Modbus RTU HART

防爆标志：Exia II C T6 Ga/Exd II C T6 Gb

Explosion-proof sign: Exia II C T6 Ga/Exd II C T6 Gb

防护等级：IP67

Protection level: IP67

液体

Liquid

液体质量流量/体积流量

Liquid mass flow/volume flow

精度等级：±0.1% ±0.15% ±0.20%

Accuracy grade: ±0.1% ±0.15% ±0.20%

重复性：≤±0.05%

Repeatability: ≤±0.05%

温度性能指标

Temperature performance index

误差: $\pm 0.5^{\circ}\text{C}$

Error: $\pm 0.5^{\circ}\text{C}$

重复性: $\pm 0.05^{\circ}\text{C}$

Repeatability: $\pm 0.05^{\circ}\text{C}$

密度性能指标

Density performance index

液体分辨率: $\pm 0.0005 \text{ g/cm}^3 (0.5 \text{ kg/m}^3)$

Liquid resolution: $\pm 0.0005 \text{ g/cm}^3 (0.5 \text{ kg/m}^3)$

重复性: $\pm 0.0002 \text{ g/cm}^3 (0.2 \text{ kg/m}^3)$

Repeatability: $\pm 0.0002 \text{ g/cm}^3 (0.2 \text{ kg/m}^3)$

测量精度: $\pm 0.002 \text{ g/cm}^3 (2 \text{ kg/cm}^3)$

或: $\pm 0.001 \text{ g/cm}^3 (1 \text{ kg/cm}^3)$

Measurement accuracy: $\pm 0.002 \text{ g/cm}^3 (2 \text{ kg/cm}^3)$

or: $\pm 0.001 \text{ g/cm}^3 (1 \text{ kg/cm}^3)$

气体

Gas

精度等级: $\pm 0.2\%$ $\pm 0.5\%$

Accuracy grade: $\pm 0.2\%$ $\pm 0.5\%$

重复性: $< \pm 0.25\%$

Repeatability: $< \pm 0.25\%$

温度测量范围

Temperature measuring range

零点稳定性指标

Zero stability index

流量 $\times$ 测量不确定度 (如 0.1%) $\geq$ 零点稳定度

Flow $\times$ Measurement uncertainty (e.g. 0.1%) $\geq$ Zero point stability

最大测量误差 (%) : 测量不确定度

Maximum measurement error (%): Measurement uncertainty

重复性: $\pm 1/2 \times$ 测量不确定度

Repeatability: $\pm 1/2 \times$ Measurement uncertainty

流量 $\times$ 测量不确定度 (如 0.1%) $\leq$ 零点稳定度

Flow $\times$ measurement uncertainty (e.g. 0.1%) $\leq$ Zero stability

最大测量误差 (%) : $\pm$ 零点稳定度/测量值 $\times 100\%$

Maximum measurement error (%) : $\pm$ Zero stability/Measured value $\times 100\%$

重复性: $\pm 1/2$ 零点稳定度/测量值 $\times 100\%$

Repeatability: $\pm 1/2$ zero stability/Measured value $\times 100\%$

过程温度的影响

Effect of process temperature

介质温度: $-200 \sim 150^{\circ}\text{C}$; $-50 \sim 150^{\circ}\text{C}$; $-50 \sim 250^{\circ}\text{C}$; $-50 \sim 350^{\circ}\text{C}$;

Medium temperature: $-200 \sim 150^{\circ}\text{C}$; $-50 \sim 150^{\circ}\text{C}$; $-50 \sim 250^{\circ}\text{C}$; $-50 \sim 350^{\circ}\text{C}$

存储温度: $-50 \sim 70^{\circ}\text{C}$

Storage temperature: $-50 \sim 70^{\circ}\text{C}$

工厂标校条件

Factory calibration conditions

- ◆ 检查和标定流量测量不确定度是线性度、重复性和迟滞性。

Check that the measurement uncertainty of calibration flow is linearity, repeatability and hysteresis.

- ◆ 性能指标基于标定工况下的 (通常 $20 \sim 30^{\circ}\text{C}$, 压力 $0.2 \sim 0.4\text{MPa}$), 检测介质: 水。

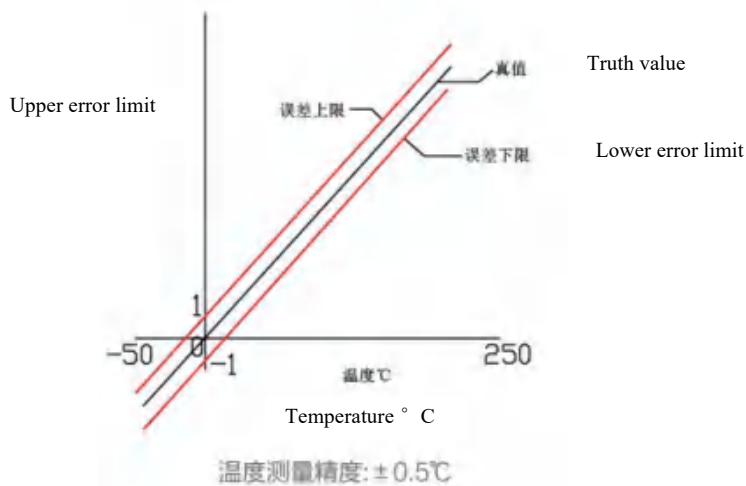
The performance index is based on the calibration condition (usually $20 \sim 30^{\circ}\text{C}$, pressure $0.2 \sim 0.4\text{MPa}$), and the detection medium is water.

- ◆ 测量精度指标基于检定装置采集流量仪表频率或脉冲当量输出作为原始依据性能参数的影响因素。

The measurement accuracy index is based on the frequency or pulse equivalent output of the flow meter collected by the verification device as the influencing factor of the original performance parameter.

