

INNOVATION MAKES EXCELLENT

有 | 跨 | 越 | 才 | 有 | 卓 | 越



安徽天康(集团)股份有限公司
ANHUI TIANKANG(GROUP) SHARES CO.,LTD

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。



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.



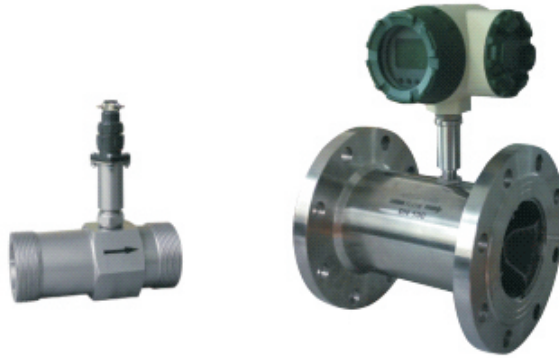
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TK5100系列标准型液体涡轮流量计

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Al₂O₃、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/m³]，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）[m³/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 Al₂O₃ 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:

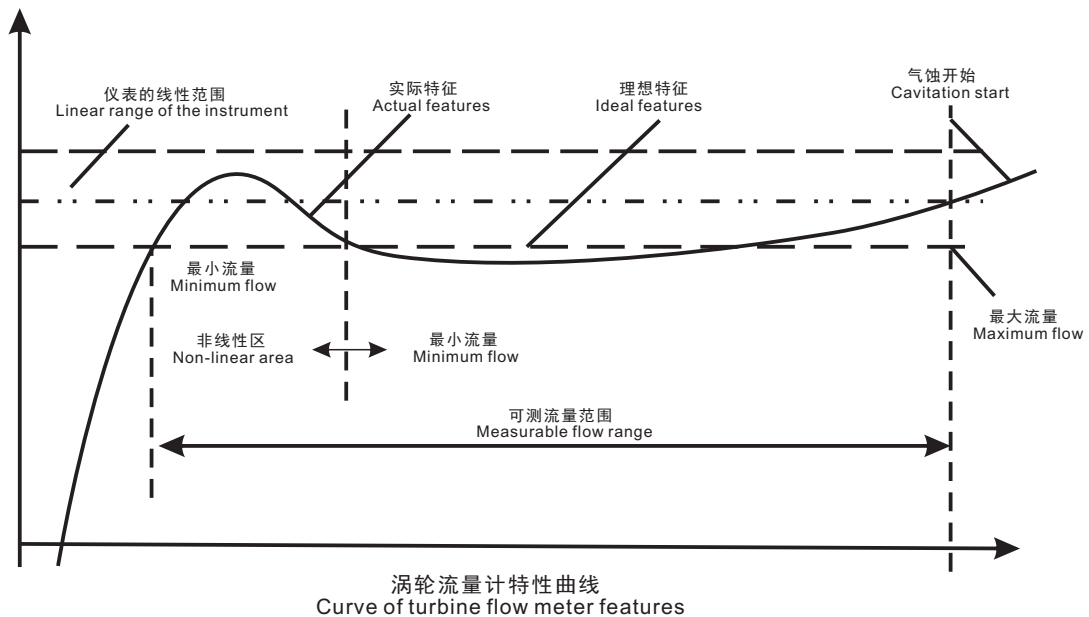
f ——pulse frequency [Hz];

k ——sensor instrument coefficient [1/m³], given by the inspection form. When the [1/L] is taken as the unit;

Q ——instantaneous flow of the fluid (under operation status) [m³/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.



TK5100系列涡轮流量计的显著特点

高精度，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.

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

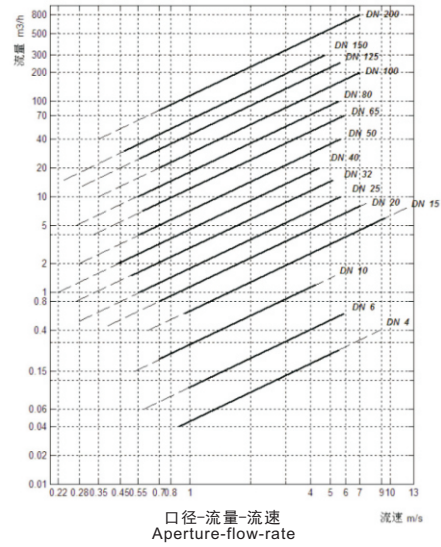
液涡轮适用于汽油、柴油、液态烃类等黏度小的流体的流量，广泛应用于石油、化工、冶金、造纸、科研领域和食品酒水饮料等行业测量液体的体积瞬时流量和体积总量的计量检测。

