INNOVATION MAKES EXCELLENT

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安徽天康(集团)股份有限公司

ANHUI TIANKANG(GROUP) SHARES CO.,LTD

ABOUT US

关于我们

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—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。

1974

成立于1974年

多项行业第一

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

Anhui Tiankang (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 Tiankang 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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工作原理

法拉第感应定律（指的是当导体通过磁场时会在导体内部产生感应电势）即为电磁流量计测量的基础原理。这种测量原理可应用于具有导电性的流体，该流体流入磁场垂直于流体方向的管道，在流体中感应生成的电势可利用对称布置的两个电极进行测量。 信号电压UE与磁感应强度B，电极间距D以及流体平均速度v成正比。由于磁感应强度B与电极间距D为常量，所以信号电压UE与平均流速v成正比。用于计算体积流速的等式表明信号电压UE与体积流量成线性正比。

感应的信号电压被转化为转换器中的分度，模拟以及数字输出信号。

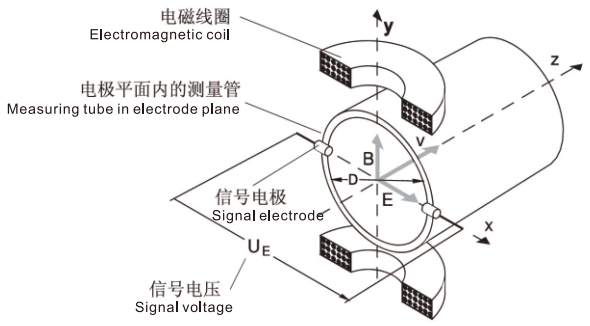
Working principle

Faraday law of electromagnetic induction(It means when the conductor flow through the magnetic field, it can cause induced electromotive force in conductor). It is the measuring principle of electromagnetic flowmeter. This measuring principle can be applied to conductive fluid. The fluid flows into a pipeline which is perpendicular to the direction of the fluid. The electromotive force induced in the flow can use the two symmetrical electrodes to measure. Signal voltage U_E is proportional to magnetic flux density B , electrode spacing D and average velocity of the fluid V .Magnetic flux density B and electrode spacing D are constants, so signal voltage U_E is proportional to average flow velocity of the fluid V .Equation for calculating the volume flow rate means signal voltage U_E is linearly proportional to volume flow.

The induced signal voltage is converted to the indexing of the converter, analog and digital output signals.

电磁流量计示意图

Schematic of electromagnetic flow meter



U_E=信号电压	U_E=signal voltage
B=磁感应强度	B=magnetic flux density
D=电极间距	D=electrode spacing
V=平均流速	V=average velocity of the fluid
qv=体积流量	qv=volume flow

$$U_E \sim B\ D\ v$$

$$qv = \frac{\pi D^2}{4} v$$

$$U_E \sim qv$$

产品特点

1）采用国际领先的励磁技术，励磁电路简洁，稳定可靠，具备人工智能的性能。管道内无可动部件，无阻流部件，测量中几乎没有附加压力损失。

2）测量结果与流速分布、流体压力、温度、密度、粘度等物理参数无关。

3）在现场可根据用户在线修改量程。

4）适用于各种导电液体的流量测量，如自来水、污水、泥浆、各类饮料、化学原料、粘稠液体和悬浮物。具有低电导测量功能。

5）Ex防爆设计，符合国家防爆技术要求，已通过鉴定验收，可应用于各类防爆场所。

Product features

It uses the international leading excitation technology. The excitation circuit is simple, stable and reliable, it has the performance of artificial intelligence.

There are no movable parts and no resisting flow parts in the pipeline.

There is no additional pressure-loss. The measurement results have no relationship to flow velocity distribution, fluid pressure, temperature, density, viscosity and other physical parameters.

It can modify the range online according to the actual need of users .

It can be used to measure the flow of conductive fluid,such as tap water, sewage, mud, all kinds of drinks, chemical materials, viscous liquid and suspended solids. It has low conductivity measurement function.

Ex explosion-proof design meet the requirements of the national explosion-proof technology, it has passed the identification and acceptance, and it can be used in all kinds of explosion-proof places.

6）高阻快速响应设计，无失真地采集微弱信号和快速反应流量变化，量程比可达 100：1。

7）采用电容式技术的空、满管检测技术，杜绝误报警的出现。

8）具备转换器互换的一致性，无须重新输入参数。

9）宽范围电源模式可供选择（DC：18V~36V AC：85V~265V）。

10）采用出厂保存设置功能，使仪表各参数万无一失。

11）红外遥控功能以及按键操作，操作更加方便。

12）提供传感器零点修正以及自动校零功能。

13）全中文（英文）友好界面，满足各方使用要求。

14）具备转换器本机自校、自检功能。

15）具备防雷电保护设计电路。高效抗干扰电路，适用各种恶劣环境。

16）具有RS485、RS232、Hart、Modbush和Pro□bus等数字通讯信号输出。

17）转换器和传感器具有多种防护等级及安装方式，有适用于潜水安装的IP68等级。

18）插入式电磁流量计在大管道流量检测中，安装简单，不需断流，现场可带压开孔，具有绝对的安装优势与价格优势。插入式电磁流量的测量只与插入深度有关，故该流量计通用性广，互换性强。一种型号就可适用于各种规格管道的流体测量要求。

Fast response design of high resistance can collect the weak signals without distortion and reflect the change of the flow. The range ratio can reach to 100:1.

It used the empty and full pipe detection of capacitive technology and prevent the false alarm of emergence.

It has the consistency of the converter swap, It's no need to re-enter the parameters.

And it has wide range power type to choose (DC: 18V~36V AC: 85V~265V).

It uses the factory function to save the settings and to ensure that no danger of anything going wrong with the instrument parameters. Infrared remote control function and keys operation let the operation more convenient.

It has the function of sensor zero correction and automatic zero calibration.

Chinese (English) interface can meet different kinds of requirements.

It also has converter self-calibration and self check function.

The circuit has anti lightning protection design. Anti-interference circuit can apply to harsh environment.

It has digital communication signal output, like RS485, RS232, Hart, Modbus and Profibus,etc.

Converters and sensors have a variety of protection levels and installation methods. IP68 level is suitable for diving installation.

Inserted electromagnetic flowmeter in large pipe flow measurement has advantages, like simple installation, without interrupting scene and hot tapping, so it has installation advantage and price advantage.

The measurement of the inserted electromagnetic flowmeter is only related to the depth of insertion, so the flowmeter is widely used and has high interchangeability. A kind of type can be applied to a variety of specifications of the pipeline fluid measurement.

标准技术规格

1. 正常工作条件

环境温度：-30～+65℃；

相对湿度：5%～90%；

供电电源：单相交流电源 85～265V，45～63Hz；

直流电源：18VDC～36VDC。

2. 测量精度

TK1100标准型：±0.5%；

TK1200高精度：±0.2%；

TK1300卫生型：±0.2%, ±0.5%；

TK1400插入式：±1.5%；

TK1500电池供电型：±0.5%。

Standard technical specifications

1．Normal working conditions

ambient temperature:-30～+65℃.

relative humidity:5%～90%.

power supply:

single phase AC power supply 85～265V,45～63Hz.

DC power supply18VDC～36VDC.

2．Measurement accuracy

TK11standard type：±0.5%.

TK12 high accuracy type：±0.2%.

TK13 hygienic type：±0.2%, ±0.5%.

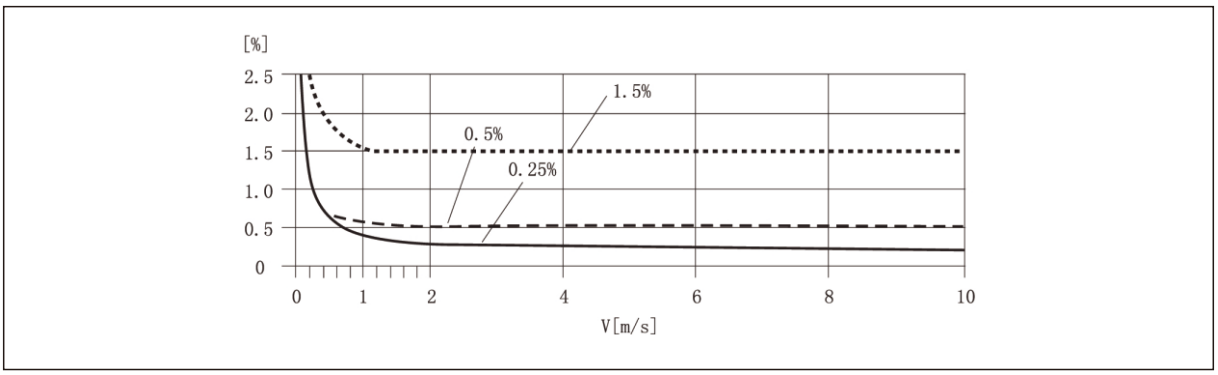
TK14 Insert type：±1.5%.

TK15 battery powered type：±0.5%.

Tk16 electromagnetic heat energy meter type：±1.0%.

测量误差

Measurement error



3. 输出变量

3.1 模拟电流输出

负载电阻：0~10mA时，0～1.5kΩ； 4~20mA时，0~750Ω。

基本误差：0.1%±10μA。

3.2 数字频率输出

频率输出范围：1~5000Hz；

输出电气隔离：光电隔离，隔离电压：>1000VDC;

频率输出驱动：场效应管输出，最高承受电压36VDC，最大负载电流250mA。

3.3 数字脉冲输出

输出脉冲范围：0～100脉冲 / 秒（高于上限时，会丢失脉冲）；

输出脉冲当量：0.001～1.000m³ /cp;
0. 001～1.000 LTR /cp;
0. 001～1.000 USG /cp;
0. 001～1.000 UKG /cp;

输出脉冲宽度：用户软件设置； 输出电气隔离：光电隔离，隔离电压：>1000VDC; 脉冲输出驱动：场效应管输出，最高承受电压36VDC，最大负载电流250mA。

3.4 报警输出

报警输出接点：ALMH—上限报警；ALML—下限报警；

输出电气隔离：光电隔离，隔离电压>1000VDC;

报警输出驱动：达林顿管输出，最高承受电压36VDC，最大负载电流250mA

3.5 数字通讯接口及通讯协议

MODBUS接口：RTU格式，物理接口RS-485，电气隔离1000V;

HART接口：支持标准HART协议，配置HART手持器，可在线显示测量值，并可修改仪表参数。

3．Output variable

3.1 Analog current output

Load resistance: 0～1.5kΩ when 0~10mA; 0~750Ω when 4~20mA.

Basic error: 0.1%±10μA.

3.2 Digital frequency output

Frequency output range: 1~5000Hz;

Output electrical isolation: photoelectric isolation, isolation voltage: >1000VDC;

Frequency output driver: field effect transistor output, the maximum withstand voltage is 36VDC, the maximum load current is 250mA.

3.3 Digital pulse output

Output pulse range: 0 ~ 100 pulse per second (higher than the upper limit, the pulse will be lost).

Output pulse equivalent: 0.001～1.000m3 /cp;
0. 001～1.000 LTR /cp;
0. 001～1.000 USG /cp;
0. 001～1.000 UKG /cp;

Output pulse width: user software settings; output electrical isolation: photoelectric isolation, isolation voltage: >1000VDC;

pulse output driver: field effect transistor output, the maximum withstand voltage is 36VDC, the maximum load current is 250mA.

3.4 Alarm output

Alarm output contact: ALMH - limit alarm; ALML - lower alarm.

output electrical isolation: photoelectric isolation, isolation voltage:>1000VDC.

Alarm output driver: Darlington output, maximum withstand voltage is 36VDC, the maximum load current is 250mA.

3.5 Digital communication interface and communication protocolAlarm output contact: ALMH - limit alarm; ALML - lower alarm; output electrical isolation: photoelectric isolation, isolation voltage:>1000VDC;

HART interface:it support the standard HART protocol, configure the HART hand held device, it can display the measured value online, and can modify the instrument parameters.

电磁流量计的主要技术参数
Technical parameters of the electromagnetic flowmeter



型 号 Model	TK1200标准型系列 TK1100 standard series	TK1200高精度系列 TK1200 high accuracy series
口径 Caliberl	DN3-DN2200	DN10-DN300
精度 Accuracy	0.5%	0.2%，0.3%
安装方式 Installation method	夹持，法兰 Hold, flange	夹持，法兰 Hold, flange
重复性 Repeatability	0.1%	0.06%，0.1%
测量范围 Measuring range	0-12m/s(流量单位可改变) 0-12m/s(flow unit can be changed)	0-12m/s(流量单位可改变) 0-12m/s(flow unit can be changed)
连接法兰 Connecting flange	GB/T9119-2000 或其他选择 GB/T9119-2000 or any other choice	GB/T9119-2000 或其他选择 GB/T9119-2000 or any other choice
压力 Pressure	4.0MPa~0.25 Mpa (按口径分classify by caliber)	4.0MPa~0.25 Mpa (按口径分classify by caliber)
衬里材料 Lining material	PO,PTFE,PFA（耐负压negative pressure resistance）， 橡胶rubber，聚氨酯polyurethane)	PO,PTFE,PFA（耐负压negative pressure resistance）， 橡胶rubber，聚氨酯polyurethane)
电极材料 Electrode material	316L,HC,HB, 钛，钽，铂金 316L,HC,HB, titanium, tantalum, platinum	316L,HC,HB, 钛，钽，铂金 316L,HC,HB, titanium, tantalum, platinum
电极形式 Electrode form	标准,（刮刀，可更换 DN>350) Standard,(scraper,it can be replaced by DN>350)	标准,（刮刀，可更换 DN>350) Standard,(scraper,it can be replaced by DN>350)
传感器防护等级 Protection level of sensor	IP65，IP67，IP68	IP65，IP67，IP68
电导率 Conductivity	> 5μS/cm（水water > 20μS/cm)	> 2μS/cm（水water > 20μS/cm)
介质最高温度 Maximum temperature of medium	一体型≤90℃，分体型≤160℃（橡胶、PO ≤ 70℃) Integrated type≤ 90℃,split type≤ 160℃（rubber、PO ≤ 70℃)	一体型≤90℃，分体型≤160℃（橡胶、PO ≤ 70℃) Integrated type≤ 90℃,split type≤ 160℃（rubber)
环境最高温度 Ambient maximum temperature	-30℃ ~+65℃	-30℃ ~+65℃
转换器安装形式 Converter installation mode	一体，分体 Integrated,split	一体，分体 Integrated,split
输出信号 Output signal	4-20mA 电流信号，频率 / 脉冲输出 4-20mA current signal, frequency / pulse output	4-20mA 电流信号，频率 / 脉冲输出 4-20mA current signal, frequency / pulse output
电源 Power supply	AC:85V~265V，DC:18V~36V	AC:85V~265，DC:18V~36V
自诊断 Self diagnosis	有 yes	有 yes
空管置零 Zero setting of empty pipe	有 yes	有 yes
通讯 Communication	RS485/Modbus、HART、PROFIBUS	RS485/Modbus、HART、PROFIBUS
防爆 Explosion-proof	非防爆 / 隔爆 No explosion proof/explosion proof	非防爆 / 隔爆 No explosion proof/explosion proof
语言 Language	中文，英语 Chinese，English	中文，英语 Chinese，English
产品标准 Product standards	JB/T 9248-1999	JB/T 9248-1999

型号 Model	TK1300 卫生型系列 TK1300 hygienic series	TK1500 电池供电系列 TK1500 battery powered series
口径 Caliberl	DN3-DN150	DN10-DN1200
精度 Accuracy	0.2%，0.5%	0.5%
安装方式 Installation method	螺纹，卡箍 Thread, clamp	夹持，法兰 Hold, flange
重复性 Repeatability	0.06%，0.1%	0.15%
测量范围 Measuring range	0-12m/s(流量单位可改变) 0-12m/s(flow unit can be changed)	0-10m/s(流量单位可改变) 0-10m/s(flow unit can be changed)
连接法兰 Connecting flange	/	GB/T9119-2000 或其他选择 GB/T9119-2000 or any other choice
压力 Pressure	最高4.0MPa The highest 4.0MPa	4.0MPa~0.6 Mpa (按口径分classify by caliber)
衬里材料 Lining material	PFA（耐负压） PFA(negative pressure resistance)	PO,PTFE,PFA（耐负压negative pressure resistance）， 橡胶rubber，聚氨酯polyurethane)
电极材料 Electrode material	316L,HC,HB, 钛，钽，铂金 316L,HC,HB, titanium, tantalum, platinum	316L,HC,HB, 钛，钽，铂金 316L,HC,HB, titanium, tantalum, platinum
电极形式 Electrode form	标准 Standard	标准，(刮刀，可更换 DN>350) Standard,(scraper,it can be replaced by DN>350)
传感器防护等级 Protection level of sensor	IP65，IP67，IP68	IP65，IP67，IP68
电导率 Conductivity	> 2μS/cm（水> 20μS/cm) > 2μS/cm (water> 20μS/cm)	> 5μS/cm（水> 20μS/cm) > 5μS/cm (water> 20μS/cm)
介质最高温度 Maximum temperature of medium	一体型≤ 90℃，分体型≤ 160℃ Integrated type≤ 90℃,split type≤ 160℃	一体型≤ 90℃，分体型≤ 160℃（橡胶、PO ≤ 70℃） Lntegrated type≤ 90℃,split type≤ 160℃（rubber、PO ≤ 70℃）
环境最高温度 Ambient maximum temperature	-30℃ ~+65℃	-30℃ ~+65℃
转换器安装形式 Converter installation mode	一体，分体 Integrated,split	一体，分体 Integrated,split
输出信号 Output signal	4-20mA 电流信号，频率 / 脉冲输出 4-20mA current signal, frequency / pulse output	频率0-5kHz Frequency 0-5kHz
电源 Power supply	AC:85V~265V,DC:18V~36V	3.6V
自诊断 Self diagnosis	有 yes	有 yes
空管置零 Zero setting of empty pipe	有 yes	有 yes
通讯 Communication	RS485/Modbus、HART、PROFIBUS	RS485/Modbus、GPRS
防爆 Explosion-proof	非防爆 / 隔爆 No explosion proof/explosion proof	非防爆 / 隔爆 No explosion proof/explosion proof
语言 Language	中文，英语 Chinese，English	中文，英语 Chinese，English
产品标准 Product standards	/	JB/T 9248-1999