1. 温度精度曲线

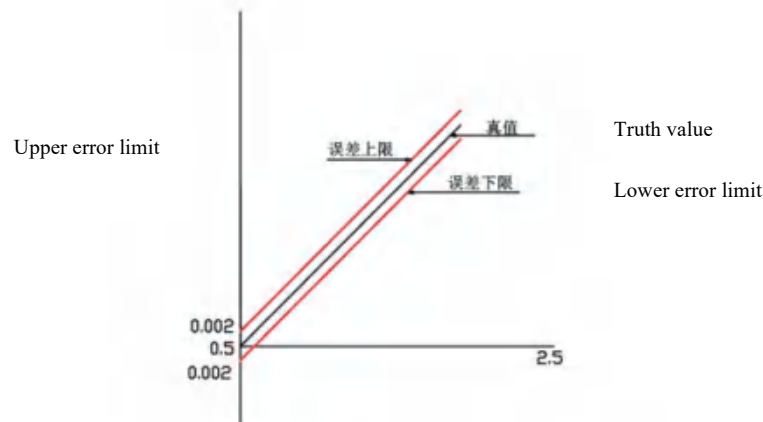
Temperature precision curve



Temperature measurement accuracy: $\pm 0.5^{\circ}\text{C}$

2. 密度精度曲线

Density precision curve



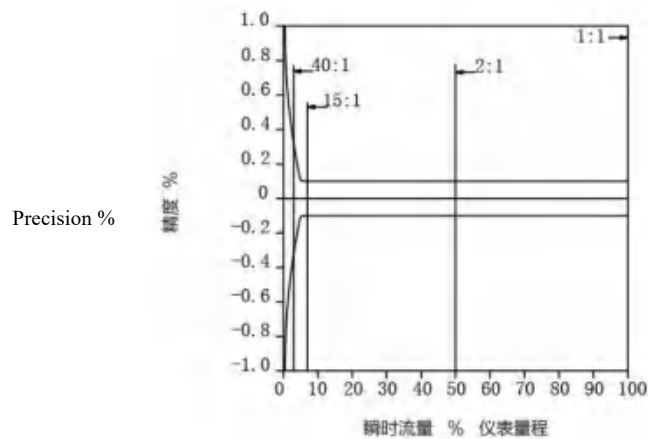
密度测量仅适用于液体 (图形原点坐标从0.5开始)

密度测量范围: 0.5- 2.5 g/cm³

Measurement of density is only applicable to liquid (figure origin coordinates start from 0.5)
Density measurement range: 0.5 - 2.5 g/cm³

3. 瞬时流量精度曲线

Instantaneous flow precision curve



响应时间出厂1秒 (用户可以调整)

Instantaneous flow % Instrument range

The response time is 1 second from the plant (user can adjust)

质量流量计的安装与调试

Installation and Commissioning of Mass Flowmeter

仪表尺寸图

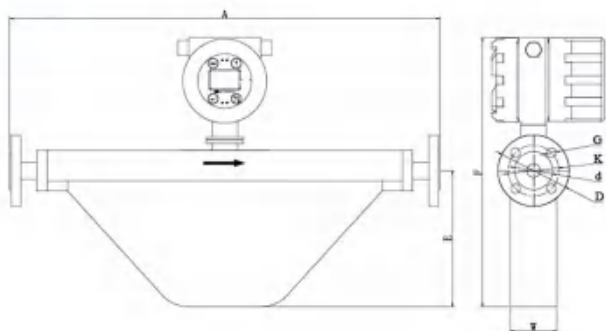
Instrument dimension drawing

质量流量计由精密数字变送器和传感器两部分组成。

Mass flowmeter consists of precision digital transmitter and sensor.

Overall dimensions of V-shaped instrument

V型仪表外形尺寸



(单位 mm)

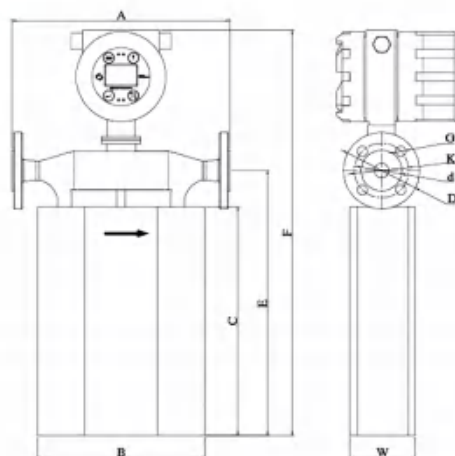
(unit mm)

型号 Model	口径 Size DN	压力 Pressure MPa	A	E	F	W	G	K	d	D
YC-MF-1-V10	10	4	545	150	375	68	14	60	40	90
YC-MF-1-V15	15	4	575	170	395	68	14	65	45	95
YC-MF-1-V20	20	4	660	190	415	68	14	75	58	105
YC-MF-1-V25	25	4	720	205	432	85	14	85	68	115
YC-MF-1-V50	50	4	920	285	533	120	18	125	99	165
YC-MF-1-V65	65	4	920	285	533	120	18	145	122	185
YC-MF-1-V80	80	1.6	1060	360	620	150	18	160	138	200
YC-MF-1-V100	100	1.6	1210	420	695	185	18	180	158	220
YC-MF-1-V125	125	1.6	1210	420	695	185	18	210	188	250
YC-MF-1-V150	150	1.6	1570	535	825	216	22	240	212	285
YC-MF-1-V200	200	1.6	1770	525	855	264	22	295	268	340
YC-MF-1-V250	250	1.6	1770	525	855	264	26	355	320	405

YC-MF-1-V300	300	1.6	1900	625	625	315	26	410	378	460
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Overall dimensions of U-shaped instrument

U型仪表外形尺寸



(单位 mm)
(unit mm)

型号 Model	口径 Size DN	压力 Pressure MPa	A	B	C	E	F	W	G	K	d	D
YC-MF-1-U10	10	4	280	210	235	285	495	80	14	60	40	90
YC-MF-1-U15	15	4	280	210	275	325	535	80	14	65	45	95
YC-MF-1-U20	20	4	300	230	325	375	585	90	14	75	58	105
YC-MF-1-U25	25	4	410	300	440	500	715	120	14	85	68	115
YC-MF-1-U50	50	4	500	360	480	585	805	130	18	110	88	150
YC-MF-1-U65	65	4	550	370	548	670	890	153	18	125	99	165
YC-MF-1-U80	80	4	560	440	600	715	955	200	18	145	122	185
YC-MF-1-U100	100	1.6	600	470	650	767	1005	220	18	160	138	200
YC-MF-1-U125	100	1.6	620	510	740	858	1110	260	18	180	158	220

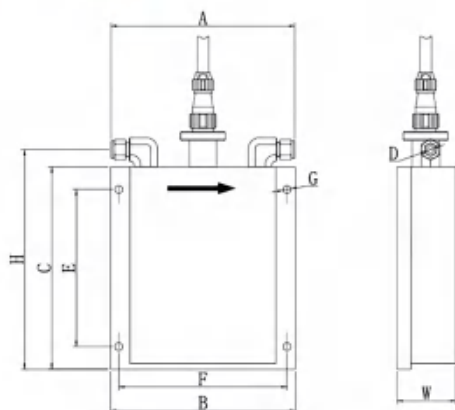
YC-MF-1-U150	125	1.6	620	510	740	858	1110	260	18	210	188	250
YC-MF-1-U200	150	1.6	785	670	950	1130	1370	280	22	240	212	285
YC-MF-1-U250	200	1.6	800	670	950	1130	1370	280	22	240	212	285
YC-MF-1-U300	250	1.6	815	670	950	1130	1370	280	22	240	212	285

说明：以上型号默认为一体式，分体需定制。

Note: The above models are integrated type by default, and the split type needs to be customized.