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 |

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> | |
| | <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> |
| 螺纹连接型 Thread Connection Type | <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> |
| | <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 | 法兰 Flange | 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 |
| | 2Cr13不锈钢 2Cr13 stainless steel | 2Cr13不锈钢 2Cr13 stainless steel | 叶轮 Impeller | 双相钢 Duplex steel | 叶轮 Impeller |
| | 304不锈钢 304 stainless steel | 304不锈钢 304 stainless steel | 表体 Meter body | 316不锈钢 316 stainless steel | 表体 Meter body |
| 螺纹连接型 Thread Connection Type | 304不锈钢 304 stainless steel | 304不锈钢 304 stainless steel | 锁母 Lock nut | 316不锈钢 316 stainless steel | 导向架 Guide frame |
| | 2Cr13不锈钢 2Cr13 stainless steel | 2Cr13不锈钢 2Cr13 stainless steel | 叶轮 Impeller | 双相钢 Duplex steel | 叶轮 Impeller |
| | 304不锈钢 304 stainless steel | 304不锈钢 304 stainless steel | 表体 Meter body | 304不锈钢 304 stainless steel | 表体 Meter body |
| 夹装连接型 Clamping Connection Type | 304不锈钢 304 stainless steel | 304不锈钢 304 stainless steel | 表体 Meter body | 304不锈钢 304 stainless steel | 表体 Meter body |
| | 2Cr13不锈钢 2Cr13 stainless steel | 2Cr13不锈钢 2Cr13 stainless steel | 叶轮 Impeller | 双相钢 Duplex steel | 叶轮 Impeller |

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

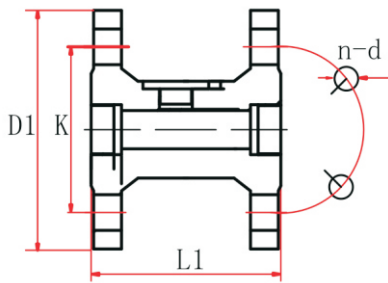


图4.1 DN15~DN200法兰连接型涡轮流量传感器尺寸图
Fig. 4.1 Dimensions of DN15~DN200 flange connection turbine flow sensor

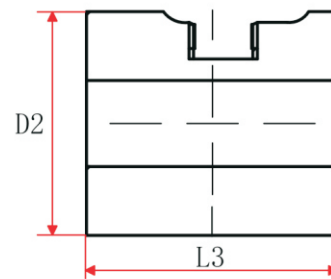


图4.2 DN4~DN200螺纹连接型涡轮流量传感器
(含直管段部分)尺寸图
Fig. 4.2 Dimensions of DN4~DN200 thread connection turbine flow sensor (including the straight pipe section)

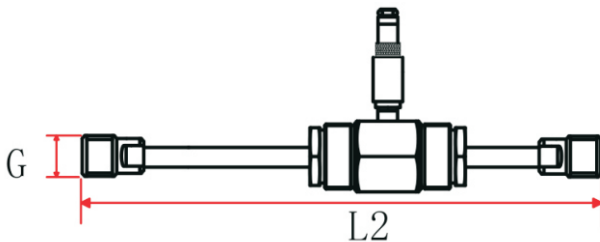


图4.3 DN4~DN10螺纹连接型涡轮流量传感器
(不含直管段部分)尺寸图
Fig. 4.3 Dimensions of DN4~DN10 thread connection turbine flow sensor (excluding the straight pipe section)

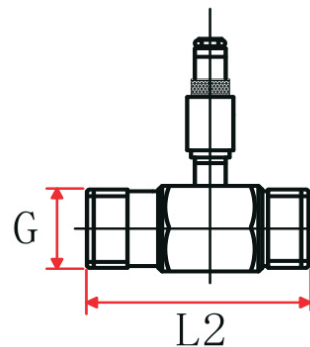


图4.4 DN15~DN50夹装连接型涡轮流量传感器
(不含直管段部分)尺寸图
Fig. 4.4 Dimensions of DN15~DN50 thread connection turbine flow sensor (excluding the straight pipe section)

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 | |
|---|--|
| <p>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.</p> | |
| <p>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. When bubble enters the measurement pipe, the flow display will be affected, which may lead to the measurement error.</p> | |