型号 Model	TK1400 插入式系列 TK1400 inserted type series	TK1600 电磁热能表系列 TK1600 electromagnetic heat meter series
口径 Caliberl	DN200-DN3000	DN15-DN1200
精度 Accuracy	1.5%，2.5%	1.0%，2.0%，2.5%
安装方式 Installation method	法兰，螺纹，在线 Flange, thread, on-line	夹持，法兰，螺纹 Hold, flange, thread
重复性 Repeatability	0.5%	0.3%，0.5%
测量范围 Measuring range	0-10m/s(流量单位可改变) 0-10m/s(flow unit can be changed)	0-12m/s(流量单位可改变) 0-12m/s(flow unit can be changed)
连接法兰 Connecting flange	GB/T9119-2000 或其他选择 GB/T9119-2000 or any other choice	GB/T9119-2000 或其他选择 GB/T9119-2000 or any other choice
压力 Pressure	1.6 MPa	4.0MPa~0.6 Mpa (按口径分classify by caliber)
衬里材料 Lining material	POM,PTFE,PFA	PO,PTFE,PFA（耐负压negative pressure resistance）， 橡胶rubber，聚氨酯polyurethane)
电极材料 Electrode material	316L,HC,HB, 钛，钽，铂金 316L,HC,HB, titanium, tantalum, platinum	316L,HC,HB, 钛，钽，铂金 316L,HC,HB, titanium, tantalum, platinum
电极形式 Electrode form	标准 Standard	标准 Standard
传感器防护等级 Protection level of sensor	IP65，IP67，IP68	IP65，IP67，IP68
电导率 Conductivity	> 5μS/cm（水> 20μS/cm) > 5μS/cm (water> 20μS/cm)	> 5μS/cm（水> 20μS/cm) > 5μS/cm (water> 20μS/cm)
介质最高温度 Maximum temperature of medium	一体型≤90℃，分体型 ≤130℃）（POM ≤ 100℃) Integrated type≤ 90℃,split type ≤ 130℃（POM ≤ 100℃)	一体型≤90℃，分体型≤160℃（橡胶、PO ≤70℃) Integrated type≤ 90℃,Split type ≤ 160℃（rubber、POM ≤ 70℃)
环境最高温度 Ambient maximum temperature	-30℃ ~+65℃	-30℃ ~+65℃
转换器安装形式 Converter installation mode	一体，分体 Integrated,split	一体，分体 Integrated,split
输出信号 Output signal	4-20mA 电流信号，频率 / 脉冲输出 4-20mA current signal, frequency / pulse output	4-20mA 电流信号，频率 / 脉冲输出 4-20mA current signal, frequency / pulse output
电源 Power supply	AC:85V~265V，DC:18V~36V	AC:85V~265V，DC:18V~36V
自诊断 Self diagnosis	有 yes	有 yes
空管置零 Zero setting of empty pipe	有 yes	有 yes
通讯 Communication	RS485/Modbus、HART、PROFIBUS	RS485/Modbus、HART、PROFIBUS
防爆 Explosion-proof	非防爆 / 隔爆 No explosion proof/explosion proof	非防爆 / 隔爆 No explosion proof/explosion proof
语言 Language	中文，英语 Chinese，English	中文，英语 Chinese，English
产品标准 Product standards	/	参照 JB/T 9248-1999 Refer to 9248-1999 JB/T

流量计口径、公称压力和流量范围
Caliber,nominal pressure and flow range of flowmete

瞬时体积流量是流速和传感器口径的函数。瞬时流量列线图表明每一口径流量计可以测量的流量范围，同时给出适合测量某给定流量的几种传感器口径规格。

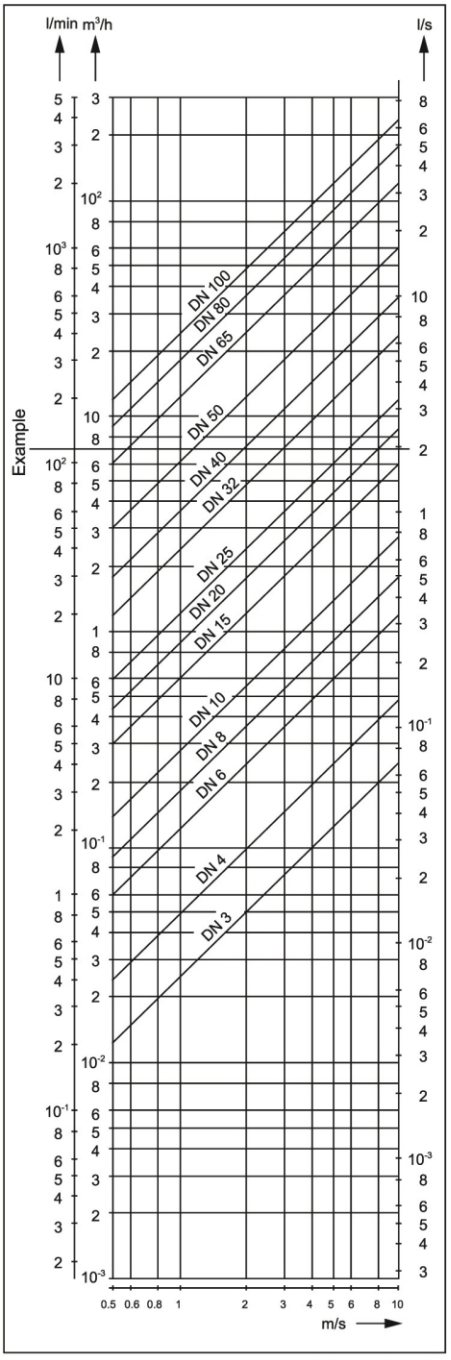
The instantaneous volume flow rate is a function of velocity and the sensor diameter. Instantaneous flow nomograms shows that the flow range that each caliber flowmeter can measure , and give several sensor caliber specifications which is suitable for a given flow.

口径 DN	压力 MPA	最小流量范围 Minimum flow range 流速0-0.5m/s Flow0-0.5m/s	最大流量范围 Maximum flow range 流速0-10m/s Flow0-0.5m/s
3	4.0	0-0.2L/min	0-4L/min
4	4.0	0-0.4L/min	0-8L/min
6	4.0	0-1.0L/min	0-20L/min
8	4.0	0-1.5L/min	0-30L/min
10	4.0	0-2.25L/min	0-45L/min
15	4.0	0-5L/min	0-100L/min
20	4.0	0-7.5L/min	0-150L/min
25	4.0	0-10L/min	0-200L/min
32	4.0	0-20L/min	0-400L/min
40	4.0	0-30L/min	0-600L/min
50	4.0	0-3m^3/h	0-60m^3/h
65	4.0	0-6m^3/h	0-120m^3/h
80	4.0	0-9m^3/h	0-180m^3/h
100	1.6	0-12m^3/h	0-240m^3/h
125	1.6	0-21m^3/h	0-420m^3/h
150	1.6	0-30m^3/h	0-600m^3/h
200	1.6	0-54m^3/h	0-1080m^3/h
250	1.6	0-90m^3/h	0-1800m^3/h
300	1.0	0-120m^3/h	0-2400m^3/h
350	1.0	0-165m^3/h	0-3300m^3/h
400	1.0	0-225m^3/h	0-4500m^3/h
500	1.0	0-330m^3/h	0-6600m^3/h
600	1.0	0-480m^3/h	0-9600m^3/h
700	1.0	0-660m^3/h	0-13200m^3/h
800	1.0	0-900m^3/h	0-18000m^3/h
900	1.0	0-1200m^3/h	0-24000m^3/h
1000	1.0	0-1350m^3/h	0-27000m^3/h
1200	0.6	0-2100m^3/h	0-42000m^3/h
1400	0.6	0-2700m^3/h	0-54000m^3/h
1600	0.6	0-3600m^3/h	0-7200m^3/h
1800	0.6	0-4500m^3/h	0-90000m^3/h
2000	0.6	0-5700m^3/h	0-114000m^3/h

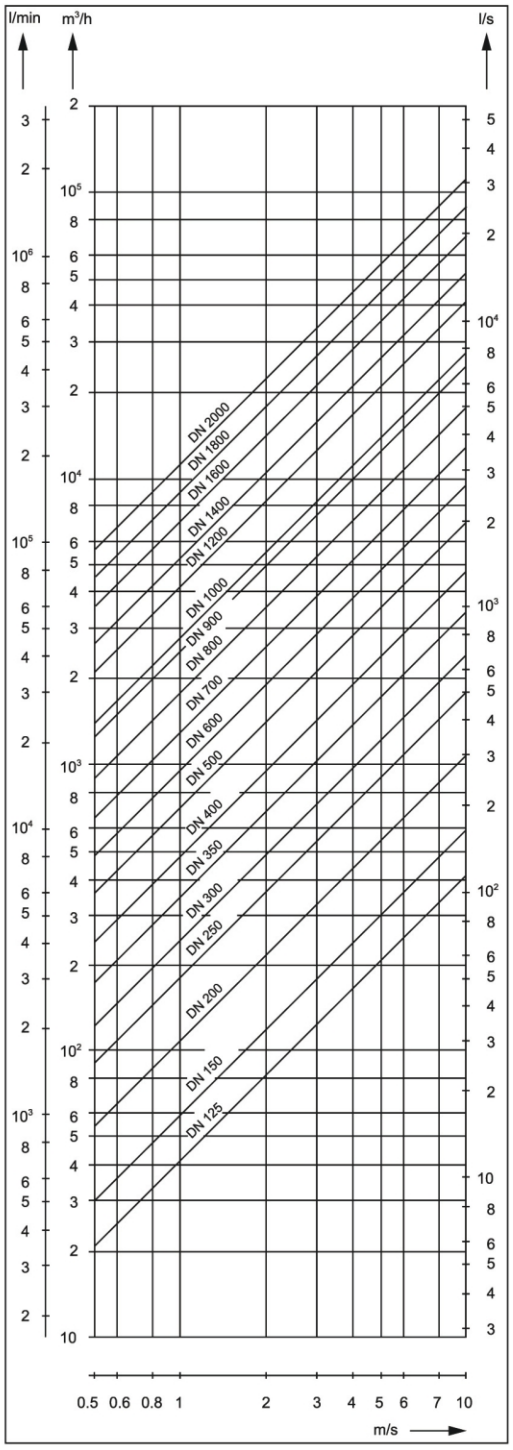
电磁流量计的瞬时流量列线图
The instantaneous flow diagrams of electromagnetic flowmeter

例：瞬时流量=7m³/h（最大值即量程的上限）。流速介于0.5-10m/s之间时，适用的传感器口径(DN20-DN65)。

Example: instantaneous flow =7m3/h (maximum value means the upper limit of the measuring range). When the flow rate is between 0.5-10m/s, the sensor diameter (DN20-DN65)is suitable.



DN3-DN100



DN125-DN2000

电磁流量计的电极材料选择
Selection of electrode materials for electromagnetic flowmeter

根据被测流体的腐蚀性来选择电极的材料。

The material of the electrode is selected according to the corrosive of the tested fluid.

材料 Material Science	耐腐蚀性 Material Science
316L	适用： 1.生活用水，工业用水，原水井水，城市用水。 Application: domestic water, industrial water, raw water well water, urban water. 2.稀酸，稀碱等弱腐蚀性，碱盐液。 Weak corrosion such as dilute acid and dilute alkali, alkali salt solution
哈氏合金B Hastelloy alloy B	适用： 1.盐酸（浓度小于10%）等非氧化性酸。 Application:non oxidative acid,like hydrochloric acid(concentration is less than 10%),etc. 2.氢氧化钠(浓度小于50%)一切浓度的氢氧化铵碱溶液。 Sodium hydroxide (concentration of less than 50%) ammonium hydroxide solution of all concentrations. 3.磷酸，有机酸。 Phosphoric acid, organic acid
	不适用：硝酸。 Not applicable: nitric acid
哈氏合金C Hastelloy alloy C	适用： 1.混合酸如铬酸与硫酸的混合溶液。 Application: Mixed acid such as the mixed solution of chromic acid and sulfuric acid. 2.氧化性盐类如Fe+++、Cu++、海水。 Oxidizing salts such as Fe+++、Cu++, sea water
	不适用：盐酸。 Not applicable: hydrochloric acid
钛(Ti) Titanium (Ti)	适用： 1.盐。如（1）氯化物（氯化物 / 镁 / 铝 / 钙 / 铵 / 铁等）。 Application:salt, such as chloride (chloride / magnesium / aluminum / calcium / ammonium / iron, etc.) （2）钠盐，铵盐，次氯酸盐，海水。 Sodium salt, ammonium salt, hypochlorite, sea water 2.浓度小于50%氢氧化钾，氢氧化铵，氢氧化钡碱溶液。 Potassium hydroxide(concentration of less than 50%), ammonium hydroxide, alkali solution of barium hydroxide
	不适用：盐酸，硫酸，磷酸，氢氟酸等还原性酸。 Not applicable： reductive acid， such as hydrochloric acid, sulfuric acid, phosphoric acid, hydrofluoric acid, etc.
钽(ta) Tantalum	适用： 1.盐酸（浓度小于40%），稀硫酸和浓硫酸（不包括发烟硫酸）。 Application: salt, such as chloride (chloride / magnesium / aluminum / calcium / ammonium / iron, etc.) 2.二氧化氯，氯化铁，次氯酸，氰化钠，乙酸铅等。 Chlorine dioxide, ferric chloride, sodium hypochlorite, sodium cyanide, lead acetate etc. 3．硝酸（包括发烟硝酸）等氧化性酸，温度低于80℃的王水。 Oxidizing acid such as nitrate (including fuming nitric acid) , aqua regia lowerthan 80℃
	不适用：碱，氢氟酸。 Not applicable: alkali, hydrofluoric acid
铂(Pt) Platinum	适用：几乎所有酸，碱，盐溶液（包括发烟硫酸、发烟硝酸）。 Application: almost all acid, alkali, salt solution (including smoke sulfuric acid, smoke nitric acid)
	不适用：王水，铵盐。 Not applicable:aqua regia, ammonium salt
碳化钨 Tungsten Carbide	适用：纸浆，污水，能抗固体颗粒干扰。 Application: pulp, sewage, can resist the solid particle interference
	不适用：无机酸，有机酸，氯化物。 Not applicable:inorganic acid, organic acid, chloride

衬里材料的选择

应根据被测介质的腐蚀性、磨损性及温度来选择。硬/软橡胶可耐一般的弱酸、碱的腐蚀，耐温65℃，软橡胶有耐磨性，聚四氟 乙烯(PTFE)几乎能耐除热磷酸以外的强酸、碱腐蚀，介质温度可达130℃，但不可耐磨损。

聚胺脂橡胶有较好的耐磨损，但不耐酸、 碱腐蚀，耐温度性也较差，介质温度小于65℃。

Selection of lining material

It should be chosen by the corrosive property, abradability and temperature of the measured medium. Hard / soft rubber can resist general corrosion of weak acid, alkali, high temperature of 65℃. Soft rubber has wear resistance. Polytetrafluoroethylene(PTFE) can resist the corrosion of alkali, strong acid except hot phosphoric acid. Medium temperature can be up 130℃,but can't resist abrasion. Urethane rubber has good abrasiveness,but can't resist the corrosion of acid and alkali,temperature resistance is also poor. Medium temperature is less than 65℃.

