

# INNOVATION MAKES EXCELLENT

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涡轮流量计选型样本

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# 企业简介

Brief Introduction

长江宛如一条巨龙奔腾不息，在长江之滨的天长市有这样一颗璀璨的明珠——安徽天康（集团）股份有限公司，在经历了岁月的历练与洗礼后愈发闪耀夺目。

安徽天康（集团）股份有限公司创建于1974年，总部位于“长三角”经济圈核心区域一天长市，是中国民营企业制造业500强企业、中国电子信息百强企业、国家级守合同重信用企业、国家高新技术企业、安徽省依法纳税先进企业、银行资信AAA级企业、中国仪表行业十强企业、中国电线电缆十强企业、安徽省重点骨干企业、“全国五一劳动奖状”获得者等荣誉。

天康集团历经四十年的蓬勃发展，已形成集仪器仪表、光电缆、医疗卫生、锂电池等跨行业、多元化的集团公司，下属子公司达二十余家。旗下产品凭借良好的质量与服务，被广泛应用于石油、电力、化工、通讯、卫生、新能源汽车及储能等行业和领域。

作为皖东经济最具活力与贡献的骨干企业之一，天康集团以“追求卓越，缔造满意”为目标，依托一流的产品、一流的管理、一流的服务，不仅在国内市场中赢得了广泛赞誉；在国际市场中，天康产品远销欧洲、非洲、亚洲等46个国家和地区。

天康集团在发展中逐步形成了独特的品牌文化及着眼全球的经营部局，全力塑造“高科技、高品质、国际化”的品牌形象。始终秉承“有跨越才有卓越”的天康精神，在创建和谐企业的基础上，引进国际先进的构架与模式，组织企业的生产经营管理体系。在积极参与国际化竞争的基础上，不断把握市场发展脉搏，寻求经济战略联盟，与全球伙伴共同发展与进步。如今天康人将全新的投入化为无私的奉献，与世界共同发展，与人类一起进步。

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Yangtze River like a dragon Pentium, there is such a shining pearl - Anhui Tiangkang (Group) Co., Ltd. in Tianchang City in the Yangtze River foreshore, in after years of experience and baptism increasingly shining brightly.

Anhui Tiangkang (Group) Co., Ltd. created in 1974, the headquarters is located in the "Yangtze River Delta" economic circle core area - Tianchang City, is China's private enterprises in the manufacturing industry 500 strong enterprises, China's electronic information hundred enterprises, state-level keep contract re credit enterprise, national new and high technology enterprise, Anhui Province tax law advanced enterprises, bank credit AAA level enterprise, China instrument industry ten strong enterprises, top ten enterprises in the Chinese wire and cable, Anhui province key enterprises, "national labor certificate" get "and other honorary.

After forty years of vigorous development, the group has formed a set of instruments, optical cable, medical and health, lithium batteries, such as cross industry, diversified group companies, subsidiaries of more than twenty. Products with good quality and service, is widely used in oil, electricity, chemicals, communications, health, new energy vehicles and energy storage and other industries and areas.

As one of the backbone enterprises in Anhui east economy the most vitality and contribution, tecon group to "the pursuit of excellence, creating satisfaction" as the goal, relying on the first-class products, first-class management, first-class service, not only in the domestic market won wide acclaim; in the international market, the day Kang products are exported to 46 countries and regions, including Europe, Africa, and Asia.

Tecon group in the developing gradually formed a unique brand culture and focus on global business department bureau, spare no effort to shape the brand image of "high-tech, high-quality, internationalization". Always adhering to the "excellence," the spirit of Tiangkang across only, to create the basis for a harmonious enterprise, the introduction of international advanced framework and patterns, organization of production management system. Actively participate in the international competition, and continue to grasp the pulse of the market development, to seek economic and strategic alliances, and global partners to develop and progress. Such as today, the people will be a new investment into the selfless dedication, and the common development of the world, together with the progress of mankind.

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# 目 录

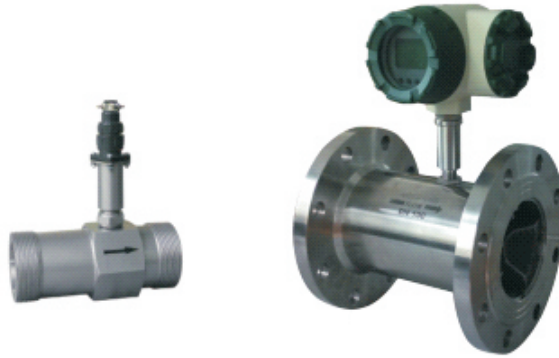
# CONTENTS

TK5100系列标准型液体涡轮流量计 TK5100 Series Standard Liquid Turbine Flowmeter .....	1
TK5200系列插入式液体涡轮流量计 TK5200 Series Plug-in Liquid Turbine Flowmeter.....	9
TK5300系列卫生型液体涡轮流量计 TK5300 Series Sanitary Liquid Turbine Flowmeter.....	14
TK5000系列涡轮流量转换器及操作说明 TK5000 Series Turbine Flow Converter and Operation Instruction.....	17
型号编码说明 Model and Coding Description.....	22
故障与排除 Fault and Troubleshooting.....	28

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# TK5100系列标准型液体涡轮流量计

## TK5100 Series Standard Liquid Turbine Flowmeter



### 一、概述

TK5100系列液体涡轮流量计基于力矩平衡原理，属于速度式流量仪表。传感器具有结构简单、轻巧、精度高、重复性好、反应灵敏，安装维护使用方便等特点，广泛用于石油、化工、冶金、供水、造纸等行业。

传感器与显示仪表配套使用，适用于测量封闭管道中与不锈钢1Cr18Ni9Ti、2Cr13及刚玉Al<sub>2</sub>O<sub>3</sub>、硬质合金不起腐蚀作用，且无纤维、颗粒等杂质的液体。若与具有特殊功能的显示仪表配套，还可以进行定量控制、超量报警等。选用本产品的防爆型式(ExdIIBT6)，可在有爆炸危险的环境中使用。

传感器适用于在工作温度下粘度小于 $5 \times 10^{-6} \text{m}^2/\text{s}$ 的介质，对于粘度大于 $5 \times 10^{-6} \text{m}^2/\text{s}$ 的液体，要对传感器进行实液标定后使用。

如用户需用特殊形式的传感器，可协商订货，需防爆型传感器时，在订货中加以说明。

### 工作原理

流体流经传感器壳体，由于叶轮的叶片与流向有一定的角度，流体的冲力使叶片具有转动力矩，克服摩擦力和流体阻力之后叶片旋转，在力矩平衡后转速稳定，在一定的条件下，转速与流速成正比，由于叶片有导磁性，它处于信号检测器（由永久磁钢和线圈组成）的磁场中，旋转的叶片切割磁力线，周期性的改变着线圈的磁通量，从而使线圈两端感应出电脉冲信号，此信号经过放大器的放大整形，形成有一定幅度的连续的矩形脉冲波，可远传至显示仪表，显示出流体的瞬时流量或总量。在一定的流量范围内，脉冲频率 $f$ 与流经传感器的流体的瞬时流量 $Q$ 成正比，流量方程为：

$f$ ——脉冲频率[Hz]；

$k$ ——传感器的仪表系数[1/m<sup>3</sup>]，由校验单给出。若以[1/L]为单位；

$Q$ ——流体的瞬时流量（工作状态下）[m<sup>3</sup>/h]；

3600——换算系数；

每台传感器的仪表系数由制造厂填写在检定证书中， $k$ 值设入配套的显示仪表中，便可显示出瞬时流量和累积总量。

### I. General

TK5100 series liquid turbine flow meters are based on the moment balance principle and they are speed type flow meters. The sensors are simple in structure, light and handy, high in accuracy, excellent in repeatability, sensitive in reaction, easy to install, maintain and use, so they are widely applied to industries like petroleum, chemistry, metallurgy, water supply and paper making. The sensor is used together with display instrument to measure the liquid in the closed pipeline which does not corrode stainless steel 1Cr18Ni9Ti, 2Cr13, corundum Al<sub>2</sub>O<sub>3</sub> and hard alloy and has no impurities like fiber and particle. When used with display instrument with special functions, it can make quantitative control and excess alarm. The explosion proof type of product (ExdIIBT6) can be used in environment with explosion hazard. The sensor is applicable to the medium with viscosity less than  $5 \times 10^{-6} \text{m}^2/\text{s}$  under operation temperature. When the liquid viscosity is larger than  $5 \times 10^{-6} \text{m}^2/\text{s}$ , actual liquid calibration shall be conducted for sensor before use. When the customer needs to use special sensor, he can discuss with the manufacturer to order the product; when he needs explosion proof sensor, the customer shall state this in the order.

### Working principle

When the fluid flows through the sensor shell, since the blade of impeller has certain angle with the flowing direction, the fluid impulsion leads to the rotation moment of the blade which rotates after overcoming the friction moment and fluid resistance. The rotation is stable after the moment is stable. Under certain conditions, the rotation is in direct proportion to the flowing speed. Due to the magnetic conductivity, the blade is in the magnetic field of the signal detector (consisting of the permanent magnet and coil). The rotating blade cuts the magnetic line, changing periodically the magnetic flux of the coil so that the electric pulse signal is induced at the coil ends. This signal is amplified and shaped by the amplifier to form certain amplitude of continuous rectangular pulse wave which can be transmitted remotely to the display instrument showing the instantaneous flow or the total amount of the fluid. Within certain flow range, the pulse frequency  $f$  is in direct proportion to the instantaneous flow  $Q$  of the fluid. The flow equation is:

Among which:

$f$ ——pulse frequency [Hz];

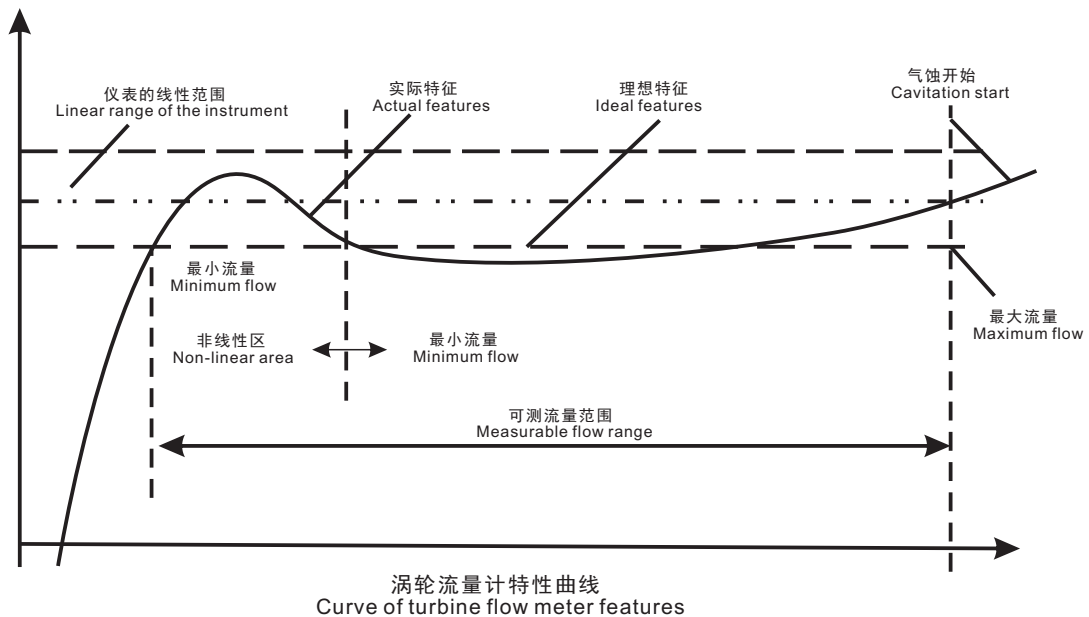
$k$ ——sensor instrument coefficient [1/m<sup>3</sup>], given by the inspection form. When the [1/L] is taken as the unit;

$Q$ ——instantaneous flow of the fluid (under operation status) [m<sup>3</sup>/h];

3600——conversion coefficient;

The instrument coefficients of each sensor are filled in the calibration certificate by the manufacturer. The value  $k$  is set into the supporting display instrument to show the instantaneous flow and total accumulative amount.