安装场所和要求 Installation site and requirements

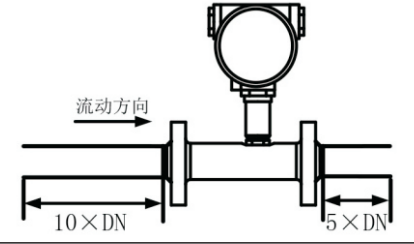
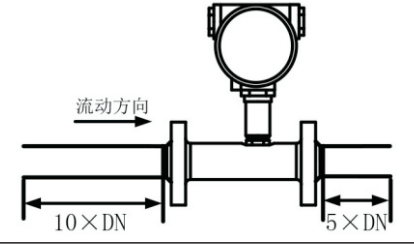
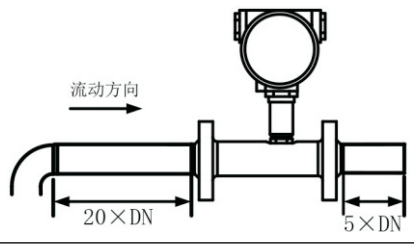
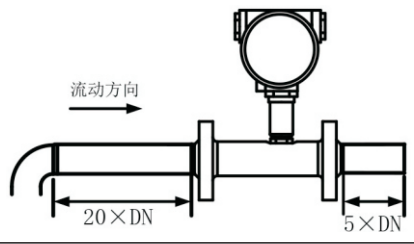
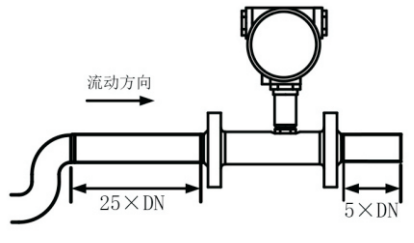
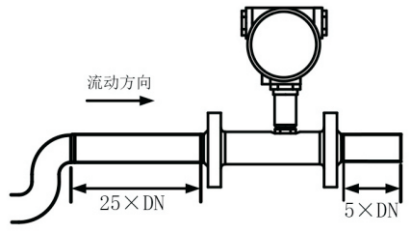
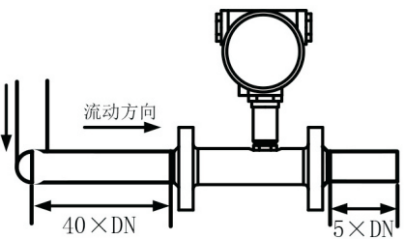
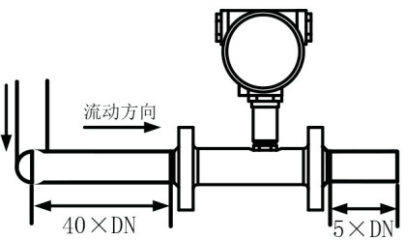
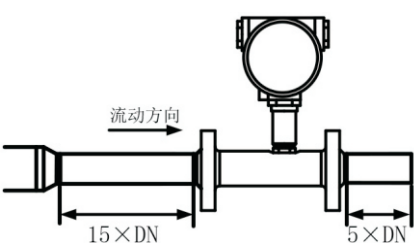
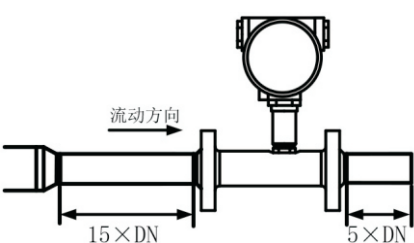
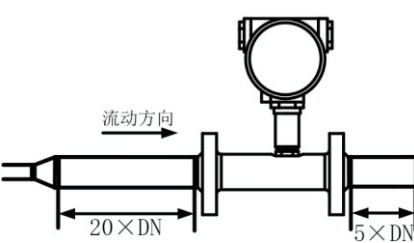
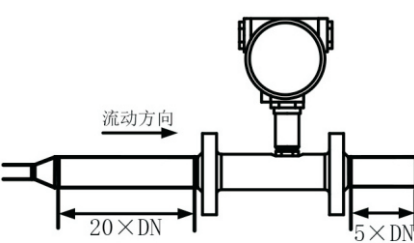
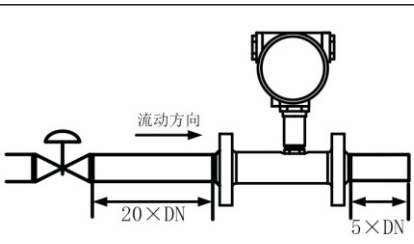
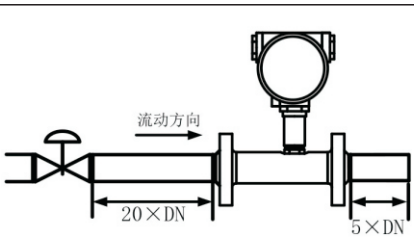
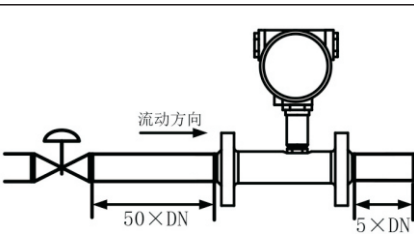
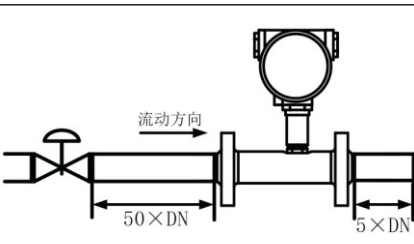
| 涡轮流量计典型安装管路系统 Typical installation system for turbine flow meter | |
|---|--|
| | |
| 管道安装注意事项 Notice for pipeline installation | |
| <p>传感器应安装在便于维修，管道无振动、无强电磁干扰与热辐射影响的场所。 The sensor shall be installed where it is easy to maintain, no pipeline vibration, no strong electromagnetic interference and thermal radiation influence.</p> <p>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°以内），垂直安装传感器管道垂直度偏差亦应小于5°。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°), the perpendicularity deviation for vertical installation of sensor shall be less than 5°. Bypass pipe and reliable cut-off valve shall be installed where there shall be no stopped flow (see the drawing above). Make sure the bypass pipe has no leakage during measurement.</p> <p>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.</p> <p>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.</p> <p>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.</p> | |