衬里材料 Lining material	主要功能 Major function	适用范围 Scope of application
硬橡胶 Hard rubber	1．可耐常温下的盐酸、醋酸、草酸、氨水、磷酸 及50%的硫酸、氢氧化钠、氢氧化钾。 2．忌强氧化剂。 1.It can resist hydrochloric acid, acetic acid, oxalic acid, ammonia, phosphoric acid and 50% sulfuric acid, sodium hydroxide,potassium hydroxide under normal temperature . 2.avoid strong oxidizing agent.	1、低于70℃； 2、一般的酸、碱、盐溶液。 1.Below 70. 2.General acid, alkali, salt solution.
软橡胶 Soft rubber	1、有较好的弹性，耐磨性能较好； 2、耐一般的低浓度酸、碱，盐介质的腐蚀，不耐氧化性介质的腐蚀。 1.It has better flexibility and better wear resistance 2.It can resist corrosion of l low concentration acid, alkali, salt medium .But it can not resist the corrosion of oxidizing medium.	1、低于70℃； 2、测一般水、污水、泥浆、矿浆 1.Below 70. 2.It can measure water, sewage, slurry, pulp.
聚四氟乙烯 Polytetrafluoroethylene (PTFE) 改性聚四氟乙烯 Modified Polytetrafluoroethylene (PFA)	1．塑料中化学性能最稳定的一种材料，能耐沸腾的盐酸、硫酸、硝酸和王水。也能耐浓碱和各种有机溶剂； 2．耐磨性和粘接性差。 1．A material with the most stable chemical properties in plastic.It can resist the boiling hydrochloric acid, boiling hydrochloric acid, sulfuric acid, nitric acid, aqua regia, concentrated alkali and various organic solvents. 2．Poor wear resistance and poor adhesion.	1、-40℃～+130℃（PTFE）， -40℃～+160℃(PFA)； 2、酸、碱等强腐蚀介质； 3、卫生的类介质。 1.-40℃～+130℃(PTFE) -40℃～+160℃(PFA) 2.Strong corrosive medium,such as acid, alkali. 3.Hygienic medium
PO	1．可耐常温下的盐酸、醋酸、草酸、氨水、磷酸 及硫酸、氢氧化钠、氢氧化钾。 2．能耐浓碱和各种有机溶剂。 1，It can resist hydrochloric acid, acetic acid, oxalic acid, ammonia, phosphoric acid and sulfuric acid, sodium hydroxide, potassium hydroxide under normal temperature 2，It can resist concentrated alkali and various organic solvents	1、低于70℃； 2、一般的酸、碱、盐溶液； 3、一般水、污水、泥浆、矿浆。 1.Below 70℃. 2.General acid, alkali, salt solution. 3.General water, sewage, slurry, pulp.

防护等级的选择

按照国际GB/T4208-1993关于外壳防护等级可分为：IP65为防喷水型，即可允许水龙头从任何方向对仪表喷水，喷水压力为30kPa，出水量为12．5升/分，喷水离仪表距离3米。 IP67为防浸水型，即仪表可短时间全部浸入水中，试验时最高点应在水下至少150cm，持续时间至少为30分钟。 IP68为潜水型，应能长期在水中工作，其浸入的最大深度由制造厂与用户协商。 防护等级选用原则应根据以上要求及仪表实际的条件选定。若仪表在地面以下的，经常受水淹的，宜选用IP68；若仪表在地面上的，可选用IP65。

Selection of protection level

According to the international GB/T4208-1993 for the shell protection level,it can be divided into: anti water spray type-IP65,it allows the faucet to water from any direction of the instrument, the water spray pressure is 30kPa, the water volume is 12.5 liters / min, water spray from the meter distance is 3 meters; Water immersion proof type-IP67,Instruments can be immersed in water for a short time.The highest point should be at least 150cm in the water when it is tested,and it should last for at least 30 minutes;Diving type- IP68,it can work in the water for a long time.The maximum depth of immersion should be negotiated with the manufacturer .The selection principle of the protection level should be selected by the above requirements and the actual conditions of the instrument.If the instrument is below the ground,and it is often flooded,you can choose IP68; if the instrument is on the ground,you can choose IP65.

电磁流量计的正确安装

1.安装场所的选择

1）选择测量管内不会出现负压的场所；

2）避免安装在电机、变压器强电设备附近，以免引起电气干扰；

3） 避免安装位置周围有强腐蚀性气体的场；

4）测量混合相流体时，避免引起相分离的场所；

5）环境温度一般在-25℃～60℃范围内，尽可能避免阳光直射；

6）安装在无振动或选择振动小的场合，如果振动过大，应该在传感器前后的管道上加固定支撑；

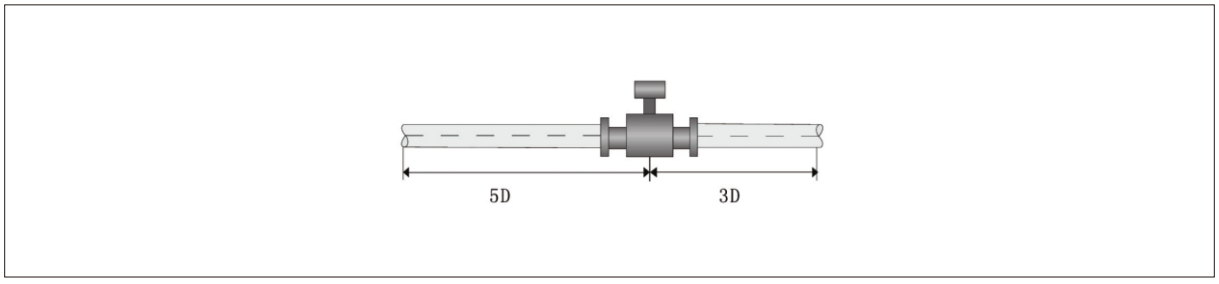
7）环境相对湿度应该在5%-90%范围内；

8）避免安装在能被雨水直淋或者浸没的场所。

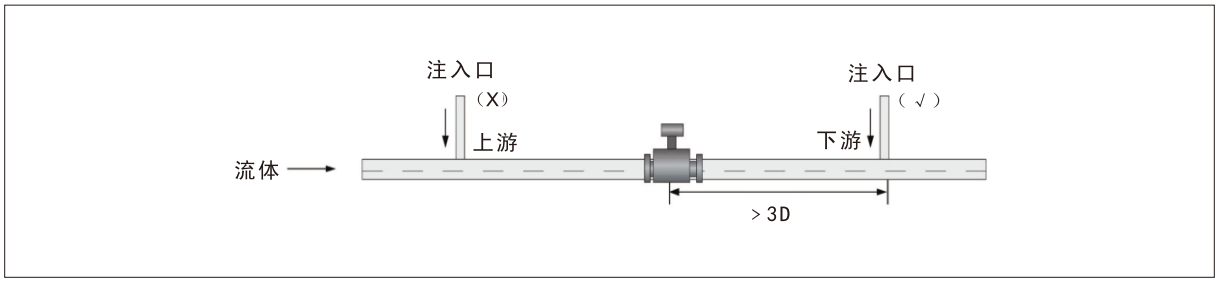
2.对直管段长度的要求（D为流量计的内径）

电磁流量计对前后直管段的要求比较低，一般对于900弯头，T形三通、异径、全开阀门等流动阻力件，离电磁流量计的电极轴中线(不是传感器的端面)应该有5D的直管段；对于不同开度的阀门（比如可调开度的阀门），则上游侧的直管段长度需要10D。一 般传感器下游的直管段只需要3D就可以满足要求。

如下图所示



测量不同介质的混合液体时，混合点与流量计之间的距离至少要大于 30D，如下图所示：



3.安装位置和流动方向

电磁流量计可以水平、垂直和倾斜安装在管道上。

在水平安装时，电磁流量计的电极轴必须水平，防止由于流体所夹带的气泡而产生电极短时间的绝缘，也可以防止电极被流体 中的沉积物覆盖。不应该将传感器安装在最高位置处，以免有气体积聚。

Correct installation of electromagnetic flowmeter

1.Selection of installation site

1.Choose a place where negative pressure will not appear in the measuring tube.

2.Avoid installing in the motor place, near the transformer in electrical equipment place, so as not to cause electrical interference.

3.Choose a place to avoid strong corrosive gas around the installation position.

4.When measuring mixed phase fluid, we should choose a place to avoid causing phase separation;

5.Ambient temperature is generally in the range of -25℃~60℃,and it should avoid the direct sunlight.

6.Installed in a place without vibration or a place with small vibration. If the vibration is too large, it should be fixed a support in front of the sensor and behind the sensor.

7.Relative humidity of environment should be in the range of 5%-90%

8.Avoid installing in the place where the rain can be directly poured or immerged.

2.Requirements for length of straight pipe (D is the inner diameter of the flowmeter)

Electromagnetic flowmeter has lower requirement for the straight pipeline.For 900 elbow,flow resistance parts,like T-type three links, different diameter, fully open valve, the center line of the electrode for the electromagnetic flowmeter (not the end of sensor) should have 5D straight pipe.For different open degrees of the valve (such as adjustable open valve),the upstream side of the straight pipe length needs 10D.the side of the straight pipe length only needs 3D.

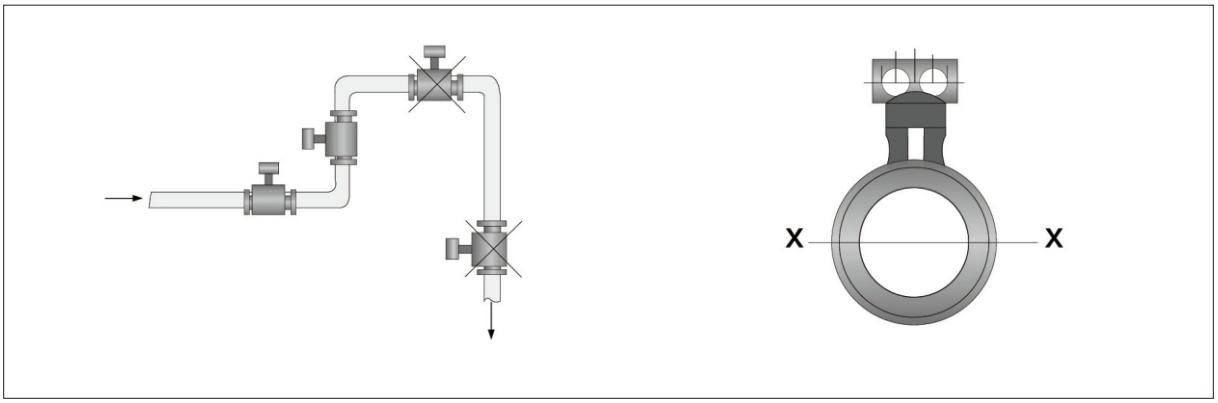
Shown as the following figure

When measure the mixed liquid of different medium, the distance between the mixing point and the flow meter must be at least more than 30D,shown as the following figure:

3.Installation position and flow direction

The electromagnetic flowmeter can be installed on the pipe in horizontal, vertical and inclined way.

When it is installed in horizontal way, The electrode shaft of the electromagnetic flowmeter must be horizontal .It can prevent electrode insulation for a short time because of bubbles carried by fluid .The electrode can also be prevented from being covered by the sediment in the fluid. The sensor should not be installed at the highest position, so as to avoid the accumulation of gas.

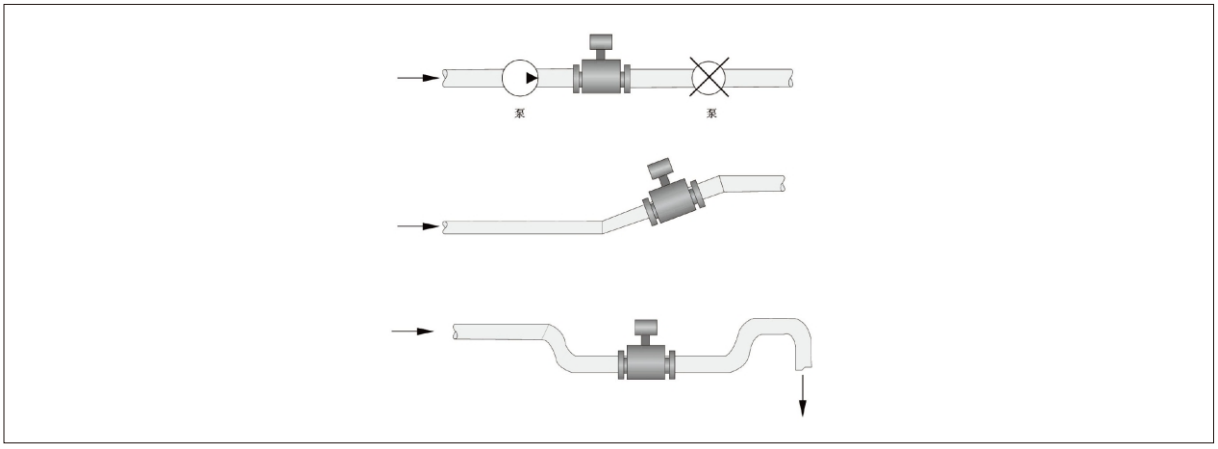


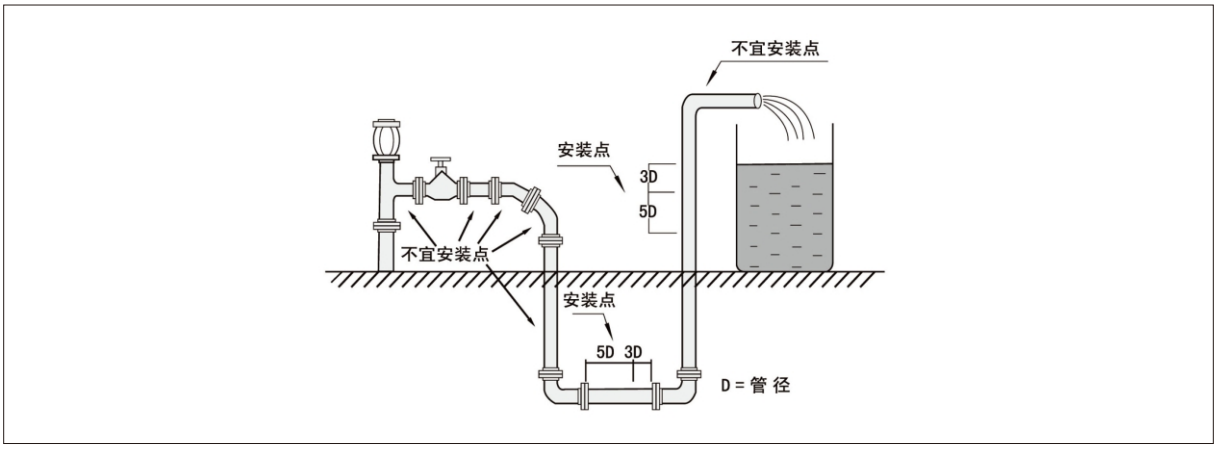
垂直安装时，应该使流动方向向上，这样可以使无流量或者流量很小时，流体中夹带的较重固体颗粒下沉，而轻的脂肪类物质 上升离开电磁流量计的传感器电极区，在测量泥浆、矿浆等液固两相介质时避免固相沉淀和传感器衬里不均匀摩擦。如图所示。

传感器的测量管道必须充满流体，必须有一定的背压。为防止出现负压(损坏衬里)，电磁流量计不应该安装在泵的进口，而应该 安装在泵的出口；在倾斜安装时，必须安装在上升管道；在开口排放的管道安装时，必须安装在管道的较低处。

When it is installed in vertical way.The flow direction should be upward.,in this case ,when there is no flow or the flow is very small,the sinking of heavier solid particles entrained in fluid,The light of the fat mass rises away from the sensor electrode area of the electromagnetic flowmeter,In the measurement of liquid-solid two-phase medium,like slurry and pulp,it can avoid solid precipitation and uneven friction of sensor lining.shown as the following figure.

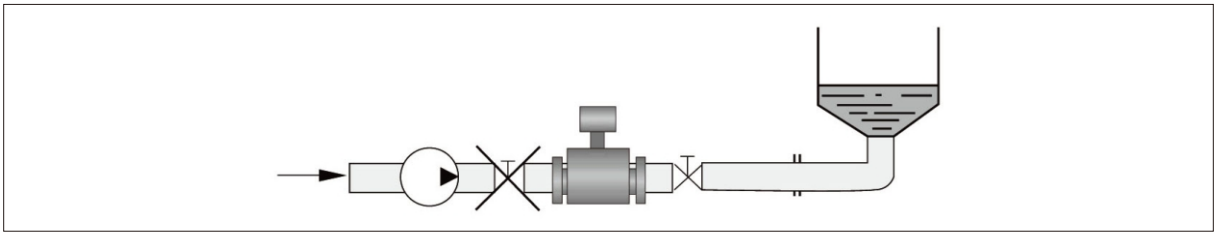
Measuring pipe of sensor must be full of fluid and a certain back pressure.In order to prevent negative pressure (damage to the lining).Electromagnetic flowmeters should not be installed in the pump inlet,it should be installed in the pump outlet;When it is installed in inclined way,it must be installed in the rising pipe;When it is installed in open discharge pipe ,it must be installed in the lower parts of the pipe.





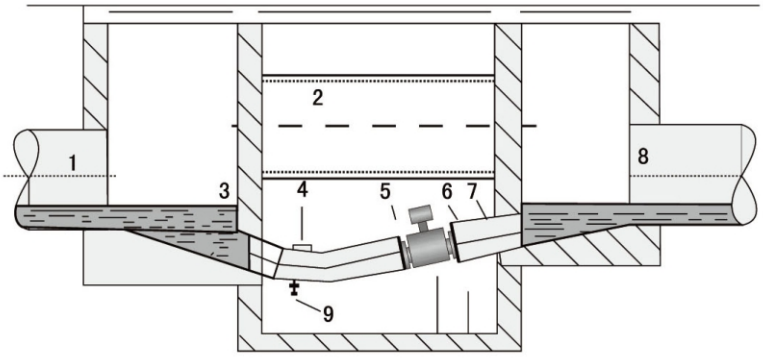
应在传感器的下游安装控制阀和切断阀，而不应该安装在传感器上游。

Control valves and cut off valve should be installed in down-stream of the sensor,not in upstream of the sensor.