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### TK5100系列涡轮流量计的显著特点

高精度度，一般可达 $\pm 1\%R$ 、 $\pm 0.5\%R$ ，高精度型可达 $\pm 0.2\%R$ ；（R指读数误差）  
 重复性好，短期重复性可达 $0.05\% \sim 0.2\%$ ，正是由于良好的重复性，如经常校准或在线校准可得到极高的精确度，在贸易结算中是优先选用的流量计；  
 输出脉冲频率信号，适于总量计量及与计算机连接，无零点漂移，抗干扰能力强；  
 原始脉冲频率范围（ $10\text{Hz} \sim 1.5\text{KHz}$ ），信号分辨力强；  
 量程比宽， $10:1 \sim 20:1$ ；  
 结构紧凑轻巧，安装维护方便，流通能力大；  
 适用高压测量，传感器表体上不必开孔，易制成高压型仪表；  
 可制成插入型，适用于大口径测量，压力损失小，价格低，可不断流取出，安装维护方便。

### Distinctive features of TK5100 series turbine flow meter

Distinctive features of TK5100 series turbine flow meter  
 High accuracy, usually up to  $\pm 1\%R$ ,  $\pm 0.5\%R$ , high accuracy up to  $\pm 0.2\%R$ ; (R refers to the reading error)  
 Good repeatability, short term repeatability can be up to  $0.05\% \sim 0.2\%$ . Due to the good repeatability, extremely high accuracy can be achieved when it is often calibrated or calibrated on line, and this flow meter is selected in preference in trade settlement.  
 Output pulse frequency signal, suitable for total amount metering and connection with the computer; no zero point drifting, high resistance to the interference;  
 Original pulse frequency range ( $10\text{Hz} \sim 1.5\text{KHz}$ ), strong signal resolution;  
 Wide range ratio,  $10:1 \sim 20:1$ ;  
 Compact and light structure, easy to install and maintain, large flow capacity;  
 Suitable for high pressure measurement, unnecessary to open hole on the sensor body, easy to make high pressure type of instrument;  
 Possible to make plug-in type, suitable for large caliber measurement, small pressure loss, low price, can be taken out without flow suspension, easy to install and maintain.

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## TK5100涡轮流量计的技术参数 Technical parameters of TK5100 turbine flow meter

被测介质 Medium Measured	无杂质、低粘度、无强烈腐蚀性液体 Liquid without impurity, low viscosity, no strong corrosive action			
执行标准 Standards Executed	涡轮流量传感器 (JB/T9246-1999) Turbine flow sensor (JB/T9246-1999)			
检定规程 Calibration Specification	涡轮流量计 (JJG1037-2008) Turbine flow meter (JJG1037-2008)			
仪表口径 Instrument Caliber	法兰连接型 Flange connection type	DN15-DN200		
	螺纹连接型 Thread connection type	DN4-DN50		
	夹装连接型 Clamping connection type	DN4-DN200		
仪表材质 Instrument Material	304不锈钢、316(L)不锈钢等 304 stainless steel, 316 (L) stainless steel, etc.			
法兰标准 Flange Standard	常规标准 Conventional standards	GB/T9113-2000		
	其他标准 Other standards	国际管法兰标准 International flange standards	如德标DIN、美标ANSI、日标JIS Like German standard DIN, American standard ANSI, Japanese standard JIS	
		国内管法兰标准 Domestic pipe flange standards	如化工部标准、机械部标准 Like standards of Ministry of Chemical Industry, Standards of Ministry of Machinery	
螺纹规格 Thread Specifications	常规规格 Conventional specifications	英制管螺纹 (外螺纹) Pipe thread of British system (external thread)		
	其他规格 Other specifications	内螺纹、球面螺纹、NPT螺纹等 Internal thread, spherical thread, NPT thread, etc.		
精度等级及对应重复性 Accuracy Class and Corresponding Repeatability	精度等级*1 Accuracy class *1	±0.1%R	±0.5%R	±0.2%R (需订制) ±0.2%R (has to be customized)
	重复性 Repeatability	≤0.15%	≤0.1%	≤0.03%
量程比 Range ratio	10:1~20:1			
输出信号 Output signal	传感器: 脉冲频率信号, 低电平≤0.8V 高电平≥8V Sensor: pulse frequency signal, low level ≤0.8V, high level ≥8V 变送器: 两线制4~20mADC电流信号 Transmitter: two-wire system 4~20mADC current signal			
供电电源 Power supply	传感器: +12VDC、+24VDC(可选) Sensor: +12VDC, +24VDC (optional) 变送器: +24VDC\220V Transmitter: +24VDC\220V 现场显示型: 仪表自带3.6V锂电池 Display type on site: 3.6V lithium battery on the instrument			
信号传输线 Signal Transmission Line	STVPV3×0.3 (三线制), 2×0.3 (二线制) STVPV3×0.3 (three-wire system), 2×0.3 (two-wire system)			
传输距离 Transmission Distance	≤1000m			
信号线接口 Signal Line Interface	基本型: 豪斯曼接头, 防爆型: 内螺纹M20×1.5 Basic type: Hausman joint, explosion-proof type: internal thread M20×1.5			
防爆等级 Explosion Proof Class	基本型: 非防爆产品, 防爆型: ExdIIBT6 Basic type: not explosion proof, explosion-proof type: ExdIIBT6			
检定条件 Calibration Conditions	检定装置 Calibration device	标准表法液体流量检定装置 Fluid flow calibration device with standard meter approach 静态质量法液体流量检定装置 Fluid flow calibration device with static mass approach		
	环境条件 Environmental conditions	环境温度 Ambient temperature	20℃	
		相对湿度 Relative humidity	65%	
使用条件 Operation Conditions	介质温度 Medium temperature	T1 (一般型) T1 (general type)	-20℃~+80℃	
		T2 (高温型, 选用) T2 (high temperature type, optional)	-20℃~+120℃	
		T3 (高温型, 选用) T3 (high temperature type, optional)	-20℃~+150℃	
	环境温度 Ambient temperature	-20℃~+70℃	相对湿度 Relative humidity	5%~90%
大气压力 Atmospheric pressure	86kPa~106kPa			

注: \*1小口径(<DN15)液体涡轮流量传感器通过缩小量程比和配置智能表头的方式, 可达0.5%R的精度等级。

Note: \*1 small caliber (<DN15), liquid turbine flow sensor can reach the accuracy class of 0.5%R by shrinking the range ratio and configuring the intelligent meter.

## 涡轮流量计的应用领域

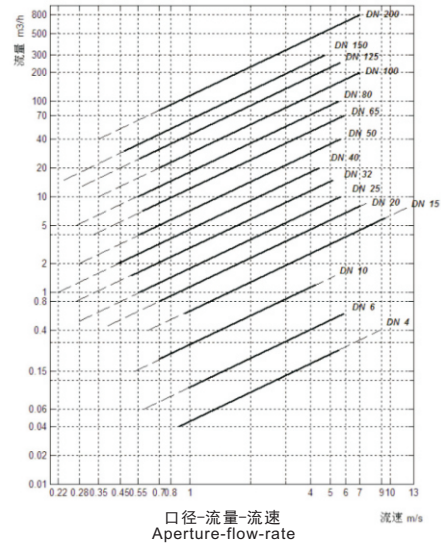
液涡轮适用于汽油、柴油、液态烃类等黏度小的流体的流量，广泛应用于石油、化工、冶金、造纸、科研领域和食品酒水饮料等行业测量液体的体积瞬时流量和体积总量的计量检测。

与定量控制仪配套使用，实现工业液体定量控制使用。

## Application fields of turbine flow meter

The liquid turbine is suitable for flow of fluid with small viscosity like gasoline, diesel and liquid hydrocarbons, and it is widely applied to measuring of the volume of liquid and metering and check of instantaneous flow and total volume in fields like petroleum, chemistry, metallurgy, paper making, scientific and research filed, food & drinks, etc.

It is used together with quantitative control meter to realize the quantitative control of the liquid in the industry. Caliber-flow-flow speed



## 测量范围及耐压等级 Measuring range and pressure level

仪表口径(mm) Instrument Caliber (mm)	正常流量范围(m³/h) Normal Flow range (m³/h)	扩展流量范围(m³/h0) Expanded Flow range (m³/h0)	常规耐受压力(MPa) Conventional Pressure Tolerance	特制耐压等级(MPa) (法兰连接方式) Special Pressure Class (MPa) (flange connection type)
DN 4	0.04~0.25	0.04~0.4	6.3	12、16、25
DN 6	0.1~0.6	0.06~0.6	6.3	12、16、25
DN 10	0.2~1.2	0.15~1.5	6.3	12、16、25
DN 15	0.6~6	0.4~8	6.3、2.5 (法兰)	4.0、6.3、12、16、25
DN 20	0.8~8	0.45~9	6.3、2.5 (法兰)	4.0、6.3、12、16、25
DN 25	1~10	0.5~10	6.3、2.5 (法兰)	4.0、6.3、12、16、25
DN 32	1.5~15	0.8~15	6.3、2.5 (法兰)	4.0、6.3、12、16、25
DN 40	2~20	1~20	6.3、2.5 (法兰)	4.0、6.3、12、16、25
DN 50	4~40	2~40	2.5	4.0、6.3、12、16、25
DN 65	7~70	4~70	2.5	4.0、6.3、12、16、25
DN 80	10~100	5~100	2.5	4.0、6.3、12、16、25
DN 100	20~200	10~200	2.5	4.0、6.3、12、16、25
DN 125	25~250	13~250	1.6	2.5、4.0、6.3、12、16
DN 150	30~300	15~300	1.6	2.5、4.0、6.3、12、16
DN 200	80~800	40~800	1.6	2.5、4.0、6.3、12、16

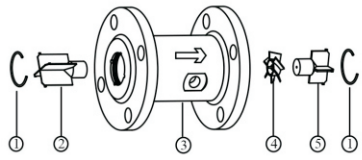
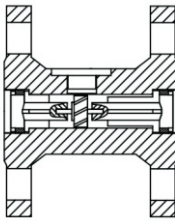
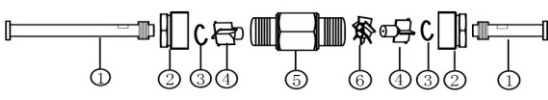
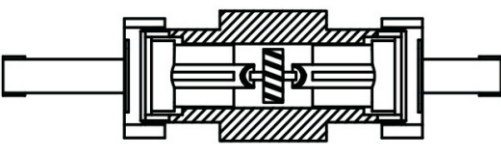
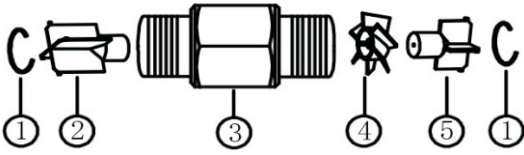
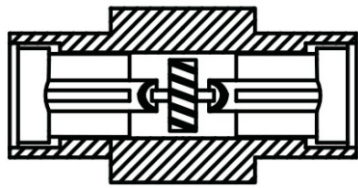
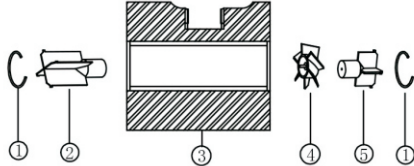
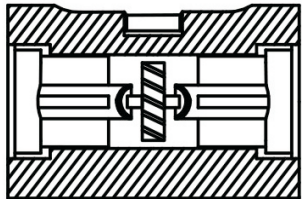
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## 安装 Installation