Outline dimensions of micro-flow meter

微小流量仪表外形尺寸



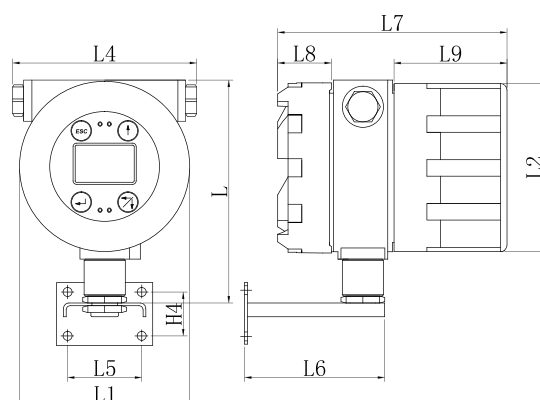
型号 Model	接管外径 Nozzle outer diameter	PN (MPa)	A	B	C	E	F	H	W	G	D
YC-MF-1-S3	6	25	160	165	180	140	150	193	53	7	6.1
YC-MF-1-S6	8	25	160	165	180	140	150	193	53	7	8.1
YC-MF-1-S8	8	25	175	208	245	185	188	258	53	7	8.1

说明：以上型号默认为分体式，电缆长度可定制，默认长度 1 米，最长不可超过 300 米。

Note: The above models are split type by default, and the cable length can be customized. The default length is 1m, and the maximum length cannot exceed 300m.

Outline dimension drawing of transmitter

变送器外形尺寸图



名称 Name	L	L1	L2	L4	L5	L6	L7	L8	L9	H4
变送器 Transmitter	156	125	118	130	54	102	180	45.5	85	32

仪表的安装

Installation of Instruments

流量计入口，出口应安装截止阀，务必加装支撑，初次安装使用前必须要零点校准。

Cut-off valves should be installed at the inlet and outlet of flowmeter, and supports must be installed. Zero calibration must be done before initial installation and use.

连接管路与仪表接口要位于同一轴心，不可对仪表施加一个附加的力。不必要的附加力会对仪表的测量精度产生影响。

The connection pipe and instrument interface should be located on the same axis, and no additional force should be applied to the instrument. Unnecessary additional force will affect the measurement accuracy of the instrument.

仪表的安装位置请远离热源，防止变送器过热造成损坏。

Please keep away from the heat source to prevent the transmitter from being damaged due to overheating.

科里奥利质量流量计是振动的工作原理，所以安装位置要尽量避免振动，远离振源，并对安装管路做好稳固的前后支撑。如振动源不可避免，建议使用金属软管连接。

Coriolis mass flowmeter is the working principle of vibration, so the installation position should try to avoid vibration, keep away from the vibration source, and provide stable front and rear support for the installation pipeline. If the vibration source is unavoidable, it is recommended to use metal hose connection.

测量蒸汽或高粘度流体，尽量安装垂直管道。

When measuring steam or high viscosity fluids, install vertical pipes as far as possible.

测量高温流体必须要求保温时，保温壳体或伴热管道请勿与传感器壳体直接接触。本公司可以为科里奥利传感器提供定制保温壳体，可用于蒸汽或导热油或电（防爆）的保温伴热，仪表外壳和测量管会有50°C温差。

When the measurement of high-temperature fluid requires insulation, the insulation housing or heat tracing pipe shall not be in direct contact with the sensor housing. Our company can provide customized thermal insulation housing for Coriolis sensor, which can be used for thermal insulation and heat tracing of steam or heat transfer oil or electricity (explosion-proof). There will be a temperature difference of 50°C between instrument housing and measuring pipe.

被测流体要处在合适的流动状态，如果自然环境条件下，流体的流动状态不适宜，可以采取调节流体温度的措施（升温/降温/保温），使被测流体处于合适的流动状态。

The measured fluid should be in a proper flowing state. If the flowing state of the fluid is not suitable under the natural environment, measures (heating/cooling/heat preservation) can be taken to make the measured fluid in a proper flowing state.

安装方向：确认传感器铭牌上的箭头方向和流体的流向（流体流过管道的方向）一致。

Installation direction: Confirm that the arrow direction on the sensor nameplate is consistent with the flow direction of fluid (the direction of fluid flowing through the pipeline).

传感器与变送器的编号要一一对应，不可随意更换，否则可能产生测量误差。

The number of sensor and transmitter shall be one-to-one corresponding and cannot be replaced at will, otherwise measurement error may occur.



安装方式

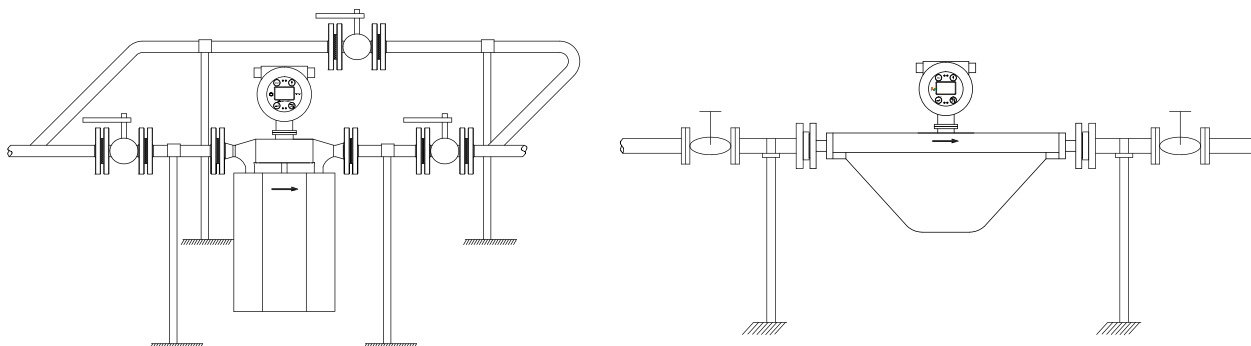
Installation Mode

水平安装

Horizontal installation

适用于液体测量工况，保证流体中可能存在的气体排出。

It is applicable to the working condition of liquid measurement to ensure that the gas that may exist in the fluid is discharged.

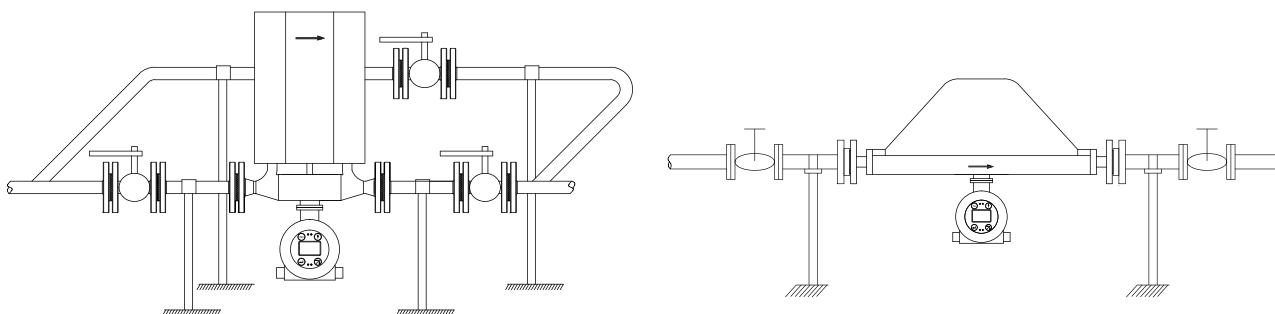


倒立安装

Inverted installation

适用于气体、高粘度液体、气固流体、液固流体测量工况，保证流体中可能存在凝液排除。

It is suitable for gas, high viscosity liquid, gas-solid fluid, liquid-solid fluid measurement conditions, and it can ensure that there may be condensate removal in the fluid.