在测量井内安装流量计的方法

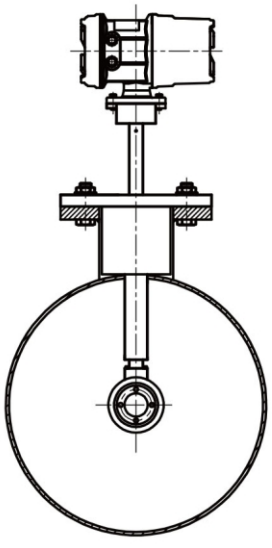
Method for installing flow meter in measuring well



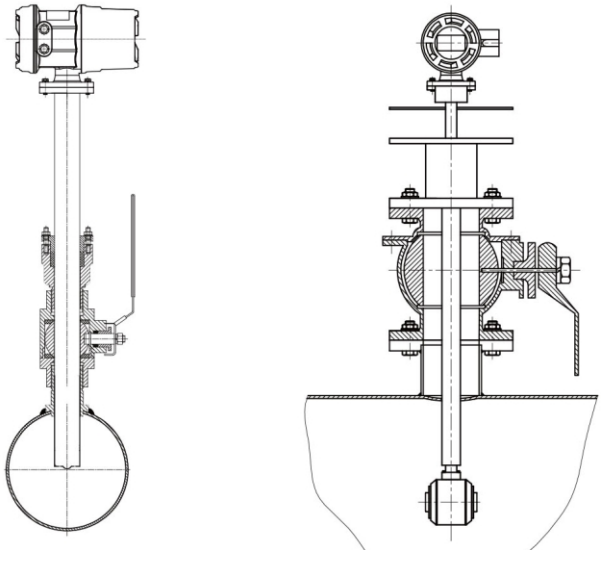
1.入口 1.Entrance
2.溢流管 2.Overflow pipe
3.入口 3.Entrance
4.清洗孔 4.Cleaning hole
5.流量计 5.Flowmeter
6.短管 6.Short pipe
7.出口 7.Exit
8.排污口 8.Drain outlet
9.排污阀 9.Drain valve

4.插入式电磁流量计安装图

4.Installation diagram of inserted electromagnetic flowmeter



标准型法兰固定插入式电磁流量计
Electromagnetic flowmeter of standardflange fixed inserted type



标准型在线插拔式电磁流量计
He electromagnetic flowmeter of standard online plug-unplug type

现场管道上开取DN100/DN50通径的孔，再焊接通径DN100/DN50的管子和DN100 PN1.6MPa/DN50 PN1.6MPa法兰或螺纹底座。将标准型法兰固定插入式电磁流量计安装在法兰上。

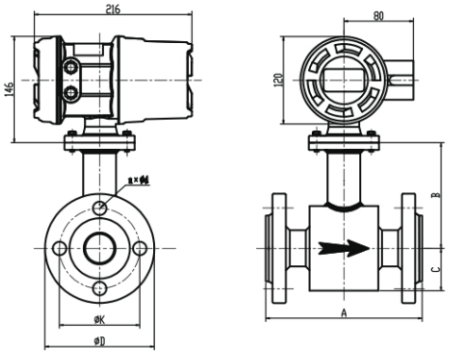
在标准型法兰固定插入式电磁流量计安装法兰的基础上，增加了全通DN100/DN50的球阀。用户可在不切断介质的情况下，将标准型在线插拔式电磁流量计抽至最高点，关闭球阀，取出流量计。

Open a hole of DN100/DN50 diameter on the pipeline, weld the pipe of DN100/DN50 diameter and PN1.6MPa/DN50 PN1.6MPa DN100 flange or screw base,then install the electromagnetic flowmeter of standard flange fixed inserted type on the flange.

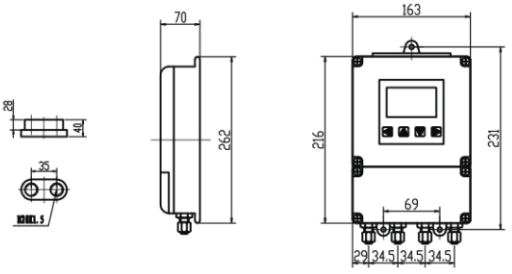
On the basis of the installation flange of the standard flange fixed inserted type electromagnetic flowmeter,it also add the ball valve of all passed DN100/DN50 . The user can pump the electromagnetic flowmeter of standard online plug-unplug type to the highest point without cutting off the medium, close ball valve and take out the flowmeter.

电磁流量计外形尺寸图

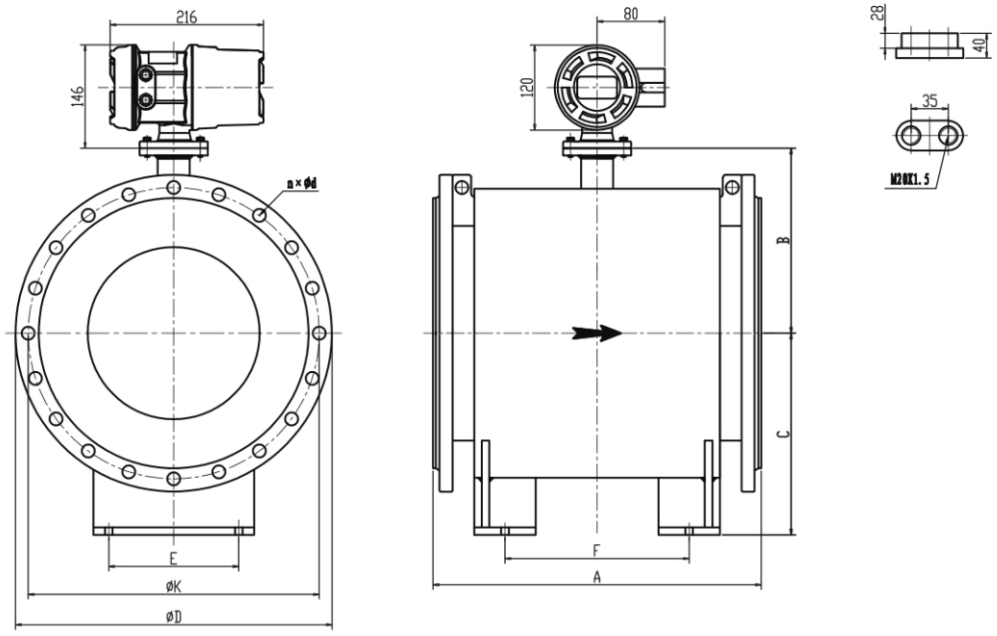
Overall dimension of the electromagnetic flowmeter



DN15-DN450管道法兰式电磁流量计
Electromagnetic flowmeter of pipe flange type DN15-DN450



分体式变送器
Split type transmitter



Dn500以上管道法兰式电磁流量计
Electromagnetic flowmeter of pipe flange type over Dn500

电磁流量计尺寸表图

Dimension table of electromagnetic flowmeter

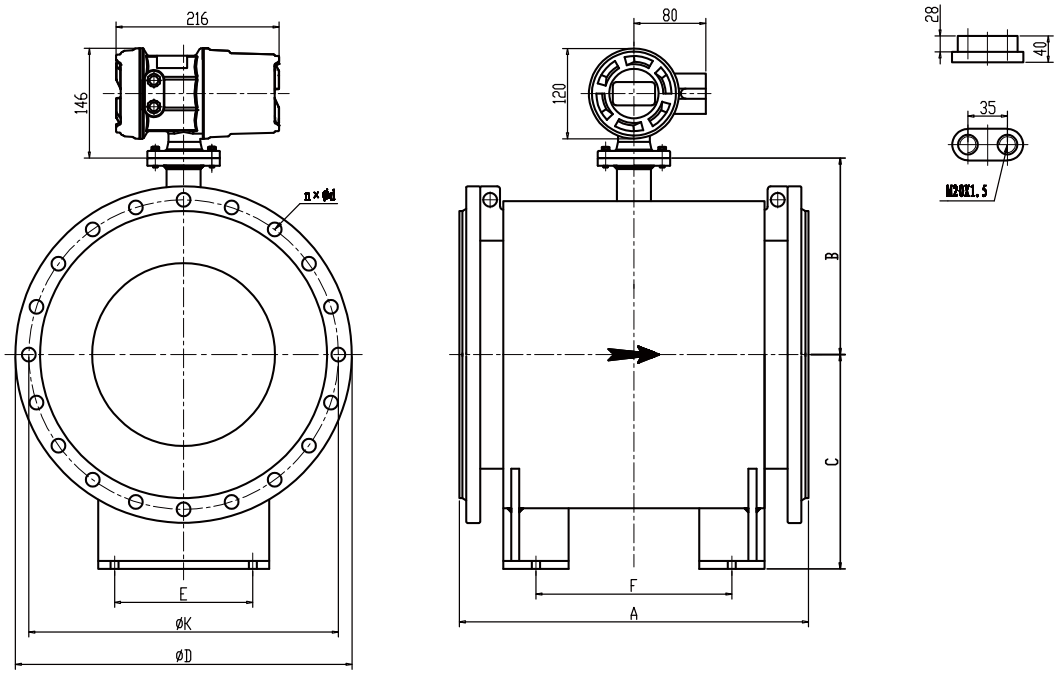
管道法兰式

Pipeline flange type

DN	额定压力 Rated pressure	仪表外形尺寸 单位： mm Overall dimension of instrument							
	Mpa	A	B	C	E	F	ϕD	ϕK	n×ϕ12
10	4.0	150	90	50			90	60	4×ϕ14
15		200	95	53			95	65	4×ϕ14
20				62			105	75	4×ϕ18
25			100	62			115	85	4×ϕ18
32			105	72			140	100	4×ϕ18
40			110	72			150	110	4×ϕ18
50			121	72			165	125	4×ϕ18
65			130	82			185	145	8×ϕ18
80			135	89			200	160	8×ϕ18
100	1.6	250	145	99			220	180	8×ϕ18
125			161	115			250	210	8×ϕ18
150		300	171	130			285	240	8×ϕ22
200	1.0	350	199	158			340	295	8×ϕ22
250		450	224	185			395	350	12×ϕ22
300		500	249	210			445	400	12×ϕ22
350		550	274	241			505	460	16×ϕ22
400		600	305	269			565	515	16×ϕ26
450		600	330	294			615	656	20×ϕ26
500		600	360	321	300	240	670	620	20×ϕ26
600		600	410	374		270	780	725	20×ϕ30
700		700	467	560	400	350	895	840	24×ϕ30
800		800	517	610		400	1010	950	24×ϕ33
900		900	567	660		470	1110	1050	28×ϕ33
1000		1000	617	712		570	1225	1160	28×ϕ36
1200	0.6	1200	719	814	600	710	1400	1340	32×ϕ33
1400		1400	819	914		900	1625	1560	36×ϕ36
1600		1600	919	1036	800	1040	1825	1760	40×ϕ36
1800		1800	1021	1138		1180	2045	1970	44×ϕ39
2000		2000	1121	1238		1350	2265	2180	48×ϕ42

DN3~DN8电磁流量计外形尺寸及安装方式请联系天康工程师洽询。

Please contact Tiankang engineer about overall dimension and installation of DN3~DN8 electromagnetic flowmeter.



DN10~DN200夹持式电磁流量计
Holding type electromagnetic flowmeter DN10~DN200

夹持式电磁流量计外形尺寸

Overall dimension of clamping type electromagnetic flowmeter

公称通径(mm) Nominal diameter	DN10	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200
L(mm)	80	80	80	80	80	80	120	120	120	120	140	160	220

电气接线

必须按照《电磁流量计安装手册》的图例及要求接线。

所有电缆必须用外径5~8mm的护套线，电源采用2芯护套线（导体截面积≥0.75mm²）。接线完成后必须检查外壳盒盖和电缆旋紧格兰接头，避免灰尘及水进入。接线后，旋紧格兰头不可更换，以防止漏水和受潮。

现场走线采用穿线管时，应注意穿线管下端预留排水口，防止水通过穿线管流进电磁流量计电子单元及表体。

供电电源注意区分是交流AC 220V还是直流DC 24V。注意电源极性。电源错接将造成仪表故障或损坏。

将配套的接地线与上下游金属管道相连，保持传感器外壳与被测介质等电位。

Electrical wiring

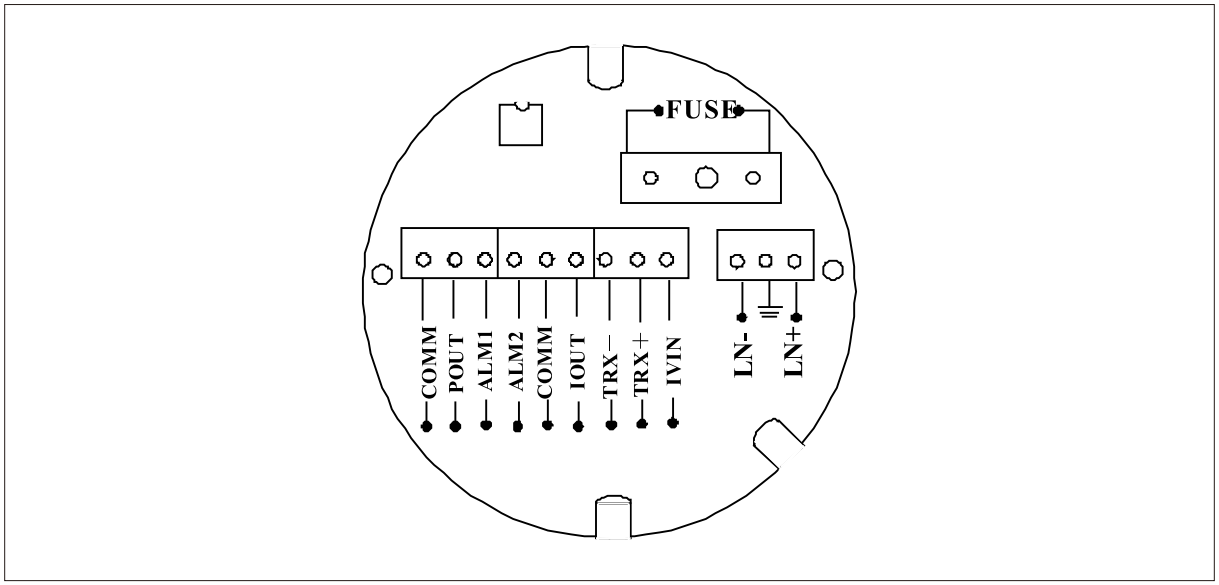
The wiring must be in accordance with the “electromagnetic flowmeter Installation Manual” illustration and requirements .
All cables must be covered with sheathed wire of 5~8mm outer diainstrument, and the power supply shall be twin core cable with sheathed wire(conductor cross-sectional area≥0.75mm2). After wiring is complete, be sure to check whether the cable gland of the housing cover and cable has been tightened, to prevent dust and water from entering. After wiring, the tightened cable gland shall not be replaced to prevent leakage and moisture.
When the conduit is used on the spot, the drainage outlet should be reserved at the lower end of the conduit to prevent water from flowing into the electronic unit and the surface of the electromagnetic flowmeter through the conduit.
The power supply should be distinguished between AC 220Vand DC 24V. Pay attention to the polarity of power supply. Faulty wiring of power supply will cause instrument failure or damage.
Connect the matching grounding wire to the upstream and downstream metallic conduits, and keep the sensor shell and the measured medium are equipotential.