### 液体涡轮传感器类型

### Liquid turbine sensor type

类型 Type	装配示意图 Installation Schematic	结构示意图 Structure Schematic
法兰连接型 Flange Connection Type	 <p>1卡簧 2前导向架 3表体 4叶轮 5后导向架 1. Jump ring 2. Front guide frame 3. Meter body 4. Impeller 5. Rear guide frame</p>	
螺纹连接型 Thread Connection Type	 <p>1前后直管段 2锁母 3压环 4导向架 5表体 6叶轮 1. Front and rear straight pipe section. 2. Lock nut 3. Pressure ring 4. Guide ring 5. Meter body 6. Impeller</p>	 <p>DN4-DN10</p>
	 <p>1卡簧/压环 2前导向架 3表体 4叶轮 5后导向架 1. Jump ring/compression ring 2. Front guide frame 3. Meter body 4. Impeller 5. Rear guide frame</p>	 <p>DN15-DN50</p>
夹装连接型 Clamping Connection Type	 <p>1卡簧 2前导向架 3表体 4叶轮 5后导向架 1. Jump ring 2. Front guide frame 3. Meter body 4. Impeller 5. Rear guide frame</p>	

### 液体涡轮传感器材质

### Material of liquid turbine sensor

类型 Type	材质（常规型） Material (conventional type)			材质（特殊型） Material (special type)	
	表体 Meter body	导向架 Guide frame	叶轮 Impeller	法兰 Flange	表体/导向架 Meter body/guide frame
法兰连接型 Flange Connection type	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	202不锈钢 202 stainless steel	304/316	316不锈钢 316 stainless steel
	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	2Cr13不锈钢 2Cr13 stainless steel	叶轮 Impeller	双相钢 Duplex steel
	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	2Cr13不锈钢 2Cr13 stainless steel	表体 Meter body	316不锈钢 316 stainless steel
螺纹连接型 Thread Connection Type	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	表体/导向架 Meter body/guide frame	316不锈钢 316 stainless steel
	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	2Cr13不锈钢 2Cr13 stainless steel	叶轮 Impeller	双相钢 Duplex steel
	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	2Cr13不锈钢 2Cr13 stainless steel	表体 Meter body	304不锈钢 304 stainless steel
夹装连接型 Clamping Connection Type	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	2Cr13不锈钢 2Cr13 stainless steel	叶轮 Impeller	双相钢 Duplex steel
	304不锈钢 304 stainless steel	304不锈钢 304 stainless steel	2Cr13不锈钢 2Cr13 stainless steel	表体 Meter body	304不锈钢 304 stainless steel

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## 外形尺寸及安装方式 Outline dimensions and installation method

公称通径(mm) Inside Nominal Diameter (mm)	法兰连接 Flange Connection					螺纹连接 Thread Connection		夹装连接 Clamping Connection	
	L1(mm)	D1(mm)	K(mm)	d(mm)	n(孔数) (number of holes)	L2(mm)	G(外螺纹) (external thread)	L3(m)	D2(mm)
4						225	G1/2	50	38
6						225	G1/2	50	38
10						345	G1/2	50	38
15	75	95	65	14	4	75	G1	55	47
20	80	105	75	14	4	80	G1	60	54
25	100	115	85	14	4	100	G5/4	60	57
32	140	140	100	14	4	140	G2	70	66
40	140	150	110	18	4	140	G2	70	72
50	150	165	125	18	4	150	G5/2	70	92
65	170	185	145	18	4			80	100
80	200	200	160	18	8			90	112
100	220	220	180	18	8			100	137
125	250	250	210	18	8			120	165
150	300	285	240	22	8			150	190
200	360	340	295	22	12			150	243

### 传感器安装方式 Installation method of the sensor

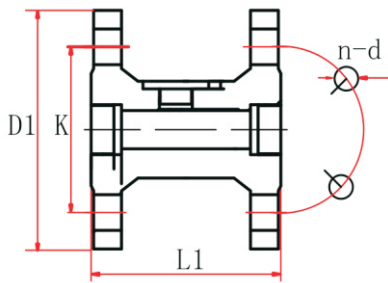


图4.1 DN15~DN200法兰连接型涡轮流量传感器尺寸图  
Fig.4.1 Dimensions of DN15~DN200 flange connection turbine flow sensor

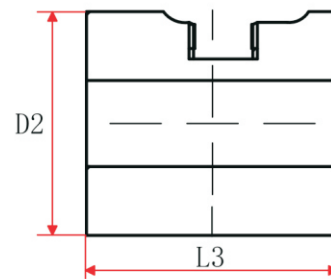


图4.2 DN4~DN200螺纹连接型涡轮流量传感器  
(含直管段部分)尺寸图  
Fig.4.2 Dimensions of DN4~DN200 thread connection turbine flow sensor (including the straight pipe section)

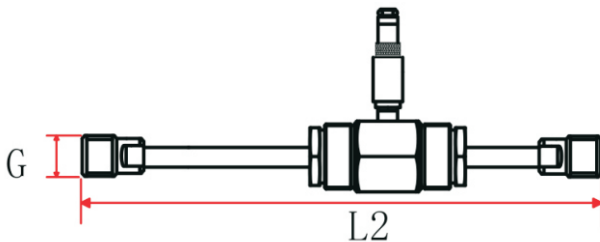


图4.3 DN4~DN10螺纹连接型涡轮流量传感器  
(不含直管段部分)尺寸图  
Fig.4.3 Dimensions of DN4~DN10 thread connection turbine flow sensor (excluding the straight pipe section)

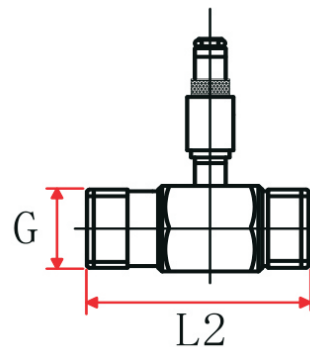


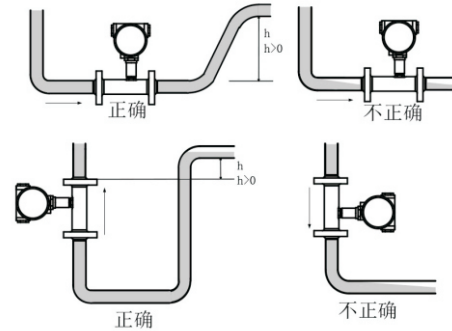
图4.4 DN15~DN50夹装连接型涡轮流量传感器  
(不含直管段部分)尺寸图  
Fig.4.4 Dimensions of DN15~DN50 thread connection turbine flow sensor (excluding the straight pipe section)

## 安装及注意事项 Installation and notice

### 安装及注意事项安装条件及位置 Installation, Notice, Installation Conditions and Position

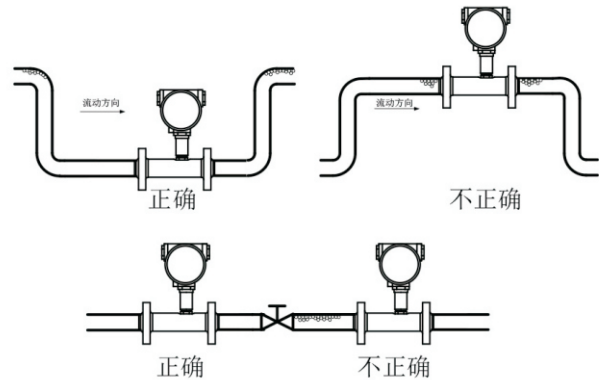
管道必须完全充满液体。重要的是，在任何时候，保持管道内完全充满液体，否则流量显示会受到影响，可能会导致测量误差。

The pipeline must be fully filled with liquid. What is important is that the pipeline shall be fully filled with liquid at any time; otherwise, the flow display will be affected, which may lead to the measurement error.



避免气泡。如果有气泡进入测量管，流量显示可能会受到影响，可能会导致测量误差。

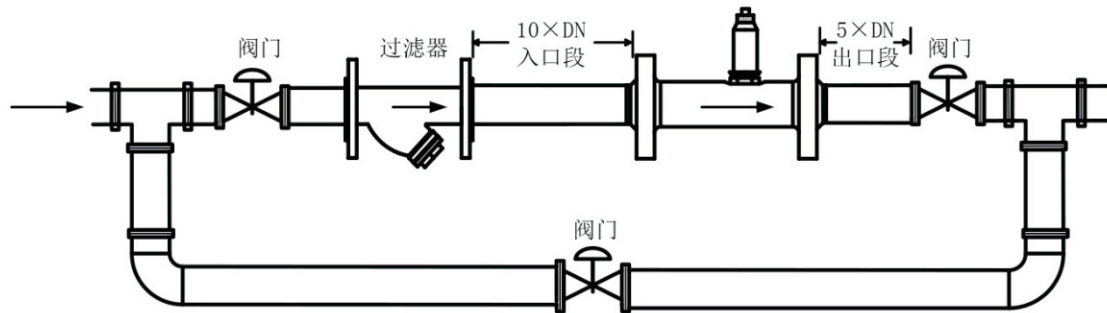
Avoid bubble. If there is a bubble entering the measurement pipe, the flow display will be affected, which may lead to the measurement error.



## 安装场所和要求

### Installation site and requirements

### 涡轮流量计典型安装管路系统 Typical installation system for turbine flow meter



### 管道安装注意事项 Notice for pipeline installation

传感器应安装在便于维修，管道无振动、无强电磁干扰与热辐射影响的场所。

The sensor shall be installed where there shall be no stopped flow (see the drawing above). Make sure the bypass pipe has no leakage during measurement.

水平安装传感器要求管道不应有目测可察觉的倾斜（一般在 $5^\circ$ 以内），垂直安装传感器管道垂直度偏差亦应小于 $5^\circ$ 。在不能停流的场所，应装旁通管和可靠的截止阀（见上图），测量时要确保旁通管无泄漏。

Horizontal installation of sensor requires that the pipeline shall have no visible inclination (usually within  $5^\circ$ ), the perpendicularity deviation for vertical installation of sensor shall be less than  $5^\circ$ .

在新铺设管道装传感器的位置先接入一段短管代替传感器，待“扫线”工作完毕，确认管道内清扫干净后，再正式接入传感器。

One section of short pipe shall be installed to replace the sensor where the sensor is installed on the new pipeline. The sensor shall be installed formally after the pipeline cleaning is finished and it is confirmed that the cleaning inside the pipeline is clean.

若流体含杂质，则应在传感器上游侧装过滤器，管道内应定期清理排放沉淀杂质；若被测液体含有气体，则应在传感器上游侧装消气器。过滤器和消气器的排污口和排气口要通向安全的场所。

If the fluid contains the impurity, the filter shall be installed on the upstream of the sensor. The inside pipeline shall be cleaned regularly to remove the sediment impurity; when the liquid measured contains gas, the getter device shall be installed upstream the sensor. The drain and getter port of the filter and the getter device shall lead to safe place.