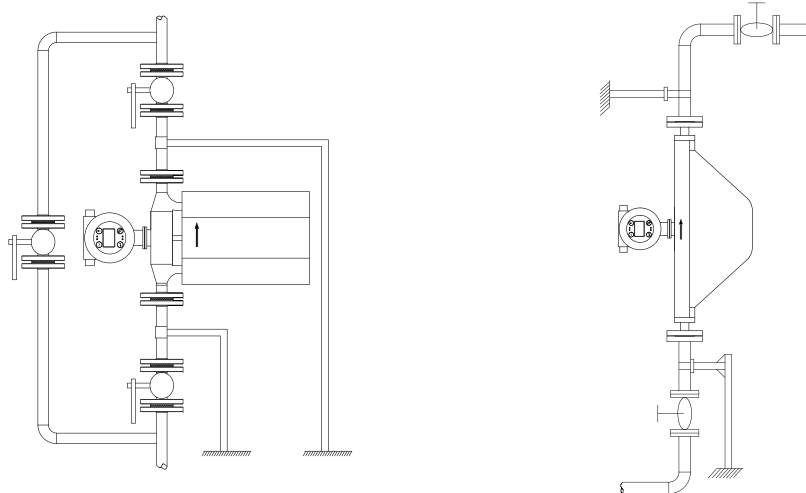


旗式安装下进上出

Flag installation, lower in and upper out

适用于高粘度液体、高温流体、液固或气固流体并需要经常性排空管道内流体的工况。

It is suitable for high viscosity liquid, high temperature fluid, liquid-solid or gas-solid fluid, and the fluid in the pipeline needs to be drained frequently.

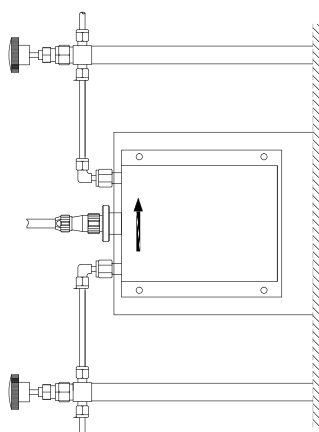


旗式安装 上进下出

Flag installation upper in and lower out

适用于溢流、蒸汽（含液）的工况，但流量计出口位置的阀门十分重要，可以有效的避免个别的虹吸效应。

It is suitable for overflow and steam (containing liquid) conditions, but the valve at the mouth of the flowmeter is very important, which can effectively avoid individual siphon effect.



接线说明

Wiring Instructions

1. 传感器与变送器之间的接线

Wiring between sensor and transmitter

一体化仪表在出厂前变送器与传感器已经连接并安装好。

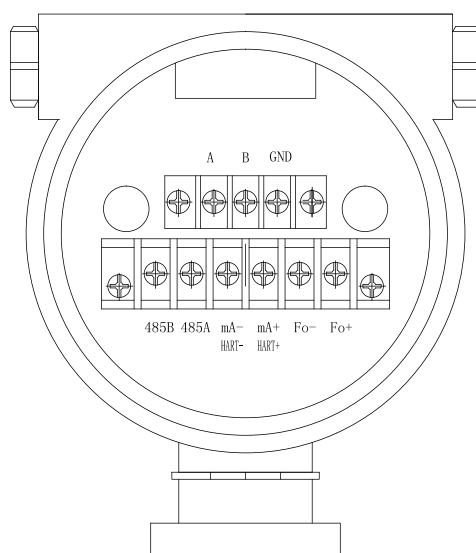
The transmitter and sensor of the integrated instrument have been connected and installed before leaving the plant.

分体式传感器与变送器之间通过专用电缆和接头连接，电缆和接头出厂前已经安装好，用户可自行通过接头连接。

The split sensor and transmitter are connected through special cables and connectors. The cables and connectors have been installed before leaving the plant, and users can connect through connectors by themselves.

2. 变送器的接线

Wiring of transmitter



3. 接线说明

Wiring instructions

24V+/- or 220VAC 24VDC 电源（电流不小于 500mA）或 220VAC 自动转换

24V+/- or 220VAC 24VDC power supply (current not less than 500mA) or 220VAC automatic conversion

Fo+/- 频率输出（瞬时质量流量或体积流量）/ 脉冲输出（当量可设定）

Fo+/- Frequency output (instantaneous mass flow or volume flow) / pulse output (equivalent can be set)

mA+/- 电流输出（瞬时流量或密度可选）

mA+/- Current output (instantaneous flow or density can be selected)

(HART + \-) HART

(HART + \-) HART

485A \ 485B RS-485S 通讯（波特率：“9600”，本机地址：设定为 "1"）

485A \ 485B RS-485S communication (baud rate: "9600", local address: set to "1")

GND 信号屏蔽地

GND Signal shielding ground



仪表外壳地



Instrument housing ground



警告

Warning

- ◆ 电源电压可能会导致严重的伤害。
Power supply voltage may cause serious injury.
- ◆ 请确保在安装或检修仪表前切断电源。
Make sure to cut off the power supply before installing or overhauling the instrument.
- ◆ 不正确的安装可能使仪表不能正常工作或损坏。
Improper installation may cause the instrument to malfunction or damage.
- ◆ 参考说明书的安装部分与传感器的接线部分。
Refer to the installation part and the sensor wiring part of the manual.
- ◆ 危险场合的不正确安装和操作可能产生危险。
Improper installation and operation in dangerous situations may cause danger.
- ◆ 关于危险场合的技术参数，请参考防爆部分说明。
For the technical parameters of dangerous situations, please refer to the explosion-proof section.
- ◆ 变送器的频率输出与电流输出不可外接任何等级的电源。
The frequency and current output of the transmitter cannot be connected with any level of power supply.
- ◆ 频率和电流输出默认为有源输出，如须无源输出订货时需特殊说明。
Frequency and current outputs are active outputs by default, and special instructions are required when ordering passive outputs.
- ◆ 错误的外接电源可能造成仪表的损坏。
The wrong external power supply may damage the instrument.

仪表的通电和检查

Energization and Inspection of Instruments

通电前请务必保证仪表接线的正确。

Please make sure that the instrument wiring is correct before electrifying.

变送器的设计具有常规的错线保护，但错误的接线仍可能造成仪表的损坏，通电前请务必保证仪表的接线正确。

The transmitter is designed with conventional wire fault protection, but the wrong wiring may still cause damage to the instrument. Please ensure the correct wiring of the instrument before powering on.

通电后仪表显示“初始化，请等待……”

After power-on, the meter displays "Please wait while initializing..."