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.

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.

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4~20mADC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 | | | |
| 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 ³ /h Flow range corresponding to the inside nominal diameter m ³ /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±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

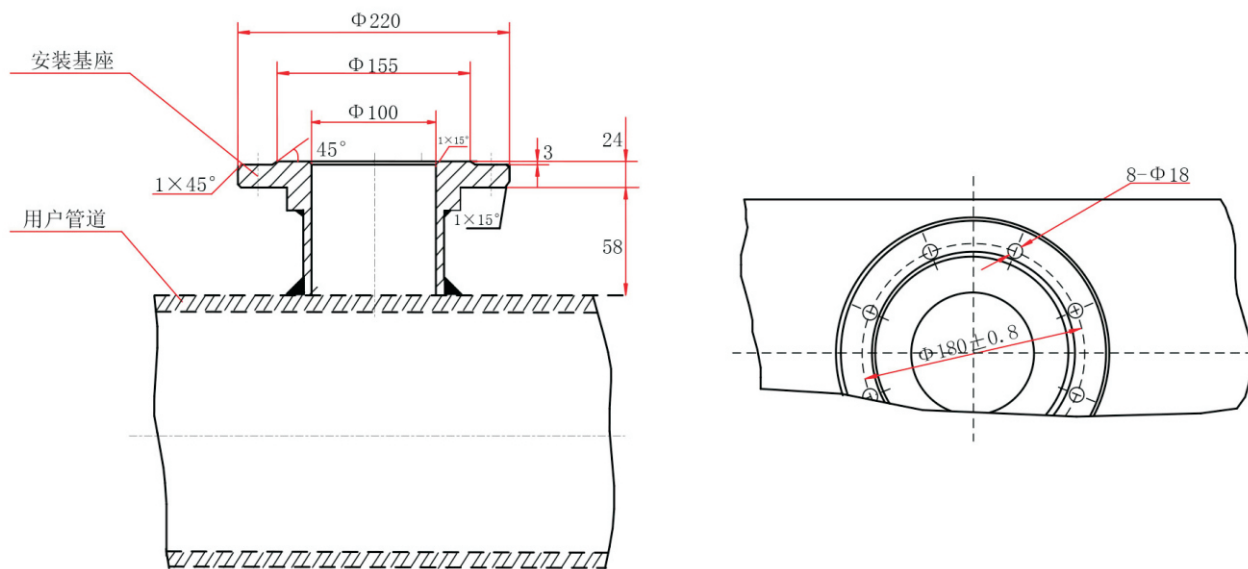
Measurement range of axial sensor

| 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 ³ /h Flow range corresponding to the inside nominal diameter m ³ /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±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 |

| 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Φ100的圆缺。 Open one Φ100 segment on the installation point meeting the requirements of the straight pipe section of the flow meter.</p> <p>用Φ109×4.5mm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 Φ109×4.5mm 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(L2=0.5D)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5°，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 (L2=0.5D) 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 5°, 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Φ100的圆缺。 Open one Φ100 segment on the installation point meeting the requirements of the straight pipe section of the flow meter.</p> <p>用Φ109×4.5mm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 Φ109×4.5mm 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(L2=0.5D)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5°，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 (L2=0.5D) 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 5°, 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.