传感器安装在室外时，应有避免直射阳光和防止雨淋的措施。

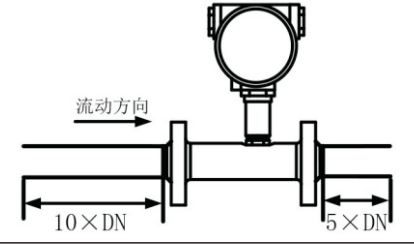
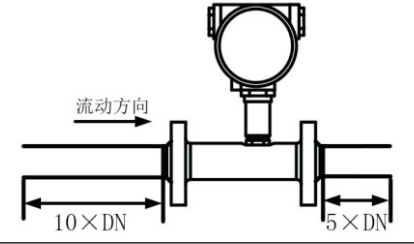
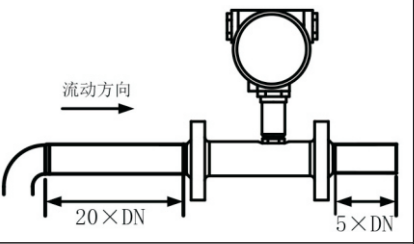
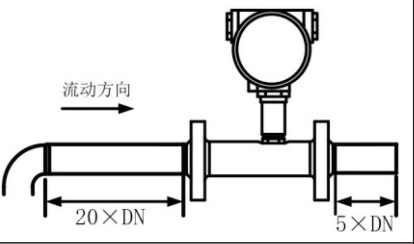
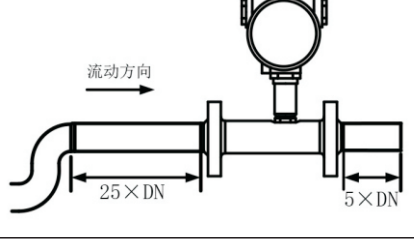
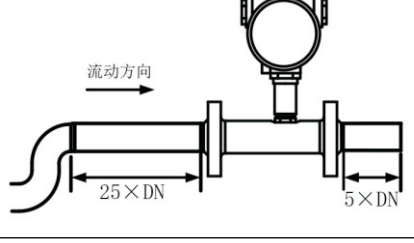
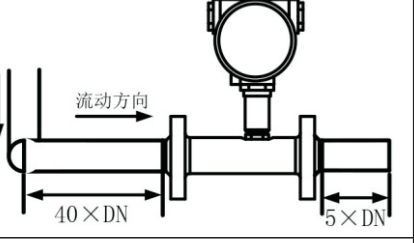
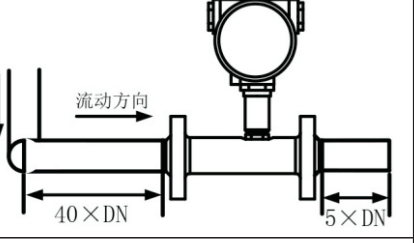
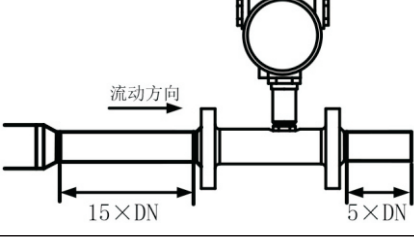
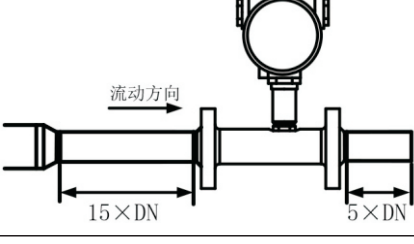
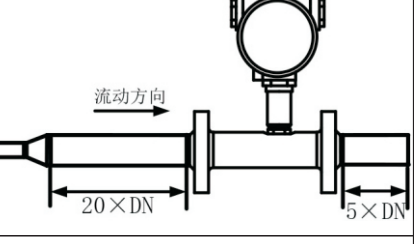
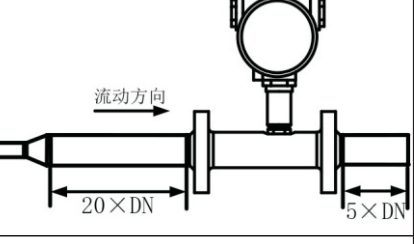
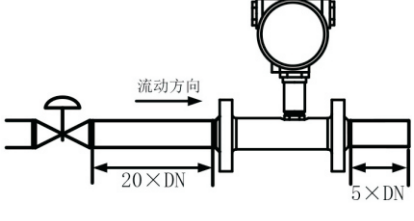
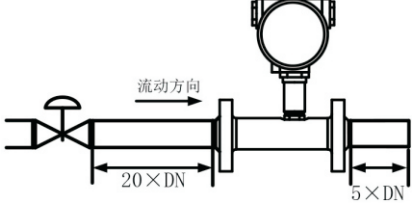
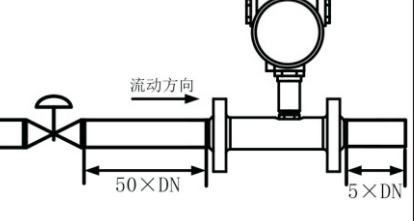
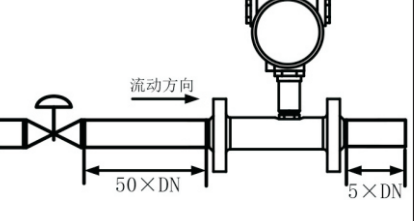
When the sensor is installed outside, measures to avoid direct sunlight and rain shall be taken.

## 所需上下游直管段长度

### Required length of upstream and downstream straight pipe section

涡轮流量计对管道内流速分布畸变及旋转流是敏感的，进入传感器应为充分发展湍流，因此要根据传感器上游侧阻流件类型配备必要的直管段或整流器，要求入口段和出口段直管段长度，如表所示。

The turbine flow meter is sensitive to the flow speed distribution distortion and rotating flow inside the pipeline. What enters the sensor shall be fully developed turbulence, so necessary straight pipe section or rectifier shall be provided depending on the baffle type upstream the sensor. It is required that the straight pipe section length of the entry section and exit section shall meet the specifications in the following table.

入口段阻流件类型 Baffle Type at the Entry Section	安装条件 Installation Conditions		入口段阻流件类型 Baffle Type at the Entry Section	安装条件 Installation Conditions	
	入口段 Entry section	出口段 Exit section		入口段 Entry section	出口段 Exit section
一般情况 General situation			90° 弯头 90° elbows		
同一平面上两个 90° 弯头 Two 90° elbows on the same plane			不同平面上两个 90° 弯头 Two 90° elbows on different planes		
缩管 Contracted pipe			扩管 Expanded pipe		
全开阀门 Fully open valve			半开阀门 Semi-open valve		

#### 安装注意事项 Installation Notice

上表所示尺寸为确保精度的最低要求的直管段安装长度，若直管段长度增加一倍，可提高精度。

The dimensions indicated above are the installation length of the straight pipe section as the minimum requirements to ensure the accuracy. When the length of the straight pipe section is doubled, the accuracy can be improved.

上游：允许的最小直管段长度至少为10倍的管道直径。

Upstream: the allowable minimum length of straight pipe section shall be at least ten times the pipeline diameter.

例如，口径为DN50的仪表，上游侧直管段长度至少为500mm，期望的上游直管段长度应为1000mm。

For example, as for the instrument with the caliber of DN50, the length of the straight pipe section upstream shall be at least 500mm, the expected length of straight pipe section upstream shall be 1000mm.

下游：允许的最小直管段长度至少为5倍的管道直径。

Downstream: the allowable minimum length of the straight pipe section shall be at least five times the pipeline diameter.

例如，口径为DN50的仪表，下游侧直管段长度至少为250mm，期望的下游直管段长度应为500mm。

For example, as for the instrument with the caliber of DN50, the length of the straight pipe section downstream shall be at least 250mm, the expected length of straight pipe section downstream shall be 500mm.

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# TK5200系列插入式液体涡轮流量计

## TK5200 series plug-in liquid turbine flow meter



### 一、概述

TK5200的切向及轴向型插入式涡轮流量传感器(简称传感器)与显示仪表(转换器部分)配套,组成插入式涡轮流量计,可广泛用于大口径管道源水、循环水、净水等液体流量和总量的测量。

### 产品特点

#### 切向式传感器特点

抗杂质能力强,切向式叶轮在转动时可随时释放流体中的杂物,使其不缠绕在叶轮的叶片上。  
抗电磁干扰和抗震能力强。  
传感器和显示仪表的结构及原理都非常简单、直观,用户特别容易掌握其使用和维修技术。  
更换叶轮和轴承后仪表系数不变。  
流量范围宽、下限流速低。  
几乎无压力损失,节省动力电耗。  
传感器可露天安装,整个传感器可长期淹没在水中使用。  
有截止阀的传感器安装和拆卸不需断流。

#### 轴向式传感器特点

传感器和显示仪表的结构及原理都非常简单、直观,用户特别容易掌握其使用和维修技术。  
更换叶轮和轴承后仪表系数不变。  
流量范围宽、下限流速低。  
几乎无压力损失,节省动力电耗。  
传感器可露天安装,整个传感器可长期淹没在水中使用。  
有截止阀的传感器安装和拆卸不需断流。  
水平、竖直、倾斜的管道均可使用。  
成套流量计的购置、安装和维修费用低。

### I. General

TK5200 tangential and axial plug-in turbine flow sensor (simply called the sensor) and the display instrument (converter part) are used together to form the plug-in type turbine flow meter which can be widely applied to the measurement of flow and total amount of the liquid like source water, circulation water and clean water of large caliber pipeline.

### Product features

#### Features of tangential sensor

Strong resistance to impurities. The tangential impeller is able to release the impurity in the fluid at any time so that it will not twine the impeller blade. Strong resistance to the electromagnetic interference and vibration.  
The structure and principle of the sensor and display meter are very simple and clear. It is very easy for the user to master the use and maintenance technology. The meter coefficients after the impeller and the bearing are replaced keep unchanged.  
Wide flow range and low lower limit of flow speed.  
Almost no pressure loss, saving power consumption.  
The sensor can be installed in the open air. The whole sensor can be submerged in the water for use in long term.  
Unnecessary to cut off the flow for installation and disassembly of sensor with stop valve.

#### Features of axial sensor

The structure and principle of the sensor and display meter are very simple and clear. It is very easy for the user to master the use and maintenance technology.  
The meter coefficients after the impeller and the bearing are replaced keep unchanged.  
Wide flow range and low lower limit of flow speed.  
Almost no pressure loss, saving power consumption.  
The sensor can be installed in the open air. The whole sensor can be submerged in the water for use in long term.  
Unnecessary to cut off the flow for installation and disassembly of sensor with stop valve.  
The pipeline can be used in horizontal, vertical and inclined way.  
The cost to buy, install and maintain the complete set of flow meter is low.