常见故障的排除

Troubleshooting of Common Faults

故障现象 Fault phenomenon	故障原因 Fault causes	解决方法 Solutions
仪表没有显示 Meter is not displayed.	检查供电是否正常 Check whether the power supply is normal.	确保电源工作正常 Make sure the power supply works properly.
测量值波动大 Measured value fluctuates greatly.	连接传感器管线是否有强烈振动 Whether there is strong vibration in the pipeline connecting the sensor.	加支撑或改用软管连接 Support or use hose connection instead.
开机不能进入测量界面 Unable to enter the measurement interface after startup.	没有连接传感器 No sensor connected.	检查电缆线，并正确连接到传感器 Check the cable and connect it to the sensor correctly.
零点漂移大 Large zero drift	传感器安装有应力 Stress sensor installed	连接管路与传感器接口要同一轴心 Connecting pipeline and the sensor interface should have the same axis.
不准 Inaccurate	安装未做支撑 零点未调 Installation without support Zero drift unadjusted	入口出口加装支撑 调零点 Install support at inlet and outlet. Zero drift adjusted

维修与保养

Repair and Maintenance

产品的寿命长短与维修和保养的好坏有关，为了延长产品的适用寿命，一定要做好维修和保养工作：

The service life of products is related to the quality of repair and maintenance. In order to prolong the applicable life of products, repair and maintenance must be done well:

1. 保持流量计清洁，尽量不要放在灰尘过多的地方，同时要做好防晒防潮。

Keep the flowmeter clean, try not to put it in a place with too much dust, and do a good job in sunscreen and moisture-proof.

2. 流量计须轻拿轻放，不得摔扔。

The flowmeter shall be handled with care and shall not be thrown.

3. 流量计传感器须定期冲洗，用于测量高粘度介质的须缩短清洗周期。

The flowmeter sensor should be washed regularly, and the cleaning cycle should be shortened if it is used to measure high viscosity media.

4. 定期对流量计检修。准确度要求较高的用户，需定期送国家计量部门检定。

Check and repair the flowmeter regularly. Users with high accuracy requirements should be sent to the national metrological department for verification regularly.

变送器的设置

Transmitter Settings

功能设置

Function Setting

1. 用户菜单密码

User menu password

用户菜单密码为: 020

User menu password is 020.

此密码可完成“查看记录”、“修改设置”、“输出测试”及“清除故障码”等功能。在“修改设置”菜单内可完成“累计清零”、“零点校准”、“单位转换”、“小数点位数设置”、“响应时间调整”、“输出电流信号（流量/密度）切换”及“小信号切除等”功能。

This password can complete the functions of "Record View", "Modify Settings", "Output Tests" and "Fault Code Cleaning". In the Modify Settings menu, it can complete the functions of "Cumulative Zero", "Zero Calibration", "Unit Conversion", "Decimal Point Setting", "Response Time Adjustment", "Output Current Signal (Flow/Density) Switching" and "Small Signal Cutting", etc.

2. 系统菜单密码

System menu password

本级菜单与仪表的标定参数有关，不建议用户更改。如确有需要，请与售后服务联系，在相关技术人员的指导下进行操作。

This level menu is related to the calibration parameters of the instrument, and it is not recommended for users to change it. If necessary, please contact the after-sales service and operate under the guidance of relevant technicians.

3. 测量单位的选择

Selection of measuring units

选择不同单位后的量程转换是由软件自动完成的。

The range conversion after selecting different units is automatically completed by software.

公制单位: t/h kg/h g/h t/min kg/min g/min kg/s g/s m³/h L/h ml/h m³/min L/s ml/s

Metric unit: t/h kg/h g/h t/min kg/min g/min kg/s g/s m³/h L/h ml/h m³/min L/s ml/s

英制单位: lb/h oz/h lb/min oz/min lb/s oz/s gal/h gal/min gal/s

Imperial unit: lb/h oz/h lb/min oz/min lb/s oz/s gal/h gal/min gal/s

注：1. 可选择流量 0 至 3 位小数显示。

Note: The flow rate can be displayed with 0 to 3 decimal places.

2. 质量单位之间可按需要切换，质量单位切换到体积单位请联系售后。

The quality units can be switched as required. If the quality unit switches to unit of volume, please contact the after-sales service.

4. 电流输出的设置

Setting of current input

可选择流量或者密度的 (4 ~ 20) mA 输出

(4 ~ 20) mA transmission with selectable flow or density

5. 频率/脉冲的输出

Output of frequency/pulse

可选择频率输出或脉冲输出。

Frequency output or pulse output can be selected.

频率输出只对应“瞬时质量流量”或相应质量流量”的体积流量。

Frequency transmission only corresponds to the volume flow rate of "instantaneous mass flow rate" or corresponding mass flow rate.

脉冲输出（当量可设定）。

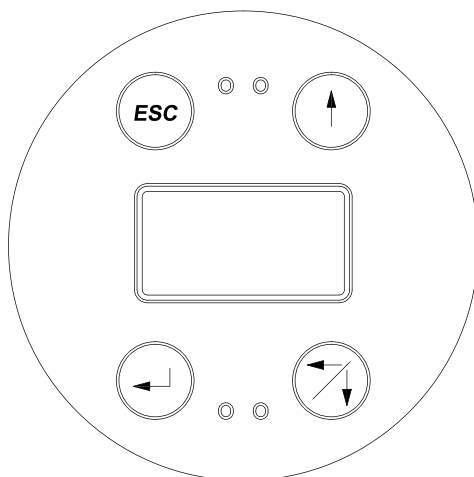
Pulse output (equivalent can be set).

仪表面板

Instrument Panel

变送器面板按钮为触摸按钮，无需开盖，直接触摸即可操作。

The transmitter panel button is a touch button, which can be operated by direct touch without opening the cover.



零点校准

Zero Calibration

首先保证流量计安装正确，让被测流体通过流量计运行 3 ~ 5 分钟，先关闭流量计出口阀门，然后关闭流量计入口阀门，保持静止状态下 1 ~ 2 分钟，进行零点校准，首先按 输入密码，按 调整光标到中间，按 进行密码输入 020 进入，按 进入菜单栏，点 到修改设置，点 进入操作页面，点 到零点校准，按 进入修改，点 否改成是，点击 ，等测试画面过后，自动到显示界面，即可正常使用。

First, ensure that the flowmeter is installed correctly, and the measured fluid should run through the flowmeter for 3 ~ 5 minutes. Close the outlet valve of the flowmeter, then close the inlet valve of the flowmeter, and keep it in a static state for 1 ~ 2 minutes and then conduct the zero calibration. First, press to enter the password, press to adjust the cursor to the middle, press to enter the password 020, press to enter the menu bar, click to modify settings, click to enter the operation page, and click to zero for calibration. Press to enter the modification, click change NO to YES, click , and after the test screen, it will automatically go to the display interface for normal use.