1.接线图

1.1 电磁流量计端子接线图

Wiring diagram

Electromagnetic flowmeter terminal connection diagram



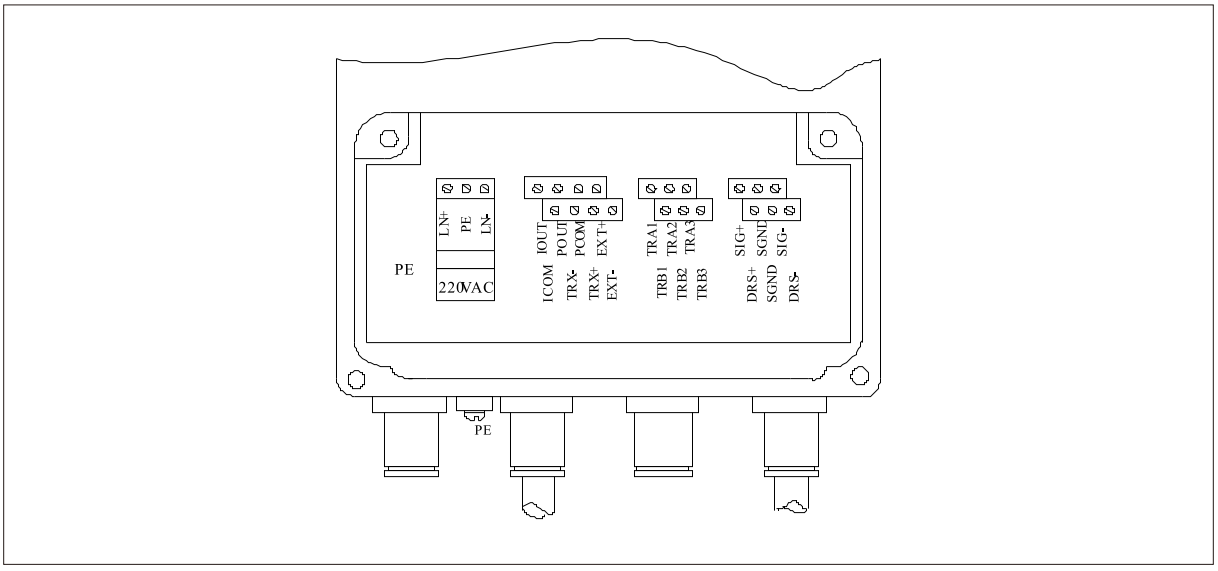
各接线端子标示含义如下

The meaning of each wiring terminal is as follows:

POUT	双向流量频率 / 脉冲输出	Two-way flow frequency/pulse output
ALM1	上限报警输出	Upper limit alarm output
ALM2	下限报警输出	Lower limit alarm output
COMM	频率、脉冲、电流公共端（地线）	Frequency、pulse、current common terminal（earth wire）
COMM	频率、脉冲、电流公共端（地线）	Frequency、pulse、current common terminal（earth wire）
IOUT	流量电流输出 / 两线制电流输出	Flow current output/Two-wire current output
IVIN	两线制24V电压输入	Two-wire 24V voltage input
TRX+	通讯输入(RS485-A)	Communication input(RS485-A)
TRX-	通讯输入(RS485-B)	Communication input(RS485-B)
LN+	220V电源输入	220V power input
LN-	220V电源输入	220V power input

1.2 电磁热能表端子接线图

Electromagnetic heat meter terminal connection diagram



各接线端子标示含义如下

The meaning of each wiring terminal is as follows

TRA1	入口温度输入 Inlet temperature input	TRA2	入口温度输入Inlet temperature input
TRA3	入口温度输入 Inlet temperature input	TRA1	出口温度输入 Outlet temperature input
TRA2	出口温度输入 Outlet temperature input	TRA3	出口温度输入 Outlet temperature input
TRA4	预留 Reservation	TRA4	预留 Reservation
SIG+	信号1 Signal 1	SGND	信号地 Signal earth
SIG-	信号2 Signal 2	DRS+	激励屏蔽1 Excitation shielding 1
DRS-	激励屏蔽2 Excitation shielding 2	MTDR	保留 Retention
EXT+	励磁电流+ Exciting current+	EXT-	励磁电流- Exciting current -
POUT	频率输出正 Frequency output positive	PCOM	频率输出地 Frequency output field
IOUT	电流输出正 Current output positive	ICOM	电流输出地 Current output field
TRX-	通讯接口（RS485-B） Communication interface(RS485-B)	TRX+	通讯接口（RS485-A） Communication interface (RS485-A)
LN-	220V电源输入220V power input	LN+	220V电源输入220V power input
开关A Switch A	热电阻选择 Thermal resistance selection	DIOP	预留 Reservation

注：图2开关A为pt1000热电阻与pt100热电阻选择开关。出厂时默认pt1000热电阻，将开关1和2都拨到OFF。若用户采用Pt100热电阻，则需将开关1和2都拨到ON即可。

Note: In fig. 2, switch A is pt1000 thermal resistance and pt100 thermal resistance selector switch. Default is pt1000 thermal resistance when delivery, place switches 1 and 2 to OFF. If you choose Pt100 thermal resistance, place switch 1 and 2 to ON.

仪表参数设置

TK1000系列电磁流量计转换器、传感器连接到流体管道上后（无论是标定还是使用），应首先进行如下工作：

- 将传感器前后的管道用铜线良好紧固连接。
- 将传感器良好接地。
- 调仪表零点时确保管道内流体静止。
- 确保传感器电极氧化膜稳定生成（电极与流体连续接触48小时即可）。

TK1000系列电磁流量计采用LCD大屏幕，人性化操作界面，易于使用，可显示瞬时流量、正向/反向累计流量及各类报警信息。

Instrument parameter setting

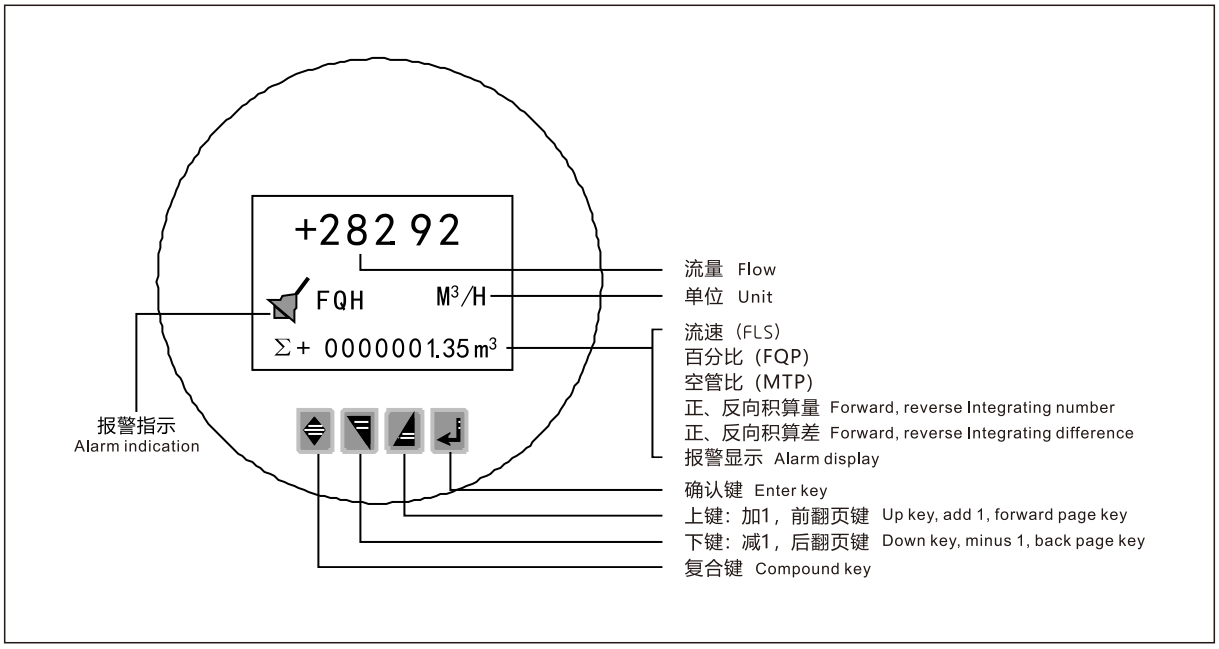
TK1000 series electromagnetic flowmeter converters, after the sensor is connected to the inter connection pipe (whether for calibration or use), the following steps should be taken first:

- Fasten the pipe before and after the sensor with copper wire.
- Ground the sensor well.
- When adjusting the zero point of the instrument, make sure that the fluid in the pipeline is still.
- Ensure that the sensor electrode oxide film generate stably (electrode and fluid continuously contact for 48 hours).

Tk1000 series electromagnetic flowmeter adopts LCD large screen, user-friendly operation interface, which is easy to use and can display instantaneous flow, forward/reverse cumulative discharge and various alarm information.

1.电磁流量计操作键盘定义与液晶显示

1.Function keyboard definition and LCD for electromagnetic flowmeter



说明：

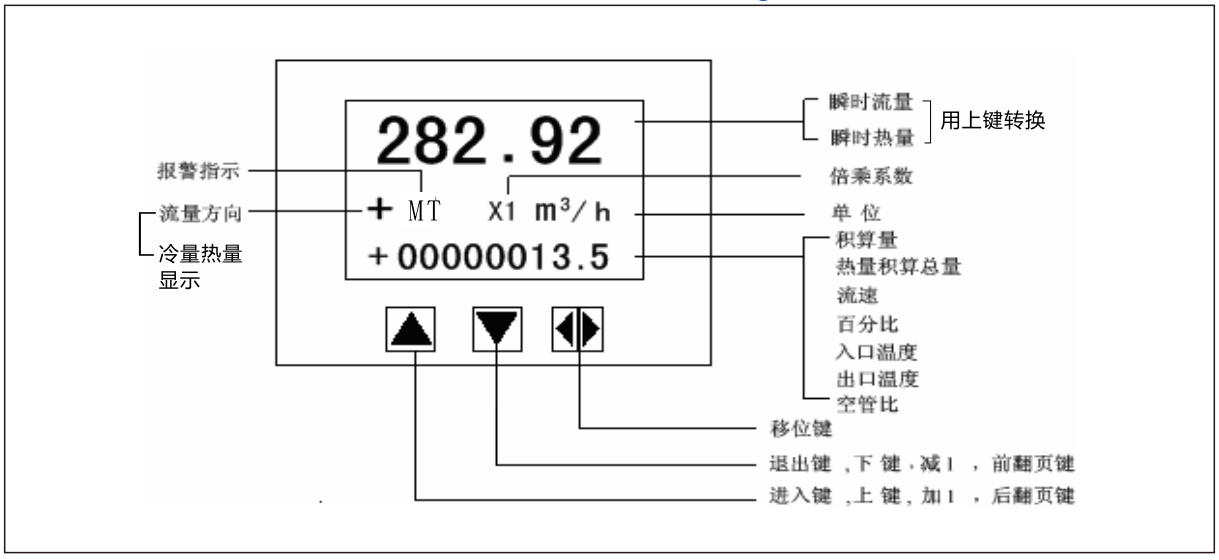
在测量状态下，按“复合键 + 确认键”，出现转换器功能选择画面“参数设置”，按一下确认键，仪表出现输入密码状态，根据保密级别，按本厂提供的密码对应修改。再按“复合键 + 确认键”后，则进入需要的参数设置状态。如果想返回运行状态，请按住确认键数秒。

Note:

in the measuring condition, press the "Compound key + Enter key", appears converter function selection screen "parameter setting", press the enter key and the instrument will in password input state. According to the security classification, change the password provided by the factory correspondingly. Press the "Compound key + Enter key" again, then enter the desired parameter setting state. If you want to return to the operating state, press the enter key for several seconds.

2.电磁热能表操作键盘定义与液晶显示

Function keyboard definition and LCD for electromagnetic heat meter



仪表上电时，自动进入测量状态。在自动测量状态下，仪表自动完成各测量功能并显示相应的测量数据。在参数设置状态下，用户使用三个面板键，完成仪表参数设置。

When the instrument is power on, it enters the measuring condition automatically. In the automatic measuring condition, the instrument automatically completes the measuring functions and displays the corresponding measuring data. In the parameter setting state, the user uses three panel keys to complete the instrument parameter setting.

3. 转换器参数及操作

3.1 电磁流量计转换器参数及操作

仪表上电时，自动进入测量状态。在自动测量状态下，仪表自动完成各测量功能并显示相应的测量数据。在参数设置状态下，用户使用四个面板键，完成仪表参数设置。

3.2 按键功能

3.2.1 自动测量状态下键功能

上键：循环选择屏幕下行显示内容；

复合键 + 确认键：进入参数设置状态；

确认键：返回自动测量状态。

在测量状态下，LCD显示器对比度的调节方法，通过“复合键 + 上键”或“复合键 + 下键”来调节合适的对比度。

3.2.2 参数设置状态下各键功能

下键：光标处数字减1；

上键：光标处数字加1；

复合键 +下键：光标左移；

复合键 +上键：光标右移；

确认键：进入/退出子菜单；

确认键：在任意状态，连续按下两秒钟，返回自动测量状态。

注：（1）使用“复合键”时，应先按下复合键再同时按住“上键”或“下键”。

3. Converter parameters and operation

3.1 Electromagnetic flowmeter converter parameters and operation

When the instrument is power on, it enters the measuring condition automatically. In the automatic measuring condition, the instrument automatically completes the measuring functions and displays the corresponding measuring data. In the parameter setting state, the user uses four panel keys to complete the instrument parameter setting.

3.2 Key function

3.2.1 Key functions in automatic measuring condition

Up key: Cycle picking the next display content on the screen

Compound key + Enter key: Enter parameter setting state;

Enter key: Return to automatic measuring condition.

In measuring condition, the method of adjusting the contrast ratio of LCD display, is to adjust the appropriate contrast ratio by "Compound key + Up key" or "Compound key + Down key".

3.2.2 Key functions in parameter setting state

Down key: the number minus 1 at the cursor position;

Up key: the number plus 1 at the cursor position;

Compound key + Up key: cursor runs left

Compound key + Down key: cursor runs right

Enter key: enter / exit submenu;

Enter key: In any state, press it two seconds continuously, then return to the automatic measuring condition.

Note: (1) when using "compound key", press the compound key first and then press "Up key" or "Down key" "at the same time.

（2）在参数设置状态下，3分钟内没有按键操作，仪表自动返回测量状态。

（3）流量零点修正的流向选择，可将光标移至最左面的“+”或“-”下，用“上键”或“下键”切换使之与实际流向相反。

3.2.3 参数设置功能及功能键操作

功能选择画面

按一下“复合键 + 确认键”进入功能选择画面，然后再按“上键”或“下键”进行选择，在此画面里共有3项功能可选择。

(2) In the parameter setting state, if there is no key operation in 3 minutes, the instrument will automatically returns to the measuring condition.

(3) For the flow direction of flow zero point modification, to move the cursor to the leftmost"+ "or" -", using "Up key" or "Down key" "to switch it contrary to the actual direction.

3.2.3 Parameter setting function and function key operation

Function selection screen

Press "Compound key + Enter key" to enter the function selection screen, and then press "Up key" or "Down key" "to select, in this screen there are three functions to choose.

参数编号 Parameter number	功能内容 Function content	说 明 Description
1	参数设置 Parameter settings	选择此功能，可进入参数设置画面 Select this function to enter the parameter settings screen
2	总量清零 Total reset	选择此功能，可进行仪表总量清零操作 Select this function to perform the instrument total reset operation
3	系数更改记录 Coefficient change record	选择此功能，可进行查看流量系数修改记录 Select this function to view the flow coefficient change record

4. 参数设置

按一下“复合键 + 确认键”显示“参数设置”功能，仪表进入到功能选择画面“参数设置”，然后按确认键进入输入密码状态，“**00000**”状态，输入密码进入按一下“复合键 + 确认键”进入参数设置画面。

4.1 总量清零

按一下“复合键 + 确认键”显示“参数设置”功能，然后再按“上键”翻页到“总量清零”，输入总量清零密码，按一下“复合键 + 确认键”，当总量清零密码自动变成“**00000**”后，仪表的清零功能完成，仪表内部的总量为**0**。

4.2 系数更改记录

按一下“复合键 + 确认键”显示“参数设置”功能，然后再按“上键”翻页到“系数修改记录”

4. Parameter setting

Press the "Compound key + Enter key", it appears the "parameter setting" function, and the instrument enters the function selection screen of "parameter setting", then press the enter key to enter the password input state, the password is "00000" , input the password to enter the "Compound key + Enter key" and to the parameter setting screen.

4.1 Total reset

Press the "Compound key + Enter key", it appears the "parameter setting" function, Then press "Up key" to the page of "total zero", input the total reset password, press the "Compound key + Enter key", when the total reset password automatically changed to "00000", the instrument's total reset function is finished, the total amount in the instrument is 0.

4.2 Coefficient change record

Press the "Compound key + Enter key", it appears the "parameter setting" function, Then press "Up key" to the page of "Coefficient change record"

5. 参数设置菜单

5.Parameter setting menu

参数 Paramete	参数文字 Parameter literal	设置方式 Setting mode	参数范围 Parameter range	密码级 Password level
1	语言 language	选择 Select	中文、英文 Chinese /English	2
2	仪表通讯地址 Instrument communication address	置数 Set number	0 ~ 99	2
3	仪表通讯速度 Instrument communication speed	选择 Select	300 ~ 38400	2
4	测量管道口径 Measuring pipe caliber	选择 Select	3 ~ 3000	2
5	流量单位 Flow Unit	选择 Select	L/h、L/m、L/s、m³/h、m³/m、m³/s	2
6	仪表量程设置 Instrument range setting	置数 Set number	0 ~ 99999	2

参数 Paramete	参数文字 Parameter literal	设置方式 Setting mode	参数范围 Parameter range	密码级 Password level
7	测量阻尼时间 Measuring damping time	选择 Select	1 ~ 64	2
8	流量方向择项 Flow direction selection	选择 Select	正向、反向 Forward, reverse	2
9	流量零点修正 Flow zero correction	置数 Set number	0 ~ ±9999	2
10	小信号切除点 Small-signal cutting point	置数 Set number	0 ~ 599.99%	2
11	允许切除显示 Allowable cutting display	选择 Select	允许/禁止 Permit/Prohibit	2
12	流量积算单位 Flow computing unit	选择 Select	0.001m3 ~ 1m3 、0.001L ~ 1L	2
13	反向输出允许 Reverse output enable	选择 Select	允许/禁止 Permit/Prohibit	2
14	电流输出类型 Current output type	选择 Select	4 ~ 20mA	2
15	脉冲输出方式 Pulse output mode	选择 Select	频率/脉冲 Frequency / pulse	2
16	脉冲单位当量 Pulse unit equivalent	选择 Select	0.001m3 ~ 1m3 、0.001L ~ 1L	2
17	频率输出范围 Frequency output range	选择 Select	1 ~ 5999 Hz	2
18	空管报警允许 Blank pipe Alarm permission	选择 Select	允许/禁止 Permit/Prohibit	2
19	空管报警阈值 Blank pipe alarm threshold	置数 Set number	59999 %	2
20	限报警允许 Upper limit alarm permission	选择 Select	允许/禁止 Permit/Prohibit	2
21	上限报警数值 Upper limit alarm value	置数 Set number	000.0 ~ 599.99 %	2
22	下限报警允许 Lower limit alarm permission	选择 Select	允许/禁止 Permit/Prohibit	2
23	下限报警数值 Lower limit alarm value	置数 Set number	000.0 ~ 599.99 %	2
24	励磁报警允许 Excitation alarm permission	选择 Select	允许/禁止 Permit/Prohibit	2
25	总量　零密码 Total reset password	置数 Set number	0 ~ 99999	3
26	传感器编码1 Sensor coding 1	用户设置 User setting	出厂年、月（0-99999） Factory date of year, month（0-99999）	4
27	传感器编码2 Sensor coding 2	用户设置 User setting	产品编号（0-99999） Product number（0-99999）	4
28	励磁方式选择 Excitation mode selection	选择 Select	方式1、2、3 Mode 1、2、3	4
29	传感器系数值 Sensor coefficient value	置数 Set number	0.0000 ~ 5.9999	4
30	流量修正允许 Flow correction permission	选择 Select	允许/禁止 Permit/Prohibit	2
31	流量修正点1 Flow correction point1	用户设置 User setting	按流速设置 Set by flow rate	5
32	流量修正数1 Flow correction number1	用户设置 User setting	0.0000 ~ 1.9999	5