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.

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.

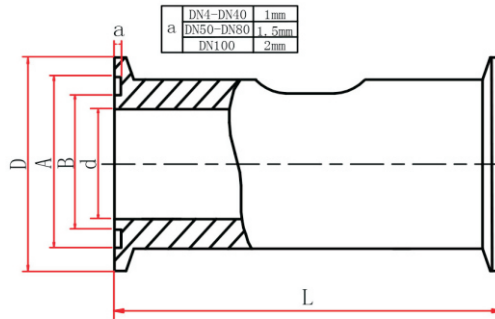
技术参数 Technical parameters

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℃ | |
| | | 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℃~+60℃ | 相对湿度 Relative humidity | 5%~90% |
| | 大气压力 Atmospheric pressure | 86kPa~106kPa | | |

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

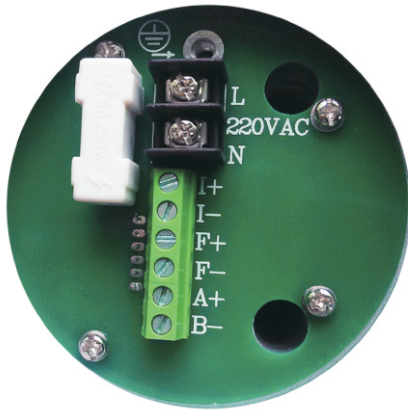
Dimension D is the inner diameter dimension of the supporting clamp.

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

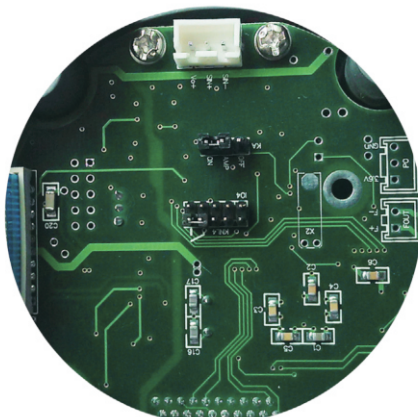
1、一体型端子接线图 Integrated terminal wiring diagram



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 + |

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 ³ /s m ³ /m m ³ /h gal/s gal/m gal/h 默认值 = m ³ /h Default value = m ³ /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 ³ gal Options: L m ³ gal 默认值 = m ³ Default value = m ³ |
| 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. |

| 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 ³ /h Scale flow m ³ /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 $Q = (\text{流速} * D * D) / 353.67765$ 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 $Q = (\text{flow} * D * D) / 353.67765$ 比如当前口径=100mm, 则: For example, when the current caliber = 100mm, then max = 424.115 m ³ /h min = 5.655 m ³ /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 ³ /h)/刻度流量(m ³ /h))×频率上限(Hz) Output frequency (Hz) = (current flow (m ³ /h)/scale flow (m ³ /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 ³ /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 ³ /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 |

| | | |
|--------------------------------|--|--|
| | 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. | |

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| 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 20mA calibration 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. | |

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 | | | | | | | | | | | | | | | | | | | |
| DN200 | | | | | | | | | | | | | | | | | | | |
| DN250 | | | | | | | | | | | | | | | | | | | |
| DN300 | | | | | | | | | | | | | | | | | | | |
| DN350 | | | | | | | | | | | | | | | | | | | |
| DN400 | | | | | | | | | | | | | | | | | | | |
| DN450 | | | | | | | | | | | | | | | | | | | |
| DN500 | | | | | | | | | | | | | | | | | | | |
| DN600 | | | | | | | | | | | | | | | | | | | |
| DN700 | | | | | | | | | | | | | | | | | | | |
| DN800 | | | | | | | | | | | | | | | | | | | |
| DN900 | | | | | | | | | | | | | | | | | | | |
| DN1000 | | | | | | | | | | | | | | | | | | | |
| DN1100 | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | |

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。

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.

| | | | |
|-----------------------------|-------------|---------------------------|--------|
| 环境温度 Ambient temperature | -20°C~+60°C | 相对湿度 Relative humidity | 5%~90% |
|-----------------------------|-------------|---------------------------|--------|

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 field interference on site, like 50Hz frequency interference of converter, motor and electromagnetic 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. |