流向设置

Flow Direction Setting

流体流动方向与流量计标注流向一致为正流向，在“修改设置”菜单中找到流向设置，设置成“正向”，进行正向计量，出厂已默认设置；流体流动方向与流量计标注流向相反为反流向在“修改设置”菜单中找到流向设置，设置成“反向”，即可反向计量。

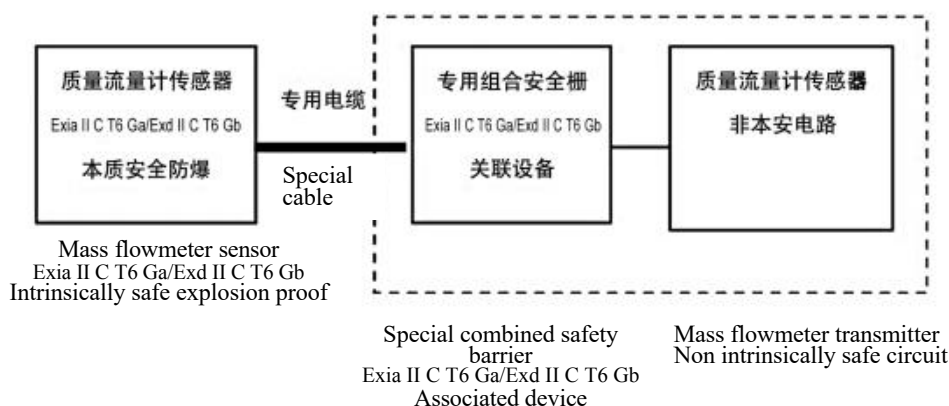
The flow direction of fluid is consistent with the direction marked by the flowmeter as the positive flow direction. Find the flow direction setting in the "Modify Settings" menu, and set it to "Forward" for forward measurement, which has been set by default in the plant. The flow direction of the fluid is opposite to the flow direction marked by the flowmeter, which is the reverse flow direction. Find the flow direction setting in the "Modify Settings" menu, and set it to "Reverse" to measure in reverse.

防爆

Explosion-proof

YC-MF-1系列质量流量计由传感器、变送器（内含专用组合安全栅，简称安全栅）组成。其中YC-MF-1系列质量流量计为本质安全型防爆产品，变送器为传感器的专用关联设备，采用隔爆型壳体，防爆标志：Exia II C T6 Ga/Exd II C T6 Gb。

YC-MF-1 series mass flowmeter is composed of sensor and transmitter (including special combined safety barrier, hereinafter referred to as safety barrier). Among them, YC-MF-1 series mass flowmeter is an intrinsically safe explosion-proof product, and the transmitter is a special associated device of the sensor. It adopts an explosion-proof housing with explosion-proof mark: Exia II C T6 Ga/Exd II C T6 Gb.



防爆性能

Explosion-proof Performance

防爆性能试验送防爆电气产品检验认证部门根据 GB 3836.1-2010, GB 3836.2-2010 和 GB3836.4-2010 的有关条款进行。防爆性能应符合 GB 3836.1-2010、GB 3836.2-2010 和 GB 3836.4-2010 标准要求。

The explosion-proof performance test shall be sent to the inspection and certification department of explosion-proof electrical products according to relevant clauses of GB 3836.1-2010, GB3836.2-2010 and GB3836.4-2010. The explosion-proof performance shall meet the requirements of GB 3836.1-2010, GB 3836.2-2010 and GB 3836.4-2010 standards.

Modbus RUT 地址表

Modbus RUT Address Table

序号 No.	寄存器 Temporary storage	地址（十六进制/十进制） Address (hexadecimal / decimal)	中文菜单名称 Chinese menu name
1	41001	0x03E8/1000	瞬时质量流量 Instantaneous mass flow
2	41003	0x03EA/1002	累积质量流量 Cumulative mass flow
3	41005	0x03EC/1004	瞬时体积流量 Instantaneous volume flow
4	41007	0x03EE/1006	累积体积流量 Cumulative volume flow
5	41009	0x03F0/1008	密度 Density
6	41011	0x03F2/1010	温度 Temperature
7	41013	0x03F4/1012	组分 A 的含量 Component A content
8	41015	0x03F6/1014	内部参数 Internal parameters
9	41017	0x03F8/1016	内部参数 Internal parameters
10	41019	0x03FA/1018	内部参数 Internal parameters

11	41021	0x03FC/1020	内部参数 Internal parameters
12	41023	0x03FE/1022	内部参数 Internal parameters
13	41025	0x0400/1024	内部参数 Internal parameters
14	41027	0x0402/1026	内部参数 Internal parameters
15	41029	0x0404/1028	内部参数 Internal parameters
16	41031	0x0406/1030	内部参数 Internal parameters
17	41033	0x0408/1032	内部参数 Internal parameters
18	41035	0x040A/1034	内部参数 Internal parameters
19	41037	0x0400/1036	内部参数 Internal parameters
20	41039	0x040E/1038	内部参数 Internal parameters
21	41041	0x0410/1040	内部参数 Internal parameters
22	41043	0x0412/1042	内部参数 Internal parameters
23	41045	0x0414/1044	内部参数 Internal parameters
24	41047	0x0416/1046	内部参数 Internal parameters
25	41049	0x0418/1048	内部参数 Internal parameters
26	41051	0x041A/1050	内部参数 Internal parameters
27	41053	0x0410/1052	内部参数 Internal parameters
28	41055	0x041E/1054	内部参数 Internal parameters
29	41057	0x0420/1056	内部参数 Internal parameters
30	41059	0x0422/1058	内部参数 Internal parameters



31	41061	0x0424 /1060	内部参数 Internal parameters
32	41063	0x0426/1062	内部参数 Internal parameters
33	41065	0x0428/1064	内部参数 Internal parameters
34	41067	0x042A/1066	内部参数 Internal parameters
35	41069	0x042C/1068	内部参数 Internal parameters
36	41071	0x042E/1070	内部参数 Internal parameters
37	41073	0x0430/1072	内部参数 Internal parameters
38	41075	0x0432/1074	内部参数 Internal parameters
39	41077	0x0434 /1076	累积量清零 Cumulant clearing
40	41079	0x0436/1078	内部参数 Internal parameters
41	41081	0x0438/1080	内部参数 Internal parameters
42	41083	0x043A/1082	内部参数 Internal parameters
43	41085	0x043C/1084	内部参数 Internal parameters
44	41087	0x043E/1086	内部参数 Internal parameters
45	71089	0x0440/1088	内部参数 Internal parameters
46	41091	0x0442 /1090	内部参数 Internal parameters
47	41093	0x0444 /1092	内部参数 Internal parameters
48	41095	0x0446/1094	内部参数 Internal parameters
49	41097	0x0448/1096	内部参数 Internal parameters
50	41099	0x044A/1098	内部参数 Internal parameters
51	41101	0x0440/1100	内部参数 Internal parameters
52	41103	0X044E/1102	内部参数 Internal parameters

53	41105	0x0450/1104	零点校准 Zero calibration
54	41107	0x0452/1106	内部参数 Internal parameters
55	41109	0x0454/1108	内部参数 Internal parameters
56	41111	0x0456/1110	内部参数 Internal parameters

通讯设置说明

Communication setup instructions

- 出厂默认参数设置，波特率：9600，数据位：8，停止位：1，奇偶校验：无；
Plant default parameter setting, baud rate: 9600, data bit: 8, stop bit: 1, parity check: none;
- 通讯设置参数，在仪表内部均可修改；
Communication setting parameters can be modified inside the instrument;
- 所有数据类型均为浮点数；
All data types are floating-point numbers;
- 远程校准时务必保证仪表内部充满介质并静止。
During remote calibration, ensure that the instrument is filled with medium and static.