参数 Paramete	参数文字 Parameter literal	设置方式 Setting mode	参数范围 Parameter range	密码级 Password level
33	流量修正点2 Flow correction point2	用户设置 User setting	按流速设置 Set by flow rate	2
34	流量修正数2 Flow correction number2	用户设置 User setting	0.0000 ~ 1.9999	2
35	流量修正点3 Flow correction point3	用户设置 User setting	按流速设置 Set by flow rate	2
36	流量修正数3 Flow correction number3	用户设置 User setting	0.0000 ~ 1.9999	2
37	流量修正点4 Flow correction point4	用户设置 User setting	按流速设置 Set by flow rate	2
38	流量修正数4 Flow correction number4	用户设置 User setting	0.0000 ~ 1.9999	2
39	正向总量低位 Forward total low-order	可以修改 Changeable	00000 ~ 99999	2
40	正向总量高位 Forward total high-order	可以修改 Changeable	0000 ~ 9999	2
41	反向总量低位 Reverse total low-order	可以修改 Changeable	00000 ~ 99999	2
42	反向总量高位 Reverse total high-order	可以修改 Changeable	0000 ~ 9999	2
43	尖峰抑制允许 Peak suppression permission	选择 Select	允许/禁止 Permit/Prohibit	2
44	尖峰抑制高位 Peak suppression coefficient	选择 Select	0.010 ~ 0.800m/s	2
45	尖峰抑制时间 Peak suppression time	选择 Select	400 ~ 2500ms	2
46	保密码1 Security code 1	用户可改 Changeable	00000 ~ 99999	2
47	保密码2 Security code 2	用户可改 Changeable	00000 ~ 99999	2
48	保密码3 Security code 3	用户可改 Changeable	00000 ~ 99999	2
49	保密码4 Security code 4	用户可改 Changeable	00000 ~ 99999	2
50	电流零点修正 Current zero pointcorrection	置数 Set number	0.0000 ~ 1.9999	2
51	电流满度修正 Current full scale correction	置数 Set number	0.0000 ~ 3.9999	3
52	出厂标定系数 Default calibration coefficient	置数 Set number	0.0000 ~ 5.9999	4
53	仪表编码1 Instrument coding 1	厂家设置 Factory setting	出厂年、月（0-99999） Factory date of year, month（0-99999）	4
54	仪表编码2 Instrument coding 2	厂家设置 Factory setting	产品编号（0-99999） Product number（0-99999）	4

仪表参数确定仪表的运行状态、计算方法、输出方式及状态。正确地选用和设置仪表参数，可使仪表运行在最佳状态，并得到较高的测量显示精度和测量输出精度。

仪表参数设置功能设有6级密码。其中，1～5级为用户密码，第6级为制造厂密码。用户可使用第5级密码来重新设置第1～4级密码。

The instrument parameters determine the operating state, calculation method, output mode and status of the instrument. Choosing and setting the parameters of the instrument correctly can make the instrument run in the best condition and obtain higher measurement display accuracy and measurement output precision.

The instrument parameter setting function has 6 levels password. Among them, level 1-5 is user password, level 6 is manufacturer password. The user can use the level 5 password to reset the password at level 1-4.

无论使用哪级密码，用户均可以察看仪表参数。但用户若想改变仪表参数，则要使用不同级别的密码。

第1级密码（出厂值00521）：用户只能查看仪表参数；

第2级密码（出厂值03210）：用户能改变1～24仪表参数；

第3级密码（出厂值06108）：用户能改变1～25仪表参数；

第4级密码（出厂值07206）：用户能改变1～29仪表参数；

第5级密码（固定值）：用户能改变1～52仪表参数。

建议由用户较高级别的人员掌握，第5级密码；第4级密码，主要用于设置总量；第1～3级密码，由用户决定何级别的人员掌握。

No matter which level of password is used, the user can view the instrument parameters. However, if the user wants to change the instrument parameters, different levels of passwords need to be used.

Level 1 password (factory default 00521): the user can only view instrument parameters;

Level 2 password (factory default 03210): the user can change the instrument parameters of 1～24;

Level 3 password (factory default 06108): the user can change the instrument parameters of 1～25 ;

Level 4 password (factory default 07206): the user can change the instrument parameters of 1～29;

Level 5 password (fixed value): the user can change the instrument parameters of 1～52.

It is suggested that the password is controlled by person at a higher user level, level 5 password; level 4 password, mainly used to set the total amount; level 1～3 password, are for user to decide which level of person to hold.

5. 电磁热能表转换器参数及操作

5.1 按键功能

a) 自　测量状态下键功能

上键：瞬时热（冷）量与瞬时流量的转换；热量显示：H，冷量显示：R。

下键：循环选择屏幕下行显示内容；

移位键：按一下移位键，仪表进入到仪表功能选择画面；

对比度调节：上键+下键（长按）对比度变暗；上键+移位键（长按）对比度变亮；

b) 参数设置状态下各键功能

下键：光标处数字减1，前翻页；

上键：光标处数字加1，后翻页；

按移位键将光标移到上键下面，按上键进入子菜单。

按移位键将光标移到下键下面，按下键返回上一级菜单。

5.2 参数设置功能及功能键操作

要进行仪表参数设定或修改，必须使仪表从测量状态进入参数设置状态。在测量状态下，按一下“移位键”，仪表进入到功能选择画面“仪表参数设置”，然后再按移位键将光标移到“上键”下面，按一下“上键”进入输入密码“00000”状态，输入密码后按移位元元键将光标移到“上键”下面，按一下“上键”进入选择操作主菜单，如下图所示：

5.Converter parameters and operation of electromagnetic heat meter

5.1 Key function

a) Key function in automatic measuring condition

Up key: The conversion between instantaneous heat (cooling) and instantaneous flow rate;

Down key: Cycle picking the next display content on the screen

Shift key: press the shift key, the instrument enter the instrument function selection screen;

Contrast ratio adjustment: Up key+ Down key(long press)Contrast darkens; Up key+ Shift key(long press)Contrast ratio brightens;

b) Key function in parameter setting state

Down key: the number minus 1 at the cursor position, to forward page;

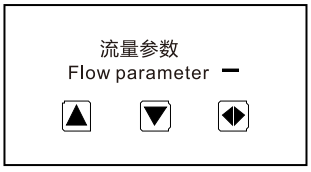
Up key: the number plus 1 at the cursor position, to back page;

Press the shift key to move the cursor below the up key and press the key to enter the submenu.

Press the shift key to move the cursor below the down key and press the key to return to the previous menu.

5.2 Parameter setting function and function key operation

In order to set or modify the instrument parameters, the instrument must be changed from the measuring condition to the parameter setting state. In the measuring condition, press "Shift key" and the instrument enters the function selection screen "instrument parameter setting", then press the shift key to move the cursor under "Up key" and press "Up key" to enter the password input "00000" state, after input the password and press the shift key to move the cursor below "Up key", and press "Up key" to enter the main menu of the selection operation, as shown in the following figure:



如若改变主菜单，按“上键”即可，如要进入主菜单改写子菜单参数，请将光标移到“上键”下方，按“上键”仪表进入当前主菜单的子菜单，如下图所示：

If you want to change the main menu, press "Up key". To enter the main menu change submenu parameter, move the cursor below the "Up key" and press the "Up key" , then the instrument to enter the submenu of the current main menu, as shown in the following figure:

如若进入　子菜单，将光标移到“上键”下方，按一下此键进行参数改写。

根据保密级别，按本厂提供的密码对应修改。在按“移位键”后，则进入需要的功能选择画面。

仪表设计有2级密码，其中1级用户可以自行设置密码值，2级密码为固定密码值，两级密码　别用于不同保密级别的操作者。

If you want to enter this submenu, move the cursor below the "Up key" and press this key to change the parameters.
According to the security classification, change the password provided by the factory correspondingly. After pressing "Shift key", enter the desired function selection screen.
The instrument has two levels of password, in which the user of level 1 can set the password value , level 2 is a fixed value, and the two level passwords are used for operators of different security classifications.

5.3 按键功能

按一下“移位键”进入功能选择画面，然后再按“进入键”进行选择，在此画面里共有5项功能可选择。

5.3 Function selection screen

Press "Shift key" to enter the function selection screen, and then press"Enter key" to select, in this screen there are 5 functions to choose;

参数编号 Parameter number	功能内容 Function content	说　明 Description
1	仪表参数设置 Instrument parameter setting	选择此功能，可进入参数设置画面 Select this function to enter the parameter settings screen
2	记录总量清零 Total record reset	选择此功能，可进行仪表总量清零操作 Select this function to perform the instrument total reset operation
3	月积总量显示 Monthly gross display	选择此功能，可查看32个月的月积总量 Select this function to view the total monthly gross for 32 months
4	掉电计时显示 Power down timing display	选择此功能，可查看32次掉电记录 Select this feature to view 32 power down records
5	系数修改记录 Coefficient change record	预 留 Reservation

5.4 仪表参数设置

按一下“移位键”显示“参数设置”功能，输入仪表密码后，按“移位键”将光标移到“进入键”下面，按一下“进入键”进入参数设置状态。

5.4 Instrument parameter setting

Press "Shift key" ,it appears the "parameter setting" function, after inputting the instrument password, Press "Shift key" to move cursor below"Enter key", press"Enter key" to enter parameter setting state.

5.5 记录总量清零

按一下“移位键”显示“仪表参数设置”，然后再按“上键”翻页到“记录总量清零”，输入总量清零密码，按“移位键”将光标移到“进入键”下面，按一下“进入键”，当总量清零密码自动变成“00000”后，仪表的清零功能完成，仪表内部的总量为0。

5.5 Total record reset

Press "Shift key" ,it appears the instrument "parameter setting" function, then press " Up key "to turn the page of record "Total record reset", input the total reset password, press "Shift key" to move the cursor below"Enter key", when the total amount of total reset password automatically becomes "00000", the instrument's total reset function is completed, and the total amount inside the instrument is 0.

5.6 月积总量显示

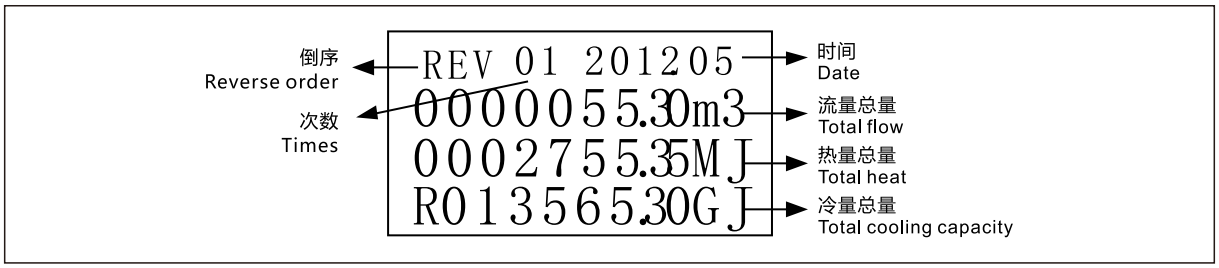
仪表内部设计有不停电时钟（内部电池供电），可连续工作5年以上。若要使用月积总量及掉电计时功能，必须保证内部不掉电时钟工作正常；

调准时钟的年、月、日、时、分、秒数值；

保证内部电池电力充足（5年一换电池）；

5.5 Monthly gross display

In the instrument has a non-blackout clock (internal battery power supply), which can continue to work for more than 5 years. If you want to use the Monthly gross display and power down timing function, it must be ensured that the internal power clock operation is normal;
calibrate the year, month, day, hour, minute, and second value of the clock;
Ensure adequate internal battery power (5 years for battery change);



月积总量最多可记录32次数据，当超过32次时，新纪录自动依次覆盖原始数据！

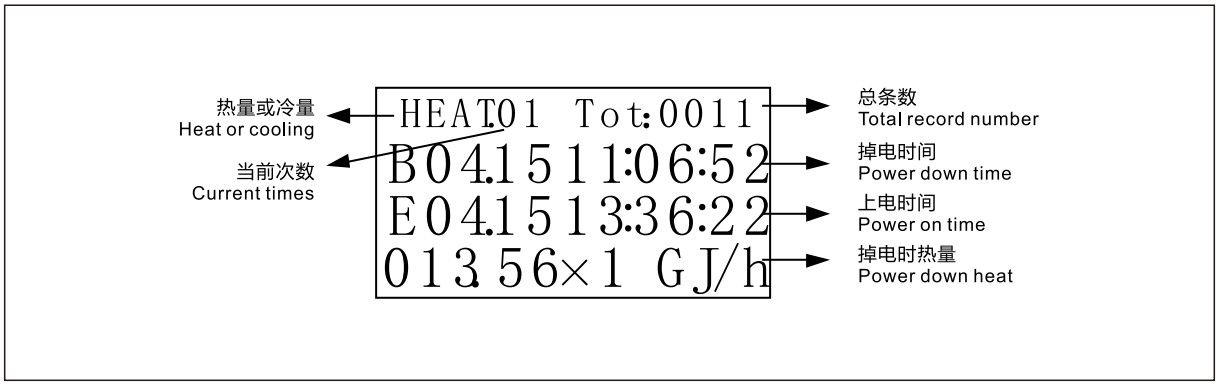
The monthly gross display can record up to 32 times of data, when more than 32 times, the new records automatically cover the original data in turn!

5.7 掉电计时显示

使用方法同月积总量。最多可记录32条掉电记录，可记录9999次掉电。

5.6 Power down timing display

The usage is the same as monthly gross display, with up to 32 power down records, and 9,999 power downs can be recorded



TK1100系列标准型电磁流量计选型编码说明
Description of standard type for TK1100 series

Tk1100系列电磁流量计DN3-DN2200;
精度 ≤0.5%。

TK1100 series electromagnetic flow meter DN3-DN2200
Accuracy ≤0.5%

型号 Model	TK1100												

安装方式 Installation method	
法兰型 Flange type	F
夹持型 Holding type	W

衬里 Lining	
硬橡胶 (Dn＞50) Hard rubber(DN＞50)	H
软橡胶 (DN＞40) Soft rubber(DN＞40)	S
聚氨酯 (DN＞50~300) Polyurethane(DN＞50~300)	E
PTFE(DN＞20)	T
F46	F
PFA	P
PO(DN＞50)	Z

口径 Caliber	
DN3	03
DN6	06
DN8	08
DN10	10
DN15	15
DN20	20
DN25	25
DN32	32
DN40	40
DN50	50
DN65	65
DN80	80
DN100	1H
DN125	1Q
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
DN1200	2M
DN1400	4M
DN1600	6M
DN1800	8M
DN2000	0M
Dn2200	P2

型号 Model	TK1100																		
电极材料 Electrode material	**接地电极材料 Grounding electrode material**																		
316L	无 NO				S														
哈氏合金B2 Hastelloy alloy B2	无 NO				B														
哈氏合金C4 Hastelloy alloy C4	无 NO				H														
钛 Titanium	无 NO					M													
钽 Tantalum	无 NO					T													
铂铱 Platinum iridium	无 NO					P													
碳化钨 Tantalum	无 NO					U													
316L	有 Yes						E												
哈氏合金B2 Hastelloy alloy B2	有 Yes						N												
哈氏合金C4 Hastelloy alloy C4	有 Yes						J												
钛 Titanium	有 Yes							A											
钽 Tantalum	有 Yes							Q											
铂铱 Platinum iridium	有 Yes							G											
碳化钨 Tantalum	有 Yes							V											
额定压力 Rated pressure	0.6Mpa								B										
	1.0Mpa								C										
	1.6Mpa								D										
	2.5Mpa								E										
	4.0Mpa								F										
	其它 Other								Z										
本体法兰材料 Flange material										**配对法兰 Companion flange**									
无(夹持式) None(clamping type)										无 None									
碳钢 Carbon steel										碳钢 Carbon steel									
304不锈钢 304 Stainless steel										304不锈钢 304 Stainless steel									
316不锈钢 316 Stainless steel										316不锈钢 316 Stainless steel									
其他 Other										其他 Other									
	0									0									
	1									1									
	2									3									
	3									5									
	4									7									
接地环 Grounding ring	无 No																		
	接地环 Grounding ring																		
																		A	
																		C	
温度范围 Temperature range	标准温度 <70℃ Standard temperature <70℃																		
	标准温度 <130℃ Sandard temperature <130℃																		
	标准温度 <160℃ Standard temperature<160℃																		
																		0	
																		1	
																		2	
转换器形式 Converter form	一体 Integrated type																		
	分体 Split type																		
																		T	
																		R	
输出模式 Output mode	4-20mA ＋ 脉冲																		
	4-20mA ＋ Pulse																		
	4-20mA ＋ HART 通讯																		
	4-20mA ＋ HART communication																		
	4-20mA ＋ Modbus 协议																		
	4-20mA ＋ Modbus protocol																		
	4-20mA ＋ Profibus 协议																		
	4-20mA ＋ Profibus protocol																		
																		01	
																		02	
																		03	
																		04	
供电电源 Power supply	220VAC																		
	24VDC																		
																		G	
																		K	
防护等级 Protection level	Ip65																		
	Ip67																		
	Ip68																		
																		0	
																		1	
																		2	
防爆等级 Explosion proof grade	无 No																		
	隔爆 Explosion suppression																		
																		0	
																		EX	

说明：以上为标准型电极，刮刀（RE）、可更换（WE)请标明；一体型防护等级为IP65，分体可选IP67，IP68（仅传感器）。

Note:The above is a standard type electrode, scraper (RE), can be replaced (WE) please mark.The protection level of integrated type is IP65, and IP67 or IP68(only sensor) can be selected for split type.