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## 技术规格

## Technical specifications

### 技术参数

### Technical parameters

测量介质 Measured Medium	循环水等大管道液体 Large pipeline liquid like circulation water			
精度等级 Accuracy Class	±5%、±2.5%			
传感器形式 Sensor Type	切向式传感器 Tangential type			
	轴向式传感器 Axial sensor			
结构形式 Structure Type	一体式仪表 Integrated meter			
	分体式仪表 Split type meter			
仪表口径及连接方式 Instrument Caliber and Connection Type	简易插入式 Easy plug-in	DN150-DN1100		
	在线插入式 Online plug-in	DN150-DN1100		
耐压等级 Pressure Class	1.6MPa			
仪表材质 Meter Material	丝杠 Screw	不锈钢 Stainless steel	叶轮 Impeller	2Cr13
	法兰 Flange	碳钢 Carbon steel	导向架 Guide frame	不锈钢 Stainless steel
	短节 Short section		球阀 Ball valve	
插入式深度 Plug-in type depth	当被测管道内径 (DN) ≤1050mm时, 插入深度为: When the inner diameter of the pipeline (DN) ≤1050mm, the plug-in depth is:			
	切向式 Tangential type	0.5×DN-20mm		
	轴向式 Axial type	0.5×DN		
量程比 Range ratio	10:1			
输出信号 Output signal	传感器: 脉冲频率信号, 低电平≤0.8V 高电平≥8V Sensor: pulse frequency signal, low level ≤0.8V, high level ≥8V			
	变送器: 两线制4~20mA DC 电流信号 Transmitter: two-wire system 4~20mA DC current signal			
供电电源 Power supply	传感器: +12VDC、+24VDC (可选) Sensor: +12VDC, +24VDC (optional)			
	变送器: +24VDC、220V Transmitter: +24VDC, 220V			
信号传输线 Signal transmission line	现场显示型: 仪表自带3.6V锂电池 On-site display type: 3.6V lithium battery on the instrument			
传输距离 Transmission distance	STVPV3×0.3 (三线制), 2×0.3 (二线制) STVPV3×0.3 (three-wire system), 2×0.3 (two-wire system)			
信号线接口 Signal line connection port	≤1000m			
防爆等级 Explosion proof class	基本型: 豪斯曼接头, 防爆型: 内螺纹M20×1.5 Basic type: Hausman joint, explosion proof: inner thread M20×1.5			
检定条件 Calibration conditions	检定装置 Calibration device	标准表法液体流量检定装置 Fluid flow calibration device with standard meter approach		
	环境条件 Ambient conditions	静态质量法液体流量检定装置 Fluid flow calibration device with static mass approach		
		环境温度 Ambient temperature	20℃	
使用条件 Operation conditions	介质温度 Medium temperature	相对湿度 Relative humidity	65%	
		T1(一般型) T1 (general type)	-20℃~+80℃	
		T2(高温型, 选用) T2 (high temperature type, optional)	-20℃~+120℃	
	T3(高温型, 选用) T3 (high temperature type, optional)	-20℃~+150℃		
	环境温度 Ambient temperature	-20℃~+70℃	相对湿度 Relative humidity	5%~90%
大气压力 atmospheric pressure	86kPa~106kPa			

## 测量范围

## Measurement range

### 切向式传感器测量范围

### Measurement range of tangential sensor

口径 (mm) Caliber (mm)	被测管道实测内径 (mm) Actual inner diameter of the measured pipeline (mm)	插入杆长度 (mm) Length of plug-in rod (mm)	对应于公称通径DN的流量范围m <sup>3</sup> /h Flow range corresponding to the inside nominal diameter m <sup>3</sup> /h	
			精确度为显示值的±5%R的流量范围 The flow range with the accuracy of ±5%R of the display value	精确度为显示值的±2.5%R的流量范围 The flow range with the accuracy of ±2.5%R of the display value
≤400	150	880	13-200	20-200
	200		23-300	40-300
	250	906	36-450	62-450
	300		52-650	90-650
	350		70-900	120-900
	400		92-100	160-1100
≤800	500	1106	150-1800	250-1800
	600		220-2500	360-2500
	700		280-3500	450-3500
	800		380-4500	640-4500
>800	900	1306	460-5800	800-5800
	1000		600-7000	990-7000
	1100		700-8500	1200-8500

### 轴向式传感器测量范围

### Measurement range of axial sensor

口径 (mm) Caliber (mm)	被测管道实测内径 (mm) Actual inner diameter of the measured pipeline (mm)	插入杆长度 (mm) Length of plug-in rod (mm)	对应于公称通径DN的流量范围m <sup>3</sup> /h Flow range corresponding to the inside nominal diameter m <sup>3</sup> /h	
			精确度为显示值的±5%R的流量范围 The flow range with the accuracy of ±5%R of the display value	精确度为显示值的±2.5%R的流量范围 The flow range with the accuracy of ±2.5%R of the display value
≤400	150	880	7-200	10-200
	200		12-300	20-300
	250	900	18-450	31-450
	300		26-650	45-650
	350		35-900	60-900
	400		46-100	80-1100
≤800	500	1100	75-1800	125-1800
	600		110-2500	180-2500
	700		140-3500	225-3500
	800		190-4500	320-4500
>800	900	1300	230-5800	400-5800
	1000		300-7000	495-7000
	1100		350-8500	600-8500

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## 结构形式与安装方法

## Structure type and installation method

插入式流量计结构形式 Structure Type of Plug-in Flow Meter	
简易插入式 Simple plug-in type	在线插入式 Online plug-in type
插入式流量计安装方法 Installation Method of Plug-in Flow Meter	
简易插入式 Simple plug-in type	在线插入式 Online plug-in type
<p>在满足流量计直管段要求的安装点上开一个<math>\Phi 100</math>的圆缺。 Open one <math>\Phi 100</math> segment on the installation point meeting the requirements of the straight pipe section of the flow meter.</p> <p>用<math>\Phi 109 \times 4.5\text{mm}</math>底座的下管段与管道上好口的缺焊接，底座焊接后目测不得有明显的歪斜。 Use the lower pipe section of <math>\Phi 109 \times 4.5\text{mm}</math> base to be welded with the segment already opened on the pipeline. Visual check and no obvious inclination of the base after welding.</p> <p>将检测探头插入管道中，调整好插入深度(<math>L_2=0.5D</math>)使检测探头中心与管道的中轴相吻合，检测探头中心线与管道中轴线的夹角不应大于<math>5^\circ</math>，然后调整好流向标使其与流体的流向相同。 Put the detection probe into the pipe and adjust the insertion depth (<math>L_2=0.5D</math>) so that the probe center is consistent with the axis of the pipeline. The inclination between the center line of the detection probe and the axis of the pipeline shall be no more than <math>5^\circ</math>, and then adjust the flow direction indicator so that it is the same as the flowing direction of the fluid.</p> <p>把法兰与焊接好的底座对接，用螺栓紧固好。 Connect the flange and the welded base and get them fastened with bolts.</p>	<p>在满足流量计直管段要求的安装点上开一个<math>\Phi 100</math>的圆缺。 Open one <math>\Phi 100</math> segment on the installation point meeting the requirements of the straight pipe section of the flow meter.</p> <p>用<math>\Phi 109 \times 4.5\text{mm}</math>底座的下管段与管道上好口的缺焊接，底座焊接后目测不得有明显的歪斜。 Use the lower pipe section of <math>\Phi 109 \times 4.5\text{mm}</math> base to be welded with the segment already opened on the pipeline. Visual check and no obvious inclination of the base after welding.</p> <p>将球阀与焊好的底座对接，用螺栓紧固好。 Connect the ball valve and the welded base and get them fastened with bolts</p> <p>将球阀打开，将带有丝杠座的检测探头插入管道中，调整好插入深度(<math>L_2=0.5D</math>)使检测探头中心与管道的中轴相吻合，检测探头中心线与管道中轴线的夹角不应大于<math>5^\circ</math>，然后调整好流向标使其与流体的流向相同。 Open the ball valve, put the detection probe with screw rod base into the pipeline, adjust the insertion depth (<math>L_2=0.5D</math>) so that the probe center is consistent with the axis of the pipeline. The inclination between the center line of the detection probe and the axis of the pipeline shall be no more than <math>5^\circ</math>, and then adjust the flow direction indicator so that it is the same as the flowing direction of the fluid.</p> <p>把丝杠座与球阀对接，用螺栓紧固好。 Connect the screw rod base and the ball valve and get them fastened with bolts.</p> <p>紧固压盖，防止介质由丝杠与丝杠座处泄露。 Fasten the gland to prevent the medium from leaking from screw rod and screw rod base.</p>

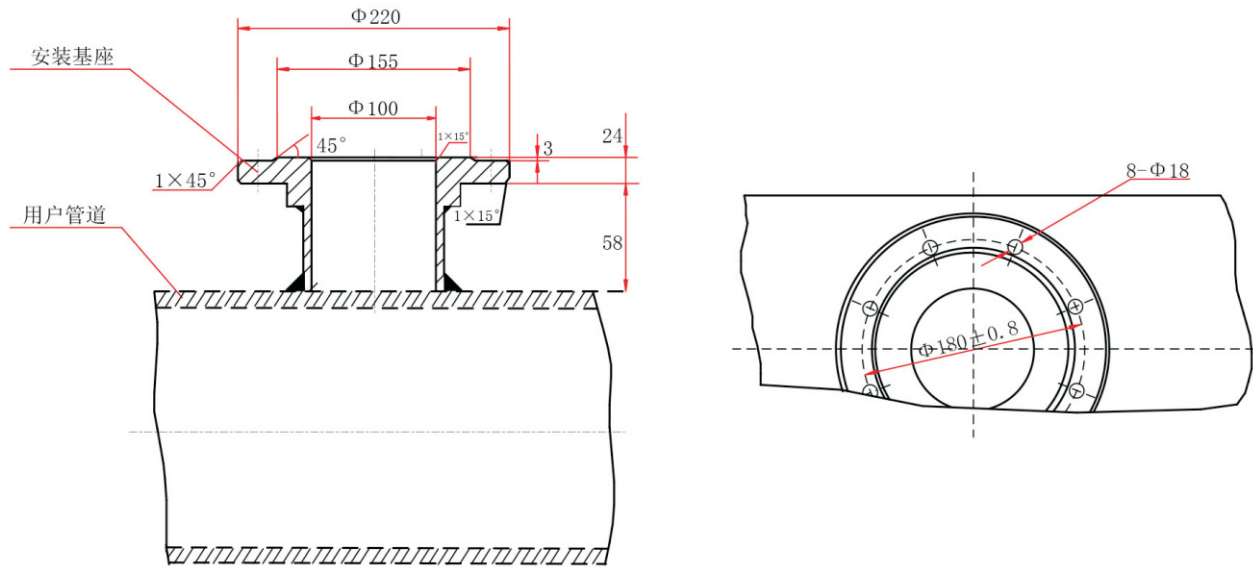
注：对直管段要求：流量计上游直管段长度不应小于 $20D$ ，下游直管段长度不应小于 $7D$ 。若直管段长度不能满足此要求，可在具备现场标定条件的情况下进行现场标定后，采用现场标定的仪表系数 $K$ 。

Note: requirements for the straight pipe section: the length of the upstream and downstream straight pipe section of the flow meter shall be no less than  $20D$  and  $7D$  respectively. When the length of the straight pipe section can not meet such requirements, the meter coefficient  $K$  calibrated on site when the calibration conditions are ready can be adopted.

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安装基座示意图  
Schematic of Installation Base



安装步骤  
Installation Steps

在第一次安装时，如果被测管道允许断流，可按照安装基座示意图(表4.2)，在被测管道上满足直管段长度要求的位置先开孔，再完成“安装基座”与管道的连接。然后按照安装示意图(表4.1)完成全部安装工作。也可以安装球阀后暂时关闭球阀，以不影响管道输送流体，待以后再安装传感器。

During the installation for the first time, when the cutoff is allowed for the pipeline measured, opening can be made where it meets the requirements of the straight pipe section on the pipeline measured and then the connection between "installation base" and the pipeline shall be completed in accordance with the schematic of installation base (Tab.4.2). Then all the installation work shall be finished as per installation schematic (Tab.4.1). One can also install the ball valve and then close the valve temporarily so as not to affect the pipeline transporting the fluid and install the sensor in future.

在第一次安装时，如果被测管道不允许断流，可以在管道尚未开孔的情况下，先完成“安装基座”(表4.2)在管道上的固定和密封，再安装球阀，然后用不停水钻孔机钻孔。钻孔后，拆下不停水钻孔机，安装传感器；或拆下不停水钻孔机，暂时关闭球阀，待以后安装传感器。不停水钻孔机在球阀上的安装和拆卸方法与传感器的安装和拆卸方法基本相同，在此不另作说明。

During the installation for the first time, when the cutoff is not allowed for the pipeline measured and when the opening is not made on the pipeline, one can first finish the fixation and sealing of "installation of base" (Tab.4.2) on the pipeline, then install the ball valve and then drill the hole with drilling machine without stopping the water. After drilling, remove the drilling machine and install the sensor; or remove the drilling machine and close the ball valve temporarily. The installation and removal method of the drilling machine on the ball valve are basically the same, which will not be described separately here.