仪表选型指南

Instrument Selection Guide

代码：YC-MF-1- Code: YC-MF-1-	产品统一代码 Unified product code	
微弯 Micro bending	口径 Size	测量范围 Measuring range
V10	仪表通径：10mm Instrument diameter: 10mm	0-1t/h
V15	仪表通径：15mm Instrument diameter: 15mm	0-3.5t/h
V20	仪表通径：20mm Instrument diameter: 20mm	0-5.5t/h
V25	仪表通径：25mm Instrument diameter: 25mm	0-20t/h
V50	仪表通径：50mm Instrument diameter: 50mm	0-40t/h



V65	仪表通径: 65mm Instrument diameter: 65mm	0-50t/h
V80	仪表通径: 80mm Instrument diameter: 80mm	0-100t/h
V100	仪表通径: 100mm Instrument diameter: 100mm	0-200t/h
V125	仪表通径: 125mm Instrument diameter: 125mm	0-300t/h
V150	仪表通径: 150mm Instrument diameter: 150mm	0-500t/h
V200	仪表通径: 200mm Instrument diameter: 200mm	0-700t/h
V250	仪表通径: 250mm Instrument diameter: 250mm	0-800t/h
V300	仪表通径: 300mm Instrument diameter: 300mm	0-1000t/h

U 型 U-shaped	口径 Size	测量范围 Measuring range
S3	仪表通径: 3mm Instrument diameter: 3mm	0-40kg/h 0-4kg/h (用于高粘度流体、气体等) 0-40kg/h 0-4kg/h (for high viscosity fluids, gases, etc.)
S6	仪表通径: 6mm Instrument diameter: 6mm	0-100kg/h 0-10kg/h (用于高粘度流体、气体等) 0-100kg/h 0-10kg/h (for high viscosity fluids, gases, etc.)
S8	仪表通径: 8mm Instrument diameter: 8mm	0-200kg/h 0-20kg/h (用于高粘度流体、气体等) 0-200kg/h 0-20kg/h (for high viscosity fluids, gases, etc.)
U10	仪表通径: 10mm Instrument diameter: 10mm	0-500kg/h 0-50kg/h (用于高粘度流体、气体等) 0-500kg/h 0-50kg/h (for high viscosity fluids, gases, etc.)
U15	仪表通径: 15mm Instrument diameter: 15mm	0-1500kg/h 0-150kg/h (用于高粘度流体、气体等) 0-1500kg/h 0-150kg/h (for high viscosity fluids, gases, etc.)
U20	仪表通径: 20mm Instrument diameter: 20mm	0-3000kg/h 0-300kg/h (用于高粘度流体、气体等) 0-3000kg/h 0-300kg/h (for high viscosity fluids, gases, etc.)
U25	仪表通径: 25mm Instrument diameter: 25mm	0-10t/h 0-1t/h (用于高粘度流体、气体等) 0-10t/h 0-1t/h (for high viscosity fluids, gases, etc.)

U40	仪表通径：40mm Instrument diameter: 40mm	0-20t/h 0-2t/h (用于高粘度流体、气体等) 0-20t/h 0-2t/h (for high viscosity fluids, gases, etc.)
U50	仪表通径：50mm Instrument diameter: 50mm	0-30t/h 0-3t/h (用于高粘度流体、气体等) 0-30t/h 0-3t/h (for high viscosity fluids, gases, etc.)
U65	仪表通径：65mm Instrument diameter: 65mm	0-50t/h 0-5t/h (用于高粘度流体、气体等) 0-50t/h 0-5t/h (for high viscosity fluids, gases, etc.)
U80	仪表通径：80mm Instrument diameter: 80mm	0-100t/h 0-10t/h (用于高粘度流体、气体等) 0-100t/h 0-10t/h (for high viscosity fluids, gases, etc.)
U100	仪表通径：100mm Instrument diameter: 100mm	0-150t/h 0-15Vh (用于高粘度流体、气体等) 0-150t/h 0-15Vh (for high viscosity fluids, gases, etc.)
U125	仪表通径：125mm Instrument diameter: 125mm	0-200t/h 0-20t/h (用于高粘度流体、气体等) 0-200t/h 0-20t/h (for high viscosity fluids, gases, etc.)
U150	仪表通径：150mm Instrument diameter: 150mm	0-500t/h 0-50Vh (用于高粘度流体、气体等) 0-500t/h 0-50Vh (for high viscosity fluids, gases, etc.)
U200	仪表通径：200mm Instrument diameter: 200mm	0-700t/h 0-70t/h (用于高粘度流体、气体等) 0-700t/h 0-70t/h (for high viscosity fluids, gases, etc.)
U250	仪表通径：250mm Instrument diameter: 250mm	0-800t/h 0-80t/h (用于高粘度流体、气体等) 0-800t/h 0-80t/h (for high viscosity fluids, gases, etc.)

三角型 Triangular type	口径 Size	测量范围 Measuring range
3CLS10	仪表通径：10mm Instrument diameter: 10mm	0-1.5t/h
3CLS15	仪表通径：15mm Instrument diameter: 15mm	0-2.0t/h
3CLS20	仪表通径：20mm Instrument diameter: 20mm	0-3.0t/h
3CLS25	仪表通径：25mm Instrument diameter: 25mm	0-10t/h



代码: YC-MF-1- Code: YC-MF-1-	产品统一代码 Unified product code
代码 Code	精度等级 Accuracy grade
A	±0.50%
N	±0.20%
M	±0.15%
H	±0.10%
代码 Code	传感器温度等级 (250°C 以上 ~ 50°C 以下为分体式) Sensor temperature grade (split type is above 250 °C ~ below 50 °C)
A	-50 ~ 150°C
B	-50 ~ 250°C
C	-50 ~ 350°C
D	-200 ~ 150°C
代码 Code	耐压等级 (可高至 100MPa) Withstand pressure grade (up to 100MPa)
16	1.6MPa
40	4.0MPa
XX	特制: 运用此字母申请特制, 标注压力等级 Special made: use this letter to apply for special made and mark the pressure grade
代码 Code	测量管材质 Measuring pipe material
A	测量管: 接液 316L Measuring pipe: liquid-contacting 316L
C	测量管: 接液 HC 合金 Measuring pipe: liquid-contacting HC alloy
D	测量管: 内壁表面喷四氟 Measuring pipe: the inner wall surface is sprayed with tetrafluoroethylene
E	特制: 运用此字母申请特制, 标注使用材质 Special made: use this letter to apply for special made, and mark the materials used.
代码 Code	过程连接 Process connection
F	标准法兰 HG/T 20592-2009 Standard flange HG/T 20592-2009
W	卫生型 Hygienic type
L	焊接螺纹 Welded thread
T	其他特殊要求连接方式, 订货时需详细说明 Other connection methods with special requirements should be specified when ordering.
代码 Code	本体材质 Body material
A	304 不锈钢 304 stainless steel
B	316L 不锈钢 316L stainless steel
代码 Code	变送器安装方式 Transmitter installation mode
A	一体安装