TK1200系列高精度电磁流量计选型编码说明
Description of high accuracy type for TK1200 series

Tk1200系列电磁流量计DN10-DN1200;
精度 ≤0.2%。

Tk1200 series electromagnetic flow meter DN10-DN1200
Accuracy ≤0.2%

型号 Model	Tk1200												
安装方式 Installation method 法兰型 Flange type 夹持型 Holding type		F W											
衬里 Lining 硬橡胶 (Dn＞50) Hard rubber(DN＞50) 软橡胶 (DN＞40) Soft rubber(DN＞40) 聚氨酯 (DN＞50~300) Polyurethane(DN＞50~300) PTFE(DN＞20) F46 PFA PO(DN＞50)		H S E T F P Z											
口径 Caliber DN10 DN15 DN20 DN25 DN32 DN40 DN50 DN65 DN80 DN100 DN125 DN150 DN200 DN250 Dn300		10 15 20 25 32 40 50 65 80 1H 1Q 1F 2H 2F 3H											

型号 Model	Tk1200													
电极材料 Electrode material	**接地电极材料 Grounding electrode material**													
316L	无 NO	S												
哈氏合金B2 Hastelloy alloy B2	无 NO	B												
哈氏合金C4 Hastelloy alloy C4	无 NO	H												
钛 Titanium	无 NO		M											
钽 Tantalum	无 NO		T											
铂铱 Platinum iridium	无 NO		P											
碳化钨 Tantalum	无 NO		U											
316L	有 Yes			E										
哈氏合金B2 Hastelloy alloy B2	有 Yes			N										
哈氏合金C4 Hastelloy alloy C4	有 Yes			J										
钛 Titanium	有 Yes				A									
钽 Tantalum	有 Yes				Q									
铂铱 Platinum iridium	有 Yes				G									
碳化钨 Tantalum	有 Yes				V									
额定压力 Rated pressure	0.6Mpa					B								
	1.0Mpa					C								
	1.6Mpa					D								
	2.5Mpa					E								
	4.0Mpa					F								
	其它 Other					Z								
本体法兰材料 Flange material							**配对法兰 Companion flange**							
无(夹持式) None(clamping type)	0						无 None	0						
碳钢 Carbon steel	1						碳钢 Carbon steel	1						
304不锈钢 304 Stainless steel	2						304不锈钢 304 Stainless steel	3						
316不锈钢 316 Stainless steel	3						316不锈钢 316 Stainless steel	5						
其他 Other	4						其他 Other	7						
接地环 Grounding ring							无 No					A		
							接地环 Grounding ring					C		
温度范围 Temperature range							标准温度 <70℃ Standard temperature <70℃					0		
							标准温度 <130℃ Sandard temperature <130℃					1		
							标准温度 <160℃ Standard temperature<160℃					2		
转换器形式 Converter form							一体 Integrated type						T	
							分体 Split type						R	
输出模式 Output mode							4-20mA 十 脉冲 4-20mA 十 Pulse							01
							4-20mA 十 HART 通讯 4-20mA 十 HART communication							02
							4-20mA 十 Modbus 协议 4-20mA 十 Modbus protocol							03
							4-20mA 十 Profibus 协议 4-20mA 十 Profibus protocol							04
供电电源 Power supply							220VAC							G
							24VDC							K
防护等级 Protection level							Ip65							0
							Ip67							1
							Ip68							2
防爆等级 Explosion proof grade							无 No							0
							隔爆 Explosion suppression							EX

说明：以上为标准型电极，刮刀（RE)、可更换（WE)请标明；一体型防护等级为IP65，分体可选IP67，IP68（仅传感器）。

Note:The above is a standard type electrode, scraper (RE), can be replaced(WE) please mark.The protection level of integrated type is IP65, and IP67 or IP68(only sensor) can be selected for split type.

TK1300系列卫生型电磁流量计选型编码说明
Description of hygienic type for TK1300 series

TK1300系列电磁流量计DN3-DN150
精度 ≤0.2%，≤0.5%。

Tk1400 series electromagnetic flow meter DN3-DN150
Accuracy ≤0.2%，≤0.5%

型号 Model	TK1300									
工艺接头 Process joints 三卡箍(3A) Three-clamps DIN11851 其它 Other		T R F								
衬里 Lining PTFE F46 PFA			T F P							
口径 Caliber DN3 DN6 DN10 DN15 DN20 DN25 DN32 DN40 DN50 DN65 DN80 DN100 DN125				03 06 10 15 20 25 32 40 50 65 80 1H 1Q						
电极材料 Electrode material 316L 哈氏合金B2 Hastelloy alloy B2 哈氏合金C4 Hastelloy alloy C4	**接地电极材料 Grounding electrode material** 无 NO 无 NO 无 NO				S B H					
钛 Titanium 钽 Tantalum 铂铱 Platinum iridium	无 NO 无 NO 无 NO				M T P					
316L 哈氏合金B2 Hastelloy alloy B2 哈氏合金C4 Hastelloy alloy C4	有 Yes 有 Yes 有 Yes				E N J					
钛 Titanium 钽 Tantalum 铂铱 Platinum iridium	有 Yes 有 Yes 有 Yes				A Q G					
温度范围 Temperature range	标准温度<90℃ Standard temperature<90℃ 高温<160℃ High temperature <160℃					1 3				
转换器形式 Converter form	一体 Integrated type 分体 Split type						T R			
供电电源 Power supply	220VAC 24VDC							G K		
输出模式 Output mode	4-20mA ＋ 脉冲 4-20mA ＋ Pulse 4-20mA ＋ HART 通讯 4-20mA ＋ HART communication 4-20mA ＋ Modbus 协议 4-20mA ＋ Modbus protocol 4-20mA ＋ Profibus 协议 4-20mA ＋ Profibus protocol								01 02 03 04	
防护等级 Protection level	Ip65 Ip67 Ip68									0 1 2

TK1400插入式电磁流量计选型编码说明
Description of inserted type for TK1400 series

Tk1400系列电磁流量计DN250-DN3000
精度 ≤1.5%

Tk1400 series electromagnetic flowmeter DN250-DN3000
Accuracy ≤1.5%

型号 Model	TK1400													
标准型 Standard type		B												
在线插拔式 On line plug and unplug		Z												
安装方式 Installation method														
螺纹固定式 Screw thread fixed type			M											
法兰固定式 Flange fixed type			G											
衬里 Lining														
PTFE				T										
POM				M										
口径 Caliber														
DN200					2H									
DN250					2F									
DN300					3H									
DN350					3F									
DN400					4H									
DN450					4F									
DN500					5H									
DN600					6H									
DN700					7H									
DN800					8H									
DN900					9H									
DN1000					1T									
DN1200					2M									
DN1400					4M									
DN1600					6M									
DN1800					8M									
DN2000					0M									
DN2200					2P									
DN2400					4P									
DN2500					5P									
DN2600					6P									
DN2800					8P									
DN3000					3Q									

型号 Model	TK1400														
电极材料 Electrode material 316L 哈氏合金B2 Hastelloy alloy B2 哈氏合金C4 Hastelloy alloy C4 钛 Titanium						S B H M									
额定压力 Rated pressure	0.6Mpa 1.0Mpa 1.6Mpa					B C D									
法兰材料 Flange material 不锈钢 Stainless steel 不锈钢 Stainless steel	**配对法兰 Companion flange** 无 None 有 Yes						0 1								
温度范围 Temperature range	标准温度<60℃ Standard temperature<60℃ 高温<100℃ High temperature <100℃							0 1							
转换器形式 Converter form	一体 Integrated type 分体 Split type								T R						
输出模式 Output mode	4-20mA + 脉冲 4-20mA + Pulse 4-20mA + HART 通讯 4-20mA + HART communication 4-20mA + Modbus 协议 4-20mA + Modbus protocol 4-20mA + Profibus 协议 4-20mA + Profibus protocol									01 02 03 04					
供电电源 Power supply	220VAC 24VDC										G K				
防护等级 Protection level	Ip65 Ip67 Ip68											0 1 2			
防爆等级 Explosion proof grade	无 No 隔爆 Explosion suppression												0 EX		

说明：以上为标准型电极，一体型防护等级为IP65，分体可选IP67，IP68(仅传感器）。

Note:The above is a standard type electrode, The protection level of integrated type is IP65, and IP67 or IP68(only sensor) can be selected for split type.

TK1500系列标准型电磁流量计选型编码说明
Description of battery powered type for TK1500 series

Tk1500系列电磁流量计DN10-DN1200
精度 ≤0.5%

Tk1500 series electromagnetic flow meter DN10-DN1200
Accuracy ≤0.5%

型号 Model	TK1500																	
安装方式 Installation method																		
法兰型 Flange type		F																
夹持型 Holding type		W																
衬里 Lining																		
硬橡胶 (Dn > 50)Hard rubber(DN > 50)		H																
软橡胶 (DN > 40) Soft rubber(DN > 40)		S																
聚氨酯 (DN > 50~300) Polyurethane(DN > 50~300)		E																
PTFE(DN > 20)		T																
F46		F																
PFA(DN > 10~150)		P																
PO(DN > 50)		Z																
口径 Caliber																		
DN15			15															
DN20			20															
DN25			25															
DN32			32															
DN40			40															
DN50			50															
DN65			65															
DN80			80															
DN100			1H															
DN125			1Q															
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															
DN1200			2M															

型号 Model	TK1500																		
电极材料 Electrode material	**接地电极材料 Grounding electrode material**																		
316L	无 NO				S														
哈氏合金B2 Hastelloy alloy B2	无 NO				B														
哈氏合金C4 Hastelloy alloy C4	无 NO				H														
钛 Titanium	无 NO					M													
钽 Tantalum	无 NO					T													
铂铱 Platinum iridium	无 NO					P													
碳化钨 Tantalum	无 NO					U													
316L	有 Yes						E												
哈氏合金B2 Hastelloy alloy B2	有 Yes						N												
哈氏合金C4 Hastelloy alloy C4	有 Yes						J												
钛 Titanium	有 Yes							A											
钽 Tantalum	有 Yes							Q											
铂铱 Platinum iridium	有 Yes							G											
碳化钨 Tantalum	有 Yes							V											
额定压力 Rated pressure	0.6Mpa								B										
	1.0Mpa								C										
	1.6Mpa								D										
	2.5Mpa								E										
	4.0Mpa								F										
	其它 Other								Z										
本体法兰材料 Flange material										**配对法兰 Companion flange**									
无(夹持式) None(clamping type)		0								无 None			0						
碳钢 Carbon steel		1								碳钢 Carbon steel			1						
304不锈钢 304 Stainless steel		2								304不锈钢 304 Stainless steel			3						
316不锈钢 316 Stainless steel		3								316不锈钢 316 Stainless steel			5						
其他 Other		4								其他 Other			7						
接地环 Grounding ring										无 No				A					
										接地环 Grounding ring				C					
温度范围 Temperature range										标准温度 <70℃ Standard temperature <70℃					0				
										标准温度 <130℃ Sandard temperature <130℃					1				
										标准温度 <160℃ Standard temperature<160℃					2				
转换器形式 Converter form										一体 Integrated type						T			
										分体 Split type						R			
输出模式 Output mode										频率 Frequency 0-5kHz							05		
供电电源 Power supply										3.6V 锂电池 Lithium battery								Y	
防护等级 Protection level										Ip65									0
										Ip67									1
										Ip68									2
防爆等级 Explosion proof grade										无 No									0
										隔爆 Explosion suppression									EX

说明：以上为标准型电极，刮刀（RE）、可更换（WE)请标明；一体型防护等级为IP65，分体可选IP67，IP68(仅传感器）。

Note:The above is a standard type electrode, scraper (RE), can be replaced (WE) please mark;
The protection level of integrated type is IP65, and IP67 or IP68(only sensor) can be selected for split type.

TK1600系列电磁（热能）流量计选型编码说明
Description of electromagnetic(heat energy)type for TK1600 series

TK1600系列电磁（热能）流量计
精度 ≤1.0%

DN15-DN1200TK1600series electromagnetic (heat energy) flowmeter DN15-DN1200
Accuracy ≤1.0%

型号 Model	TK1600																	

安装方式 Installation method

法兰型 Flange type	F
夹持型 Holding type	W

衬里 Lining

硬橡胶 (Dn > 50)Hard rubber(DN > 50)	H
软橡胶 (DN > 40) Soft rubber(DN > 40)	S
聚氨酯 (DN > 50~300) Polyurethane(DN > 50~300)	E
PTFE(DN > 20)	T
F46	F
PFA(DN > 10~150)	P
PO(DN > 50)	Z

口径 Caliber

DN15	15
DN20	20
DN25	25
DN32	32
DN40	40
DN50	50
DN65	65
DN80	80
DN100	1H
DN125	1Q
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
DN1200	2M

型号 Model	TK1600																		
电极材料 Electrode material	**接地电极材料 Grounding electrode material**																		
316L	无 NO					S													
哈氏合金B2 Hastelloy alloy B2	无 NO					B													
哈氏合金C4 Hastelloy alloy C4	无 NO					H													
钛 Titanium	无 NO						M												
钽 Tantalum	无 NO						T												
铂铱 Platinum iridium	无 NO						P												
碳化钨 Tantalum	无 NO						U												
316L	有 Yes							E											
哈氏合金B2 Hastelloy alloy B2	有 Yes							N											
哈氏合金C4 Hastelloy alloy C4	有 Yes							J											
钛 Titanium	有 Yes								A										
钽 Tantalum	有 Yes								Q										
铂铱 Platinum iridium	有 Yes								G										
碳化钨 Tantalum	有 Yes								V										
额定压力 Rated pressure	0.6Mpa									B									
	1.0Mpa									C									
	1.6Mpa									D									
	2.5Mpa									E									
	4.0Mpa									F									
	其它 Other									Z									
本体法兰材料 Flange material																			
无(夹持式) None(clamping type)	0																		
碳钢 Carbon steel	1																		
304不锈钢 304 Stainless steel	2																		
316不锈钢 316 Stainless steel	3																		
其他 Other	4																		
配对法兰 Companion flange																			
无 None		0																	
碳钢 Carbon steel		1																	
304不锈钢 304 Stainless steel		3																	
316不锈钢 316 Stainless steel		5																	
其他 Other		7																	
接地环 Grounding ring	无 No										A								
	接地环 Grounding ring										C								
温度范围 Temperature range	标准温度 <70℃ Standard temperature <70℃											0							
	标准温度 <130℃ Sandard temperature <130℃											1							
	标准温度 <160℃ Standard temperature<160℃											2							
转换器形式 Converter form	一体 Integrated type												T						
	分体 Split type												R						
输出模式 Output mode	4-20mA+脉冲 4-20mA+Pulse													01					
	4-20mA+HART 通讯 4-20mA+HART communication													02					
	4-20mA+Modbus 协议 4-20mA+Modbus protocol													03					
	4-20mA+Profibus 协议 4-20mA+Profibus protocol													04					
供电电源 Power supply	220VAC														G				
	24VDC														K				
防护等级 Protection level	Ip65															0			
	Ip67															1			
	Ip68															2			
防爆等级 Explosion proof grade	无 No																0		
	隔爆 Explosion suppression																EX		

说明：以上为标准型电极，刮刀（RE)、可更换（WE)请标明；一体型防护等级为IP65，分体可选IP67，IP68(仅传感器）。

Note: The above is a standard type electrode, scraper (RE), can be replaced(WE) please mark. The protection level of integrated type is IP65, and IP67 or IP68(only sensor) can be selected for split type.