注意①：安装球阀前，必须检查球阀，应能完全打开和完全关闭。必须使球阀由全开到全关，再由全关到全开。当球阀的限位片由全关的位置转到全开的位置时，阀芯必须处在全开状态，否则应修整限位片。

注意②：安装球阀时，较长的一端与管道上的“安装基座”连接。

Note ①: before installation of ball valve, the ball valve must be checked that it can be fully opened or closed. The ball valve must be turned from full open to full close and then from full close to full open status. When the stopper of the ball valve is turned from the full closed position to the full open position, the spool must be at the full open status, otherwise the stopper shall be reconditioned.

Note ②: when the ball valve is installed, the longer end shall be connected with the "installation of base" on the pipeline.

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# TK5300系列卫生型液体涡轮流量计

## TK5300 Series Sanitary Liquid Turbine Flow Meter



### 概述

卫生涡轮流量计是一种可广泛应用于制药、食品、饮料等行业，作为计量、配料、控制、成品灌装等用途的流量计量仪表。该仪表外壳是用不锈钢制成，机芯部分使用特种材质，具有良好的防腐蚀、防锈能力。整表结构突破传统工艺，采用国外先进结构优化设计，大大提高了仪表的精确度和重复性。专门为制药、饮料行业设计，采用快装式连接结构，方便清洗。该产品已达到同类产品国际水准，是卫生行业理想仪表。

### General

Sanitary turbine flow meter is one flow metering instrument widely applicable to industries like pharmacy, food and drinking for metering, burdening, control and filling of finished products. This instrument shell is made of stainless steel and the movement is made of special material with good resistance to corrosion and rust. The whole meter breaks through the traditional process and foreign advanced structural design is adopted, which greatly improves the accuracy and repeatability of the meter. It is specifically designed for pharmacy and drinking. Quick-installation connection structure is adopted, making the washing easy. This product has already reached the international standard of similar product and it is ideal meter for health care industry.

### 产品特点

国际化标准，可替代同类进口产品  
防腐防锈材质，适用于卫生行业  
快装式结构，易于安装维护  
精度高、重复性好  
高品质涡轮，超出常规的量程范围

### Product characteristics

International standard, able to replace similar kind of imported product.  
Material resistant to corrosion and rust, applicable to health care industry.  
Quick-installation structure, easy to install and maintain.  
High accuracy and good repeatability.  
High quality turbine, exceeding the conventional range.

### 使用场合

制药行业：生理盐水、葡萄糖水等输液制品的灌装与计量；  
食品、饮料行业：蔬菜汁、果汁、白酒、啤酒、成品油等液态食品的灌装与计量。

### Application fields

Pharmaceutical industry: filling and metering of transfusion products like saline, glucose water, etc.  
Food and drinking industry: filling and metering of liquid food like vegetable juice, fruit juice, wine, beer, product oil, etc.

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## 技术参数 Technical parameters

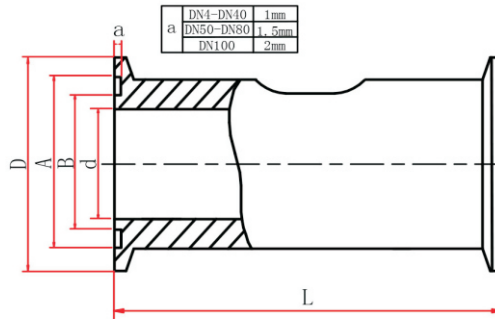
### 结构形式与安装方法

### Structure type and installation method

测量介质 Measurement medium	食品、药液等卫生场合液体 Liquid for health care fields like food and liquor			
执行标准 Execution standards	涡轮流量传感器 (JB/T9246-1999) Turbine flow sensor (JB/T9246-1999)			
检验标准 Execution standards	涡轮流量计 (JJG1037-2008) Turbine flow meter (JJG1037-2008)			
仪表口径及连接方式 Meter caliber and connection method	卡箍连接型 Clamp connection type	DN4-DN100		
精度等级 Accuracy class	±1%R、±0.5%R、±0.2%R (需特制) (to be made specially)			
仪表材质 Instrument material	传感器 Sensor	316 (L) /304不锈钢 316 (L)/304 stainless steel	导向架 Guide frame	316/304
	叶轮 Impeller	双相钢 Dual phase steel		304
量程比 Range ratio	10:1~20:1			
耐压等级 Pressure level	1.0MPa			
输出信号 Output signal	传感器: 脉冲频率信号, 低电平≤0.8V 高电平≥8V Sensor: pulse frequency signal, low level ≤0.8V, high level ≥8V 变送器: 两线制4~20mADC电流信号 Transmitter: two-wire system 4~20mADC current signal			
供电电源 Power supply	传感器: +12VDC、+24VDC(可选) Sensor: +12VDC, +24VDC (optional) 变送器: +24VDC\220V Transmitter: +24VDC\220V 现场显示型: 仪表自带3.6V锂电池 On-site display type: 3.6V lithium battery on the instrument			
信号传输线 Signal transmission line	STVPV3×0.3(三线制), 2×0.3(二线制) STVPV3×0.3 (three-wire system), 2×0.3 (two-wire system)			
传输距离 Transmission distance	≤1000m			
信号线接口 Signal line connection port	基本型: 豪斯曼接头, 防爆型: 内螺纹M20×1.5 Basic type: Hausman joint, explosion proof: inner thread M20×1.5			
防爆等级 Explosion proof class	基本型: 非防爆产品, 防爆型: ExdIIBT6 Basic type: not explosion proof, explosion proof: ExdIIBT6			
检定条件 Calibration conditions	检定装置 Calibration device	标准表法液体流量检定装置 Fluid flow calibration device with standard meter approach 静态质量法液体流量检定装置 Fluid flow calibration device with static mass approach		
	环境条件 Ambient conditions	环境温度 Ambient temperature	20°C	
		相对湿度 Relative humidity	65%	
使用条件 Operation Conditions	介质温度 Medium temperature	T1(一般型) T1 (general type)	-20°C~+80°C	
		T2(高温型, 选用) T2 (high temperature type, optional)	-20°C~+120°C	
		T3(高温型, 选用) T3 (high temperature type, optional)	-20°C~+150°C	
	环境温度 Ambient temperature	-20°C~+60°C	相对湿度 Relative humidity	5%~90%
	大气压力 Atmospheric pressure	86kPa~106kPa		

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## 技术参数 Technical parameters



尺寸 Dimensions 口径Caliber	D(mm)	A(mm)	B(mm)	D(mm)	L(mm)
DN4	50.5	46	40.5	4	100
DN6				6	
DN10				10	
DN15				15	
DN20				20	
DN25				25	
DN32				32	120
DN40	64	59	53.5	40	140
DN50	78	73.5	68	50	150
DN65	91	86	80.5	65	170
DN80	106	100.5	94	80	200
DN100	119	113	106	100	220

D尺寸即为配套卡箍内径尺寸

Dimension D is the inner diameter dimension of the supporting clamp.

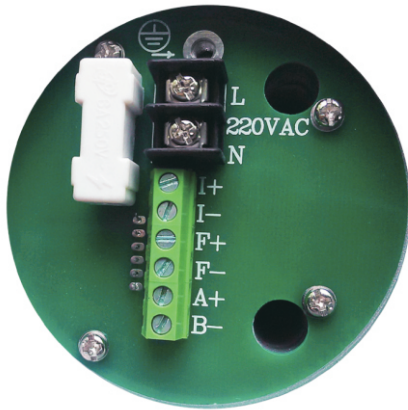
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# TK5000系列涡轮流量转换器接线及操作

## Wiring and operation of TK5000 series turbine flow converter

### 电气接线 Electric wiring

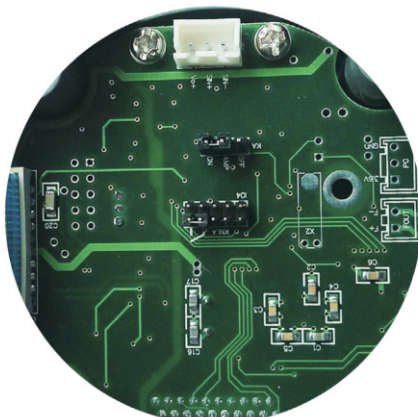
#### 1、一体型端子接线图 Integrated terminal wiring diagram



一体型接线端子标示定义  
Definition of marking of integrated wiring terminal

序号No.	标示 Marking	功能 Function	备注 Note
L	L	AC 85~265V供电 AC 85~265V power supply	L为AC220V供电 L is the AC220V power supply
N	N	AC 85~265V供电 AC 85~265V power supply	N为AC220V供电 N is the AC220V power supply
+	+	DC 18~36V供电 + DC 18~36V power supply +	电源24V+ Power supply 24V+
-	-	DC 18~36V供电 + DC 18~36V power supply +	电源24V- Power supply 24V-
1	I+	4~20mA输出+ 4~20mA output +	负载电阻 ≤500Ω, Hart通讯时, 采用外部24VDC供电, external 24VDC power supply is adopted
2	I-	4~20mA输出- 4~20mA output -	
3	F+	频率或脉冲输出+ Frequency or pulse output +	频率或脉冲输出的幅值为+24V, 负载电流 ≤50mA The amplitude value of the frequency or pulse output is +24V, load current ≤50mA.
4	F-	频率或脉冲输出- Frequency or pulse output -	
5	A+	RS-485 Data +	
6	A-	RS-485 Data -	

#### 2、一体型传感器接线图 Integrated sensor wiring diagram

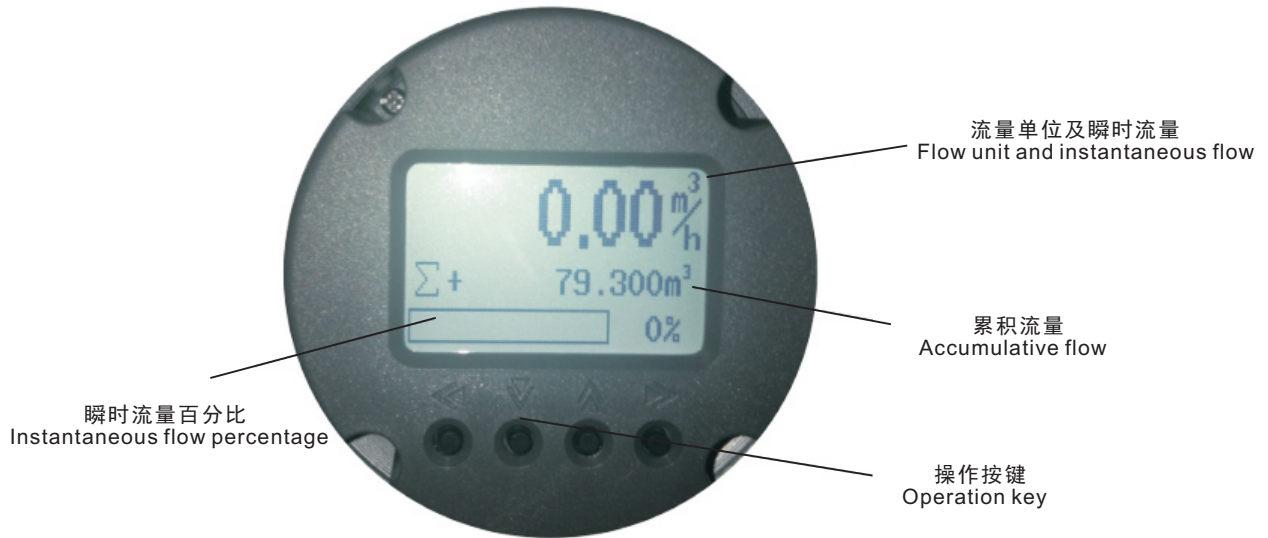


序号No.	标示 Marking	功能 Function	备注 Note
v	V0+	电压输出 Voltage output	3V电压输出 (接霍尔传感器) 3V voltage output (connected with Hall sensor)
-	SIN-	信号线- Signal line -	传感器信号- Sensor signal -
+	SIN+	信号线+ Signal line +	传感器信号+ Sensor signal +

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## 转换器面板结构与按键定义 Converter panel structure and key definition

### 面板结构示意图 Panel structure schematic



### 操作按键 Operation key

基本组态 Basic configuration	
1.1 流量单位 Flow unit	选择项: L/s L/m L/h Flow unit Options: L/s L/m L/h m <sup>3</sup> /s m <sup>3</sup> /m m <sup>3</sup> /h gal/s gal/m gal/h 默认值 = m <sup>3</sup> /h Default value = m <sup>3</sup> /h
1.2 流量显示分辨率 Flow display resolution	选择项: 1 2 3 Options: 1 2 3 默认值 = 3 Default value = 3 定义瞬时流量显示的小数位数 Define the decimal digits of the instantaneous flow display
1.3 总量单位 Total amount unit	选择项: L m <sup>3</sup> gal Options: L m <sup>3</sup> gal 默认值 = m <sup>3</sup> Default value = m <sup>3</sup>
1.4 总量显示分辨率 Total amount display resolution	选择项: 1 2 3 Options: 1 2 3 默认值 = 3 Default value = 3 定义累积流量显示的小数位数 Define the decimal digits of the accumulative flow display
1.5 阻尼时间(s) Damping time (s)	浮点数: 99.9 - 0.1 Floating point number: 99.9 - 0.1 默认值 = 1.0 Default value = 1.0 定义流量平滑滤波的时间常数 Define the time constant of the smooth filtering of the flow.