	Integrated installation
B	分体安装（连接线长度），带支架 Split installation (length of connecting wire), with support
代码 Code	变送器环境温度 Transmitter ambient temperature
A	-20 ~ 50°C
B	-41 ~ 80°C
代码 Code	变送器输出 Transmitter output
A	4 ~ 20mA（瞬时流量或密度可选）；0-10KHz（瞬时流量脉冲信号）；RS485 Modbus RTU 4 ~ 20mA (instantaneous flow or density optional); 0 ~ 10KHz (instantaneous flow pulse signal); RS485 Modbus RTU
B	4 ~ 20mA（瞬时流量或密度可选）；0-10KHz（瞬时流量脉冲信号）；RS485 Modbus RTU；HART 4 ~ 20mA (instantaneous flow or density optional); 0-10KHz (instantaneous flow pulse signal); RS485 Modbus RTU; HART
代码 Code	证书 Certificate
F	厂标 Emblem mark
I	第三方认证 Third party certification
代码 Code	语言 Language
A	中文 Chinese
B	英文 English
代码 Code	变送器外壳 Transmitter housing
B	压铸铝合金外壳 电气接口：M20x1.5 Electrical interface of die-cast aluminum alloy shell: M20x1.5
C	压铸铝合金外壳电气接口：1/2"NPT Electrical interface of die-cast aluminum alloy shell: 1/2"NPT
代码 Code	防爆等级 Explosive-proof grade
A	Exia II C T6 Ga/Exd II C T6 Gb
代码 Code	防护等级 Protection grades
A	IP67

仪表选型指南

Instrument Selection Guide

说明:

Description:

- ◆ 默认法兰等级: 国外为 150LB, 国内为 4MPa; 更高压力可定制, 可高至 100MPa;
Default flange grade: 150LB abroad and 4MPa at home; Higher pressure can be customized, up to 100MPa;
- ◆ 默认为一体式, 分体可定制 (电缆长度需提前告知);
The default is integrated type, and the split type can be customized (the cable length needs to be informed in advance);
- ◆ 默认法兰标准: 国外为 Weld Neck Flanges-ANSI B16.5, 国内为 HG/T 20592-2009; 其他连接方式可定制。
Default flange standard: Weld Neck Flanges-ANSI B16.5 abroad and HG/T 20592-2009 at home; Other connection methods can be customized.

选型注意事项:

Precautions for type selection:

- ◆ 测量液体要结合常用流量和最大最小流量, 选用合适量程的仪表。
When measuring liquid, it is necessary to combine the common flow rate and the maximum and minimum flow rate, and choose the instrument with appropriate range.
- ◆ 测量气体要结合工艺管径, 压力, 常用量, 最大最小量计算流速选型。
Gas measurement should be combined with process pipe diameter, pressure, common amount, maximum and minimum amount to calculate flow rate selection.
- ◆ 测量高粘度流体或者液固两相流体, 要告知粘度, 密度, 工艺管径, 常用量, 和最大最小流量来选型。
When measuring high viscosity fluid or liquid-solid two-phase fluid, it is necessary to inform the viscosity, density, process pipe diameter, commonly used quantity, and maximum and minimum flow rate to select the type.
- ◆ 测量有腐蚀性的介质要告知具体介质化学名称, 根据腐蚀手册选择不同材质的测量管 (316L, HC276、HC22、C4 钢、2205 钢、衬四氟)。
When measuring corrosive media, the chemical name of the specific media should be informed, and measuring pipes of different materials (316L, HC276, HC22, C4 steel, 2205 steel and PTFE lining) should be selected according to the corrosion manual.

建议常用量在仪表标准量程的 1/3 以上, 并且建议用户的最小流量在仪表标校量程的 1/10 以上。如用户特殊需要, 请订货时说明, 我们可以针对用户的特殊需要进行修正, 以保证仪表在用户的使用范围内满足要求。根据实际物料特性, 选择仪表传感器的材质、压力等级和温度等级, 并保证防爆等级满足客户使用要求。

It is suggested that the commonly used amount should be more than 1/3 of the standard measuring range of the instrument, and the minimum flow rate of users should be more than 1/10 of the calibrated measuring range of the instrument. If the user has special needs, please indicate when ordering. We can make corrections according to the user's special needs to ensure that the instrument meets the requirements within the user's scope of use. According

to the actual material characteristics, select the material, pressure grade and temperature grade of the instrument sensor, and ensure that the explosion-proof grade meets the customer's requirements.



U型

U-shaped



微弯

Micro bending



三角型

Triangular type

本着“对用户负责,为用户服务,让用户满意”的宗旨,我公司对产品质量技术服务郑重承诺:

Our service objective is "being responsible for clients, serving clients and satisfying clients ". Thus, we promise to provide the best product quality and technical services:

服务承诺书 Service Commitment

1

严格按照合同要求,提供全新的一流的符合设计标准、质量合格的产品。
According to the requirements of clients' contracts, we may definitely provide brand-new and first-class products that both qualified and meet design standards.

2

严格检查和控制原材料、配套件采购质量,按国家标准提供节流装置。
Checking the sourcing quality of raw materials and supporting parts with strict criteria, and providing throttle devices in accordance with national standards.

3

作为产品制造单位,对用户全面负责,组织各协作配套生产单位,确保产品整体质量,保证按质按时完成任务。
As a product manufacturer, we are fully responsible for clients in all the aspects. We organize all cooperative producers with the aim to ensure the overall quality of products as well as the timely completion of tasks with high quality.

4

按合同规定向监造单位提供产品有关标准和计算结果,为监造提供方便。
According to the contract, we will provide relevant product standards and calculation results to the supervisors, which may provide supervisors with convenient.

5

接到需方反映的质量问题信息后,在 24 小时内作出答复或派出服务人员,尽快到达现场,以用户满意为最终结果。
Once receive the quality problems from clients, we will give a reply or dispatch service personnel within 24 hours. The personnel will arrive as soon as possible, and we pay more attention to clients' satisfaction as our top pursuit.

6

对产品制造过程中出现的质量缺陷及时向需方和监造代表通报,若产品缺陷超过合同规定的标准,我司无条件返修或更换。
We will inform the clients and supervisors immediately once find the quality defects during the manufacturing process. If the product defects exceed the standards specified in the contract, our company will repair or replace them unconditionally.

7

在安装和试运过程中,产品出现质量问题,先处理问题,再分清责任,一切以满足工程进度需要为准则。
In the process of installation and trial operation, if there are any quality problems of our products, the problems shall be handled first, and then clarify the responsibility. The most important objective is to meet the needs of project progress.

8

随时满足需方对备品件的要求。
Meeting the clients' requirements for spare parts at any time.

真诚合作
Genuine Cooperation



永久服务
Permanent Service



上海仪昌节流装置制造有限公司

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