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系统组态 System configuration		
2.1 新密码 New code	数字: 0000 - 9999 Numbers: 0000 - 9999 默认值 = 0200 Default value = 0200	
2.2 语言 Language	选择项: 中文 英文 Options: Chinese English 默认值 = 中文 Default value = Chinese	
2.3 信号处理 Signal processing	2.3.1 刻度流量m <sup>3</sup> /h Scale flow m <sup>3</sup> /h	浮点数: max = 当前口径下15m/s流速对应流量 min = 当前口径下0.2m/s流速对应流量 $Q = (\text{流速} \times D^2) / 353.67765$ Floating point number: max = flow corresponding to speed of 15m/s under current caliber min = flow corresponding to speed of 0.2m/s under current caliber $Q = (\text{flow} \times D^2) / 353.67765$ 比如当前口径=100mm, 则: For example, when the current caliber = 100mm, then max = 424.115 m <sup>3</sup> /h min = 5.655 m <sup>3</sup> /h 默认值 = 100.0 Default value = 100.0 刻度流量是指在瞬时流量达到此设定值时, The scale flow refers to when the instantaneous flow reaches this set value, 电流输出 = 20mA Current output = 20mA 频率输出 = “频率上限Hz”的设定值。 Frequency output = the set value of “upper limit of frequency Hz” 改变此参数将会影响: 电流输出 频率输出 Modification of this parameter will affect: current output and frequency output
	2.3.2 小流量中止% Small flow suspension %	浮点数: 9.9 - 0.0 Floating point number: 9.9 - 0.0 默认值 = 1.0 Default value = 1.0 当瞬时流量的绝对值小于刻度流量×此设定值时, 使得瞬时流量=0
2.4 频率输出 Frequency output	2.4.1 频率上限Hz Upper limit of frequency Hz	浮点数: 5000.0 - 100.0 Floating point number: 5000.0 - 100.0 默认值 = 2000.0 Default value = 2000.0 当前刻度流量所对应的输出频率 Output frequency corresponding to the current scale flow 输出频率(Hz) = (当前流量(m <sup>3</sup> /h)/刻度流量(m <sup>3</sup> /h))×频率上限(Hz) Output frequency (Hz) = (current flow (m <sup>3</sup> /h)/scale flow (m <sup>3</sup> /h))×upper limit of frequency (Hz)
	2.4.2 脉冲当量L/p Pulse equivalent L/p	浮点数: xxx - 0.0 Floating point number: xxx - 0.0 默认值 = 0.0 Default value = 0.0 设置值=0时, 频率输出按照“频率上限Hz”的设置输出。 When the set value = 0, the frequency output follows the setting of “upper limit of frequency Hz”. 设置值>0时, 输出频率(Hz) = [瞬时流量(m <sup>3</sup> /h)/3.6]/脉冲当量(L/p) =瞬时流量(L/s)/脉冲当量(L/p) When the set value > 0, the output frequency (Hz) = [Instantaneous flow (m <sup>3</sup> /h)/3.6]/pulse equivalent(L/p) =instantaneous flow (L/s)/pulse equivalent(L/p) 本仪表频率输出上限: 5000.0Hz Upper limit of the output of this meter: 5000.0Hz

2.5 RS485输出 (版本: MODBUS) RS485 output (version: MODBUS)	2.4.3 脉冲宽度(ms) Pulse width (ms)	浮点数: 1000.0 – 0.0 Floating point number: 1000.0 – 0.0 默认值 = 0.0 Default value = 0.0 设置值=0时, 输出方波。 When the set value =0, the output is square wave. 设置值>0时, 脉冲电平的宽度按照设置值输出, 如果设置的脉冲宽度>实际输出脉冲周期的50%时, 自动将脉冲宽度缩小至实际输出脉冲周期的50%。 When the set value >0, the width of pulse level is output as per set value. When the set pulse width > 50% of the actual output pulse cycle, the pulse width is automatically reduced to 50% of the actual output pulse cycle. 比如: “脉冲宽度” 设置值=100ms, 但此时实际脉冲频率=500Hz, 那么此时实际的脉冲周期=2ms, 则实际输出的脉冲宽度=1ms。 For example, the set value of “pulse width”=100ms, however, the actual pulse frequency at this time =500Hz, then the actual output pulse width =1ms.
	2.4.4 脉冲电平 Pulse level	选择项: 低有效 高有效 Options: low effective, high effective 默认值 = 低有效 Default value=low effective 表示一个脉冲输出周期中 “脉冲宽度” 设置值所对应的电平类型。 Refers to the level type corresponding to the set value of “pulse width” in one pulse output cycle. 比如, 脉冲电平=低有效, 脉冲宽度=1ms For example, pulse level = low effective, pulse width =1ms
	2.5.1 RS485通讯协议 RS485 communication protocol	选择项: MODBUS-RTU MODBUS-ASCII Options: MODBUS-RTU MODBUS-ASCII
	2.5.2 波特率 Baud rate	选择项: Options: 1200 2400 4800 9600 19200 38400 默认值 = 9600 Default value = 9600
	2.5.3 数据位 Data bit	选择项: 7 8 Options: 7 8 默认值 = 8 Default value = 8 在RTU协议下, 不能选择7位数据位 With RTU protocol, seven bits of data bits can not be selected
	2.5.4 校验方式 Check method	选择项: 无校验 奇校验 偶校验 Options: no check, odd check, even check 默认值 = 无校验 Default value =no check
	2.5.5 停止位 Stop bit	选择项: 1 2 Options:1 2 默认值 = 1 Default value =1
	2.5.6 设备地址 Equipment address	数字: 247 – 1 Number: 247 – 1 默认值 = 1 Default value =1
2.6 HART地址 (版本: HART) HART address (Version: HART)	选择项: 00 01 02 03 04 05 06 07 Options:00 01 02 03 04 05 06 07 默认值 = 00 Default value =00	
2.7 累计管理 Accumulative management	2.7.1 清累计 Clear accumulative	选择项: No Yes Options: No Yes 默认值 = No Default value = No 清除正向和反向累计量 Remove the positive and reverse accumulative amount

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	2.7.2 预置正向累计m3 Pre-set the positive accumulative m3	浮点数: 999999999 - 0 Floating point number: 999999999 - 0 默认值 = 0 Default value = 0 设置此值后, 当前的正向累计量将会被此设置值覆盖。 After this value is set, the current positive accumulative amount will be covered by this set value.
2.8 恢复出厂设置 Factory reset	选择项: No Yes Options: No Yes 默认值 = No Default value = No 如选择YES 则恢复出厂参数设置, 现行的所有设置将被出厂参数覆盖, 同时仪表将强制复位, 用出厂 参数设置重新初始化仪表 When Yes is selected, the the factory parameter setting will be restored and all the available setting will be covered by factor parameters. At the same time, the meter will force to reset and use the factor setting to re-initialize the meter.	

仪表校准 Indicating Instrument Calibration		
3.1 4mA校准 4mA Calibration	浮点数: 5.0 - 3.0 默认值 = 0.0 执行此功能, 同时用精密电流表测量4-20mA电流输出, 将读数输入仪表, 则仪表内部自动完成校准运算 Floating-point Number: 5.0 - 3.0 Default Value = 0.0 Execute this function while simultaneously measuring 4-20mA current output with precision ammeter, and then input the reading into ammeter. Thus, calibration computing is automatically completed in internal ammeter.	
3.2 20mA校准 20mA calibration	浮点数: 21.0 - 19.0 默认值 = 0.0 执行此功能, 同时用精密电流表测量4-20mA电流输出, 将读数输入仪表, 则仪表内部自动完成校准运算 Floating-point Number: 21.0 - 19.0 Default Value = 0.0 Execute this function while simultaneously measuring 4-20mA current output with precision ammeter, and then input the reading into ammeter. Thus, calibration computing is automatically completed in internal ammeter.	

仪表检验 Indicating Instrument Inspection		
4.1 4-20mA检验 4mA Calibration	浮点数: 20.0 - 4.0 默认值 = 12.0 执行此功能, 同时用精密电流表测量4-20mA电流输出, 在允许范围内改变当前的给定值, 检验输出值和 给定值的偏差 Floating-point Number: 20.0 - 4.0 Default Value = 12.0 Execute this function while simultaneously measuring 4-20mA current output with precision ammeter, change current given value within the allowable range, and inspect deviation between output value and given value.	
4.2 频率输出检验 20mA calibration	浮点数: 5000.0 - 1.0 默认值 = 1000.0 执行此功能, 同时用精密频率计测量频率输出, 在允许范围内改变当前的给定值, 检验输出值和给定值 的偏差 Floating-point Number: 5000.0 - 1.0 Default Value = 1000.0 Execute this function while simultaneously measuring frequency output with precision frequency meter, change current given value within the allowable range, and inspect deviation between output value and given value.	

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# TK5100/5200/5300流量计选型编码说明

## Selection and coding of TK5100/5200/5300 flow meters

### TK5100系列标准型涡轮流量计选型编码说明

#### Selection and coding of TK5100 series standard turbine flow meters

型号 Model	TK5100																						
安装方式 Installation method 法兰型 Flange type 夹持型 Clamping type 螺纹型 Thread type		F																					
本体材质 Material of the body 304不锈钢 304 stainless steel 316L不锈钢 316L stainless steel PP PTFE 其他 Others			T																				
口径 Caliber DN4 DN6 DN10 DN15 DN20 DN25 DN32 DN40 DN50 DN65 DN80 DN100 DN125 DN150 DN200																							
机芯材质 Material of movement 2Cr13 双相钢 Duplex steel 镀钛 Titanium plating 其他 Others																							
法兰/卡箍材质 Material of flange/clamp 202不锈钢 202 stainless steel 304不锈钢 304 stainless steel 316不锈钢 316 stainless steel 其他材质 Other materials																							
配对法兰 Matching flange 无配对法兰 No matching flange 202不锈钢 202 stainless steel 304不锈钢 304 stainless steel 316不锈钢 316 stainless steel 其他材质 Other materials																							

型号 Model	TK5100																			
额定压力 Rated pressure	0.6Mpa						B													
	1.0Mpa						C													
	1.6Mpa						D													
	2.5Mpa						E													
	4.0Mpa						F													
	其它 Others						Z													
涡轮类型 Turbine type	宽量程涡轮 Wide range turbine						A													
	普通量程涡轮 Normal range turbine						B													
温度范围 Temperature range	标准温度<80°C Standard temperature <80°C										0									
	标准温度<120°C Standard temperature <120°C										1									
	标准温度<120°C Standard temperature <120°C										2									
	标准温度<150°C Standard temperature <150°C																			
精度等级 Turbine type	1%										D									
	0.5%										C									
	0.2%										B									
	0.1%										A									
输出模式 Output mode	4-20mA										01									
	4-20mA + HART通讯 communication										02									
	4-20mA + Modbus协议 communication										03									
	现场显示不输出 No output of site display										04									
	脉冲无显示 No pulse display										05									
供电电源 Power supply	220VAC																			G
	24VDC																			K
	3.6V锂电池 3.6V lithium battery																			Y
防护等级 Protection class	Ip65																			0
	Ip67																			1
防爆等级 Explosion proof class	无None																			0
	防爆/隔爆 Explosion proof/explosion suppression																			EX

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# TK5200系列插入式涡轮流量计选型编码说明

## Selection and coding of TK5200 series plug-in turbine flow meters

型号 Model	TK5200																			
安装方式 Installation method																				
标准型 Standard type	B																			
在线型 On-line type	Z																			
本体材质 Material of the body																				
304不锈钢 304 stainless steel	T																			
316L不锈钢 316L stainless steel	S																			
其他 Others	Z																			
传感器形式 Sensor type																				
切向式 Tangential	Q																			
轴向式 Axial	B																			
口径 Caliber																				
DN150																				1F
DN200																				2H
DN250																				2F
DN300																				3H
DN350																				3F
DN400																				4H
DN450																				4F
DN500																				5H
DN600																				6H
DN700																				7H
DN800																				8H
DN900																				9H
DN1000																				1T
DN1100																				1M
机芯材质 Material of movement																				
2Cr13																				E
双相钢 Duplex steel																				S
镀钛 Titanium plating																				T
其他 Others																				A
法兰/卡箍材质 Material of flange/clamp																				
202不锈钢 202 stainless steel																				1
304不锈钢 304 stainless steel																				2
316不锈钢 316 stainless steel																				3
其他材质 Other materials																				4
配对法兰 Matching flange																				
无配对法兰 No matching flange																				0
202不锈钢 202 stainless steel																				1
304不锈钢 304 stainless steel																				2
316不锈钢 316 stainless steel																				3
其他材质 Other materials																				4

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型号 Model	TK5200																								
额定压力 Rated pressure	0.6Mpa																								
	1.0Mpa																								
	1.6Mpa																								
	2.5Mpa																								
	4.0Mpa																								
	其它 Others																								
涡轮类型 Turbine type	宽量程涡轮 Wide range turbine																								
	普通量程涡轮 Normal range turbine																								
温度范围 Temperature range	标准温度<80°C Standard temperature <80°C																								0
	标准温度<120°C Standard temperature <120°C																								1
	标准温度<150°C Standard temperature <150°C																								2
精度等级 Turbine type	5%																								G
	2.5%																								F
	1.5% (需定制 Need custom)																								E
	1% (需定制 Need custom)																								D
输出模式 Output mode	4-20mA																								01
	4-20mA + HART通讯 communication																								02
	4-20mA + Modbus协议 communication																								03
	现场显示不输出 No output of site display																								04
	脉冲无显示 No pulse display																								05
供电电源 Power supply	220VAC																								G
	24VDC																								K
	3.6V锂电池 3.6V lithium battery																								Y
防护等级 Protection class	IP65																								0
	IP67																								1
防爆等级 Explosion proof class	无None																								0
	防爆/隔爆 Explosion proof/explosion suppression																								EX

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## TK5300系列卫生型涡轮流量计选型编码说明 Selection and coding of TK5300 series sanitary turbine flow meter

型号 Model	TK5300																				
安装方式 Installation method 法兰型 Flange type 卡箍型 Clamp type																					
本体材质 Material of the body 304不锈钢 304 stainless steel 316L不锈钢 316L stainless steel 其他 Others																					
口径 Caliber DN4 DN6 DN10 DN15 DN20 DN25 DN32 DN40 DN50 DN65 DN80 DN100																					
机芯材质 Material of movement 2Cr13 双相钢 Duplex steel 镀钛 Titanium plating 其他 Others																					
法兰/卡箍材质 Material of flange/clamp 202不锈钢 202 stainless steel 304不锈钢 304 stainless steel 316不锈钢 316 stainless steel 其他材质 Other materials																					
配对法兰 Matching flange 无配对法兰 No matching flange 202不锈钢 202 stainless steel 304不锈钢 304 stainless steel 316不锈钢 316 stainless steel 其他材质 Other materials																					

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型号 Model	TK5300												
额定压力 Rated pressure	0.6Mpa				B								
	1.0Mpa				C								
	1.6Mpa				D								
	2.5Mpa				E								
	4.0Mpa				F								
	其它 Others				Z								
涡轮类型 Turbine type	宽量程涡轮 Wide range turbine				A								
	普通量程涡轮 Normal range turbine				B								
温度范围 Temperature range	标准温度<80℃ Standard temperature <80℃										0		
	标准温度<120℃ Standard temperature <120℃										1		
	标准温度<150℃ Standard temperature <150℃										2		
	标准温度<150℃ Standard temperature <150℃												
精度等级 Turbine type	1%										D		
	0.5%										C		
	0.2%										B		
	0.1%										A		
输出模式 Output mode	4-20mA											01	
	4-20mA + HART通讯 communication											02	
	4-20mA + Modbus协议 communication											03	
	现场显示不输出 No output of site display											04	
	脉冲无显示 No pulse display											05	
供电电源 Power supply	220VAC												G
	24VDC												K
	3.6V锂电池 3.6V lithium battery												Y
防护等级 Protection class	IP65												0
	IP67												1
防爆等级 Explosion proof class	无NONE												0
	防爆/隔爆 Explosion proof/explosion suppression												EX

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# 保修及常见故障排除

## Warranty and normal fault elimination

### 运输和贮存注意事项

为防止仪表受到意外损坏，流量计在运到用户使用地点之时，请保持我公司发货时的包装状态。  
 仪器到达之后应及时安装，以免因意外因素使流量转换器的绝缘性能减低，金属部件受到腐蚀。如需要长期存放，请遵守下列事项：  
 存放时，尽量勿拆包装。  
 存放地点应具备下列条件：  
 具有防水设施  
 不易受到机械振动或冲击  
 仪器应存放在下表所列的温度和湿度范围里。

环境温度 Ambient temperature	-20°C~+60°C	相对湿度 Relative humidity	5%~90%
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### Notice on transportation and storage

In order to prevent the instrument from being damaged accidentally, please keep the packaging status as it is sent by our company before the flow meter is transported to the customer place. The instrument shall be installed immediately after its arrival so as to prevent the insulation performance of the flow converter from decreasing due to accidental factor and metal parts from corrosion. When the instrument has to be stored for long term, please observe the matters as follows:  
 Do not remove the packaging during storage.  
 The storage place shall be provided with following conditions:  
 Water proof and rain proof facilities  
 Not easy to subject to mechanical vibration or impact.

### 安装场所所注意事项

环境温度  
 避免安装在温度变化较大的场所，若可能受到其他设备热辐射，须有隔热通风措施。  
 大气条件  
 避免把流量计安装在含腐蚀性气体的环境中，如需安装，则必须提供通风措施。  
 机械振动或冲击  
 流量计虽结构很坚固，但应选择安装在振动或撞击小的场所。如确须将流量计装在振动较大的管道上，需加设管道支撑。  
 其他注意事项  
 涡轮流量计的周围应有充裕的空间，以便作业和定期检查。  
 安装场所应便于接线和安装管道。

### Notice on installation place

Ambient temperature  
 It shall not be placed where the temperature changes largely. There shall be thermal insulation and ventilation measures when it may be subject to thermal radiation of other equipment.  
 Atmospheric conditions  
 It shall not be installed in environment with corrosive gas. Ventilation measures have to be taken when it has to be installed.  
 Mechanical vibration or impact  
 Although the flow meter is strong in structure, it shall be placed where the vibration or impact is small. When the flow meter has to be installed on the pipeline where the vibration is large, pipeline support has to be added.  
 Other notice  
 There shall be sufficient space around the turbine meter for operation and regular check.  
 The installation site shall be such that it is easy to wire and install the pipeline.

## 转换器面板结构与按键定义 Converter panel structure and key definition

故障现象 Fault	故障分析及方案 Fault Analysis and Solution
1 有流量通过，仪表瞬时流量为零 There is flow passing, but the instantaneous flow of the meter is zero	(1) 接线错误，检查仪表接线。 wrong wiring, check the instrument wiring. (2) 仪表内部参数被修改。按照鉴定证检测仪表参数。 the parameters inside the instrument are modified. Check the instrument parameters as per verification certificate. (3) 信号采集线圈损坏，影响信号的传递，即使有流量通过也无法将信号传输给转换器。用带磁性的螺丝刀滑动信号采集线圈。 the signal acquisition coil is damaged, affecting the signal transmission so that it is impossible to send the signal to the converter even when there is flow passing. Slide the signal acquisition coil with magnetic screw driver. (4) 叶轮卡死，检查叶轮。 the impeller is blocked. Check the impeller
2 仪表无流量通过时，仪表就有瞬时流量显示 There is no flow passing but the instrument shows the instantaneous flow.	(1) 管道存在剧烈震动。建议加减震措施。 there is strong vibration on the pipeline. Add the vibration damping measures. (2) 仪表是否良好接地。检查接地。 whether the instrument is well grounded. Check the grounding. (3) 现场存在磁场干扰，如变频器、电机、电磁阀等（现场50HZ的工频干扰。在一定程度上，可能会影响仪表的使用，工频干扰的计算 $Q=3600f/k$ （ $f=50HZ$ ， $k$ =仪表的系数）。通过计算，可以判断仪表是否存在工频干扰。）。建议更换安装位置。 there is magnetic filed interference on site, like 50Hz frequency interference of converter, motor and electromagnet valve on site, which may affect the performance of the instrument to certain extent. The calculation of frequency interference is $Q=3600f/k$ ( $f=50HZ$ , $k$ =instrument coefficient). You can judge whether there is such interference after calculation. It is recommended to change the installation position. (4) 仪表的管道截止阀没有彻底关好。检查阀门。 the cut-off valve of the instrument pipeline is not closed completely. Check the valve.
3 仪表正常测量，测量值不准确 The measurement value is not accurate during normal instrument.	(1) 仪表内部参数存在问题。按照鉴定证检测仪表参数。 there is problem with parameters inside the instrument. Check the instrument parameters as per verification certificate. (2) 现场管道不符合要求，含有气体或粘度过高。按照说明书的安装说明及注意事项严格操作。 the pipeline has gas or high viscosity on site, not meeting the requirements. Operate strictly according to the installation instruction and notice. (3) 仪表机芯问题，将仪表拆下用嘴吹动叶轮应滑块运转。如损坏建议与厂家联系。 problem with the instrument movement. Remove the instrument, blow the impeller with mouth and the sliding block shall run. It is recommended to contact the manufacturer when it is damaged.
4 仪表正常测量，现场液晶显示正常，仪表电流输出不正确 The current output of the instrument is not correct during the normal	(1) 检测仪表参数第四屏，查看仪表量程是否和仪表名牌所标量程上限相同。 check the forth panel of the instrument parameters. Check whether the instrument range is the same as the upper limit of the range indicated on the instrument nameplate. (2) 仪表电流输出芯片的损坏。 damage of current output chip of the instrument.