电极材质防腐选用参考表
Reference table for anti-corrosion of electrode materials

介质名称 Dielectric name	浓度% Concentration	温度℃ Temperature	316L	哈氏C Hastelloy C	钛 Titanium	钽 Tantalum	铂 Platinum
硫酸 Sulfuric acid	2-5	室温 Room temperature	N	X	X	A	A
		沸点 Boiling point	N	N	X	N	A
	10	室温 Room temperature	N	X	X	A	A
		沸点 Boiling point	N	N	N	N	A
	25-60	室温 Room temperature	N	X	B	A	A
		沸点 Boiling point	N	N	N	N	A
	70-85	室温 Room temperature	N	X	N	A	A
		沸点 Boiling point	N	N	N	N	A
	90-96	室温 Room temperature	X	X	N	A	A
		沸点 Boiling point	N	N	N	N	A
盐酸 Hydrochloric acid	0.5-5	室温 Room temperature	N	X	A	A	A
		沸点 Boiling point	N	N	A	X	X
	10-20	室温 Room temperature	N	B	A	A	A
		沸点 Boiling point	N	N	N	X	X
	37	室温 Room temperature	B	N	N	A	X
		沸点 Boiling point	N	N	N	X	X
硝酸 Nitric acid	7-65	室温 Room temperature	X	X	X	A	A
		沸点 Boiling point	X	N	X	A	A
	100	室温 Room temperature	N	-	X	A	A
		沸点 Boiling point	-	-	X	A	A
铬酸 Chromic acid	10	室温 Room temperature	A	A	A	A	A
		沸点 Boiling point	N	A	A	A	N
	50	室温 Room temperature	N	A	A	A	A
		沸点 Boiling point	N	A	A	A	A
	100	室温 Room temperature	N	N	-	A	A
		沸点 Boiling point	N	N	-	A	A

符号说明：A-适用，B-可用，寿命短；N-不能用；X-耐腐蚀；空白-无数据；Sat-饱和。
Symbol notes: A-applicable, B-available, shot life, N-not available, X-corrosion resistance.

介质名称 Dielectric name	浓度% Concentration	温度℃ Temperature	316L	哈氏C Hastelloy C	钛 Titanium	钽 Tantalum	铂 Platinum
王水 Aqua regia	100	室温 Room temperature	N	N	B	A	N
		沸点 Boiling point	N	N	N	N	A
氢氟酸 Hydrofluoric acid	1-50	室温 Room temperature	N	N	N	N	A
	98-100	沸点 Boiling point	N	N	N	N	A
磷酸 Phosphoric acid	1-30	室温 Room temperature	X	X	X	A	A
	45-Sat	室温 Room temperature	B	X	B	A	A
	80-Sat	沸点 Boiling point	N	N	N	A	A
乙酸 Acetic acid	5-10	室温 Room temperature	A	A	A	A	A
	50以上 More than 50	室温 Room temperature	N	A	A	A	A
	Sat	室温 Room temperature	A	A	A	X	A
□ □ Methanol	100	室温 Room temperature	A	A	A	X	A
	100	沸点 Boiling point	B	A	B	X	A
污水 Wastewater	-	室温 Room temperature	A	A	A	A	A
海水 Seawater	-	室温 Room temperature	B	A	A	A	A
甲酸 Formic acid	10-20	室温 Room temperature	N	A	A	A	A
		沸点 Boiling point	N	B	A	A	A
	50-100	室温 Room temperature	N	B	B	A	A
		沸点 Boiling point	N	N	N	A	A
草酸 Oxalic acid	5-10	室温 Room temperature	A	A	A	X	A
	25-50	沸点 Boiling point	-	A	A	X	A
	sat	室温 Room temperature	-	N	B	X	A
	5-sat	沸点 Boiling point	N	N	N	X	A
柠檬酸 Citric acid	5-25	室温 Room temperature	A	A	A	X	A
		沸点 Boiling point	A	A	A	X	A
	50	室温 Room temperature	A	A	A	X	A
		沸点 Boiling point	A	A	B	X	B

符号说明：A-适用，B-可用，寿命短；N-不能用；X-耐腐蚀；空白-无数据；Sat-饱和。
Symbol notes: A-applicable, B-available, shot life, N-not available, X-corrosion resistance.

介质名称 Dielectric name	浓度% Concentration	温度℃ Temperature	316L	哈氏C Hastelloy C	钛 Titanium	钽 Tantalum	铂 Platinum
氯化铁 Ferric chloride	10-sat	室温 Room temperature	N	A	A	A	N
		沸点 Boiling point	N	A	A	A	N
氯化钠 Sodium chloride	100	室温 Room temperature	B	A	A	X	A
		沸点 Boiling point	B	A	A	X	A
氯化铵 Ammonium chloride	10-20	室温 Room temperature	N	B	B	A	A
		沸点 Boiling point	N	B	B	A	A
	50-100	室温 Room temperature	N	B	B	X	A
		沸点 Boiling point	N	B	B	X	A
氯化钙 Calcium chloride	100	室温 Room temperature	N	N	-	A	A
		沸点 Boiling point	-	X	-	A	A
氯化镁 Magnesium chloride	10-30	室温 Room temperature	N	B	B	A	A
		沸点 Boiling point	N	B	-	X	A
硝酸钾 Potassium nitrate	20-50	室温 Room temperature	A	A	A	X	A
		沸点 Boiling point	A	A	A	X	A
	80-Sat	室温 Room temperature	A	A	A	X	A
		沸点 Boiling point	A	A	A	X	A
硫酸钠 Sodium sulfate	Sat	室温 Room temperature	A	A	A	A	A
		沸点 Boiling point	N	N	N	A	A
脂肪酸 Fatty acids	100	室温 Room temperature	A	A	A	X	A
	100	沸点 Boiling point	B	A	A	X	A
乳酸 Lactic acid	1.5-10	室温 Room temperature	A	A	A	X	-
	1.5-10	沸点 Boiling point	N	A	A	X	-
	Sat	沸点 Boiling point	N	N	A	A	-
硝酸铝 Aluminum nitrate	10	室温 Room temperature	A	X	A	A	A
	10-100	室温 Room temperature	-	X	A	X	-
	57	120℃	-	X	A	X	-
纸浆 Paper pulp	-	室温 Room temperature	B	A	A	A	A
石灰浆 Calcium hydroxide	-	室温 Room temperature	N	B	A	A	A

符号说明：A-适用，B-可用，寿命短；N-不能用；X-耐腐蚀；空白-无数据；Sat-饱和。
Symbol notes: A-applicable, B-available, shot life, N-not available, X-corrosion resistance.

常见液体电导率参数表
Parameter table of liquid conductivity parameter table

介质名称 Dielectric name	浓度% Concentration	温度℃ Temperature	电导率(S/cm) Conductivity
硫酸 Sulfuric acid	5	18	$20.85*10^{-2}$
	85	-	$98.50*10^{-3}$
	99.4	-	$85.00*10^{-4}$
盐酸 Hydrochloric acid	5	15	$39.48*10^{-2}$
	40	-	$51.52*10^{-2}$
硝酸 Nitric acid	6.2	18	$31.23*10^{-2}$
	31	-	$79.19*10^{-2}$
	62	-	$49.04*10^{-2}$
氢氟酸 Hydrofluoric acid	0.004	18	$2.50*10^{-4}$
	0.121	-	$21.00*10^{-4}$
	4.80	-	$59.3*10^{-3}$
	29.80	-	$34.11*10^{-2}$
醋酸 Acetic acid	0.30	18	$3.18*10^{-4}$
	20	-	$16.05*10^{-4}$
	70	-	$2.35*10^{-4}$
	99.70	-	$4.00*10^{-8}$
	100(纯)	25	$1.20*10^{-8}$
磷酸 Phosphoric acid	10	15	$56.6*10^{-3}$
	70	-	$14.73*10^{-2}$
	87	-	$70.90*10^{-3}$
氨水 Ammonium hydroxide	0.10	15	$2.51*10^{-4}$
	8.03	-	$10.38*10^{-4}$
	30.50	-	$1.93*10^{-4}$
丁酸 Butyric acid	1.00	18	$4.55*10^{-4}$
	50.04	-	$2.96*10^{-4}$
	70.01	-	$5.6*10^{-7}$
	100	-	$6.0*10^{-8}$
氢溴酸 Hydrobromic acid	5	15	$19.08*10^{-2}$
	15	-	$49.40*10^{-2}$
	100	-	$8.0*10^{-4}$
氯化钡 Barium chloride	5	18	$3.89*10^{-2}$
	24	-	$15.34*10^{-2}$
硫酸钾 Potassium sulphate	5	18	$45.80*10^{-3}$

介质名称 Dielectric name	浓度% Concentration	温度℃ Temperature	电导率(S/cm) Conductivity
甲酸 Formic acid	4.94	18	$55.00*10^{-4}$
	39.955	-	$98.40*10^{-4}$
	100	-	$2.80*10^{-4}$
	100(纯)	-	$5.60*10^{-5}$
草酸 Oxalic acid	3.5	18	$5.08*10^{-2}$
	5	18	$67.20*10^{-3}$
氯化钠 Sodium chloride	10	-	$12.11*10^{-2}$
	26	-	$21.51*10^{-2}$
氯化钙 Calcium chloride	5	-	$6.43*10^{-2}$
	25	-	$17.81*10^{-2}$
	35	-	$13.66*10^{-2}$
氯化铵 Ammonium chloride	5	18	$91.80*10^{-3}$
	25	-	$40.25*10^{-2}$
氯化钾 Potassium chloride	5	18	$69.90*10^{-3}$
	21	-	$28.10*10^{-2}$
氯化镁 Magnesium chloride	5	18	$68.30*10^{-3}$
	30	-	$10.61*10^{-2}$
硫酸钠 Sodium sulfate	5	18	$40.90*10^{-3}$
	15	-	$88.60*10^{-3}$
硫酸铜 Cupric sulfate	2.50	18	$10.90*10^{-3}$
	17.50	-	$45.80*10^{-3}$
硝酸钾 Potassium nitrate	5	15	$45.4*10^{-3}$
	22	-	$16.25*10^{-2}$
硫酸铵 Ammonium sulfate	5	15	$55.20*10^{-3}$
	31	-	$23.21*10^{-2}$
硝酸铵 Ammonium nitrate	5	15	$55.20*10^{-3}$
	50	-	$23.21*10^{-2}$
氯化锌 Zinc chloride	2.5	15	$27.60*10^{-3}$
	30	-	$92.60*10^{-3}$
	60	-	$36.9*10^{-3}$
碳酸钠 Sodium carbonate	5	18	$45.10*10^{-3}$
	15		$83.60*10^{-3}$
尿素 Urea	100	145	$5.0*10^{-3}$

组态数据表
Data table of configuration

客户名称 Client name		日 期 Date		
联系人 Client name		部 门 Department		
电 话 TEL		传 真 FAX		
产品型号 Product model		位号 No.		
测量介质 Measuring medium	液体Liquid（是否带有固体颗粒 With solid particles	Yes	No ）	
电导率 Conductivity	是否大于 More than	☐5μs	☐Yes	☐No
流量范围 Flow range				
工作压力 Working pressure	☐ 最大 Maximum	☐ 正常 Normal	☐ 最小 Minimum	
介质温度 Working pressure	☐ 最大 Maximum	☐ 正常 Normal	☐ 最小 Minimum	
工艺管径 Working pressure				
法兰材质 Flange material	☐ 碳钢 Carbon steel	☐ 不锈钢 Stainless steel		
转换器 Converter	☐ 一体 One type	☐ 分体（电缆长度） Split type(cable length)		
供电电源 Power supply	☐ 220V AC	☐ 24VDC		
防护等级 Ingress protection	☐ Ip65	☐ Ip68		
防爆要求 Explosion proof requirement	☐ Yes	☐ No		
电气输出 Electrical output	☐ 脉冲Pulse	☐ 4-20mA 电流Current		
	☐ HART	☐ MODBUS	☐ PROFIBUS	

涡街流量计

TK2000系列电磁流量计

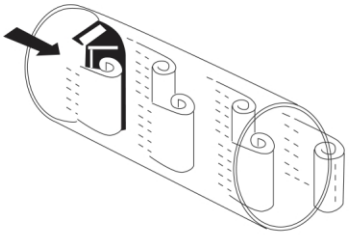
Vortex Street Flowmeter Tk2000

工作原理

当流体以一定流速流经设置在流场中的旋涡发生体时，在柱体的下游产生一对交替出现的而且排列整齐的涡列（涡街），先在柱体的一侧产生，继而在柱体的另一侧产生。这一产生旋涡的理论首先由卡门（Karman）提出，命名为卡门涡街，并给出了频率与流速的关系式，其中系数被命名为斯特罗哈尔数（图1）。

Working principle

When fluid flows through the vortex generator in the flow field at a certain velocity and generates a pair of alternating while aligned vortex row (vortex street), which firstly appears on the one side of column and then the other side. This vortex-generating theory was first put forward by Karmen and named as Karman Vortex. Karmen also gave the relation between frequency and velocity, among which the coefficient was named as Strouhal number (Figure 1).



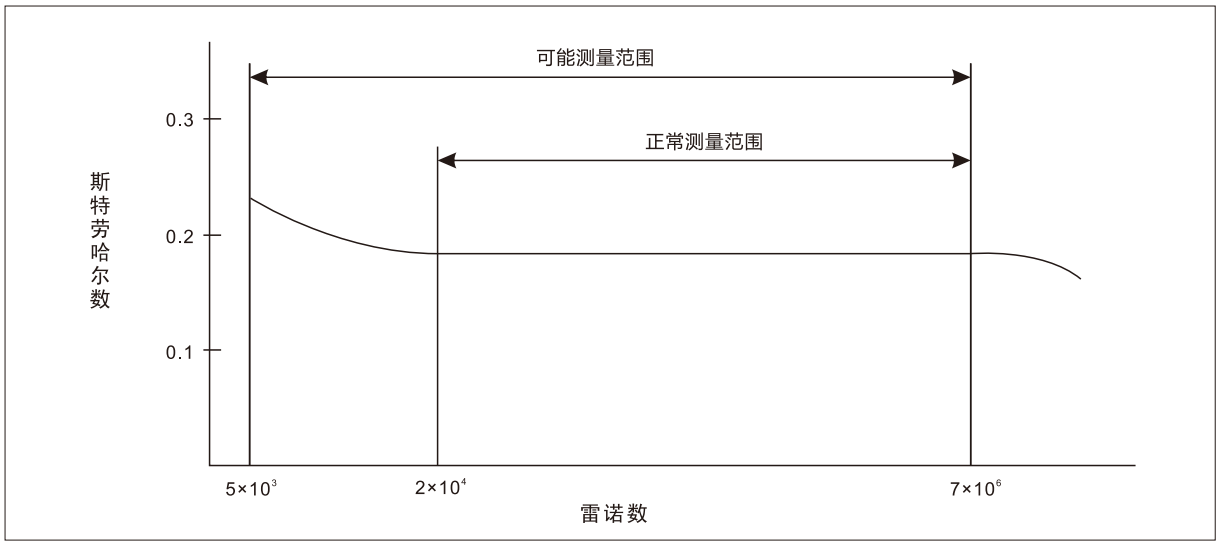
原理图
Schematic Diagram

$$f=St\cdot\frac{V}{d}$$

式中：f-旋涡的分离频率
In the Formula: f— separating frequency of vortex
St-斯特罗哈尔数
St— Strouhal number
V-流体的流速
V— fluid velocity
d-柱体的迎流面宽度
d— fluid-approaching plane width of column

对于设计正确的漩涡发生体，Strouhal数在很广的雷诺数Re范围内保持恒定（图2）。

For correctly-designed vortex generator, Strouhal number may maintain constant within a highly wide range of Reynolds number Re (Figure 2).



产品特点

1、应用范围广，蒸汽、气体、液体的流量均可测量；

2、测量结果与流速分布、流体压力、温度、密度、粘度等物理参数无关；

3、无可动部件，可靠性高，长期运行稳定；

4、耐磨、耐脏污，无须机械维修，使用寿命长，安全防爆，适用于恶劣环境；

5、传感器测量探头采用特殊工艺封装，耐高温可达350℃；

6、传感器采用补偿设计，提高仪表抗震性；

7、采用微功耗高新技术，电池供电的现场显示型流量计，不断电运行可达五年以上；

8、电隔离型电流输出，共模干扰抑制能力良好；

9、抗振性能好，零点无漂移，有效消除外界振动影响；

10、表面贴装工艺电路，结构紧凑，可靠性高，测量范围宽，量程比可达10：1，15:1,20:1，30:1；

11、压损小，动态测量范围宽，运行费用低，不锈钢材质表体，耐腐蚀性强；

12、脉冲输出、4~20mA输出或HART通讯/Modbus协议通迅，可与工业自动化系统连接；

13、现场液晶显示，同时瞬时流量显示、累计总量显示；

14、密度计算、温度、压力补偿计算，补偿计算公式在线检验，就地按键设置，方便参数调整，无需手持通讯器。

Product Characteristics

1. Wide application, capable of measuring flow of vapor, gas and liquid.
2. Measurement results are independent of physical parameters including flow distribution, fluid pressure, temperature, density, viscosity, etc.
3. No movable parts, high reliability, long-term stable operation;
4. Abrasion and dirt resistance, unnecessary mechanical maintenance, long service life, safe and explosion-proof, suitable for harsh environment.
5. The measuring probe of sensor is packed with a special technique and boasts temperature resistance of up to 350℃.
6. Sensor is designed by means of compensation, so as to promote meter's shock resistance.
7. The on-site displaying flowmeter with micro-power high technology and battery supply can operate with electricity for more than 5 years.
8. Electric-isolated current input, fine capability of suppressing common mode interference.
9. Good anti-vibration property, non-drift at zero point, effectively eliminate external vibration influences.
10. Surface mount processed circuit, compact structure, high reliability, wide measuring range; range ratio can be 10:1, 15:1, 20:1 and 30:1.
11. Small pressure loss, wide dynamic measuring range, low operating cost, body of stainless steel, strong corrosion resistance.
12. Pulse input, 4~20mA input or HART communication/Modbus protocol communication can connect with industrial automation system.
13. On-site LCD display, simultaneous display of instantaneous flow and cumulative total flow.
14. Calculation of density, temperature and pressure compensation, on-line inspection of compensation calculating formula, in-place button layout, convenient for parameter adjustment without any handheld communication device.

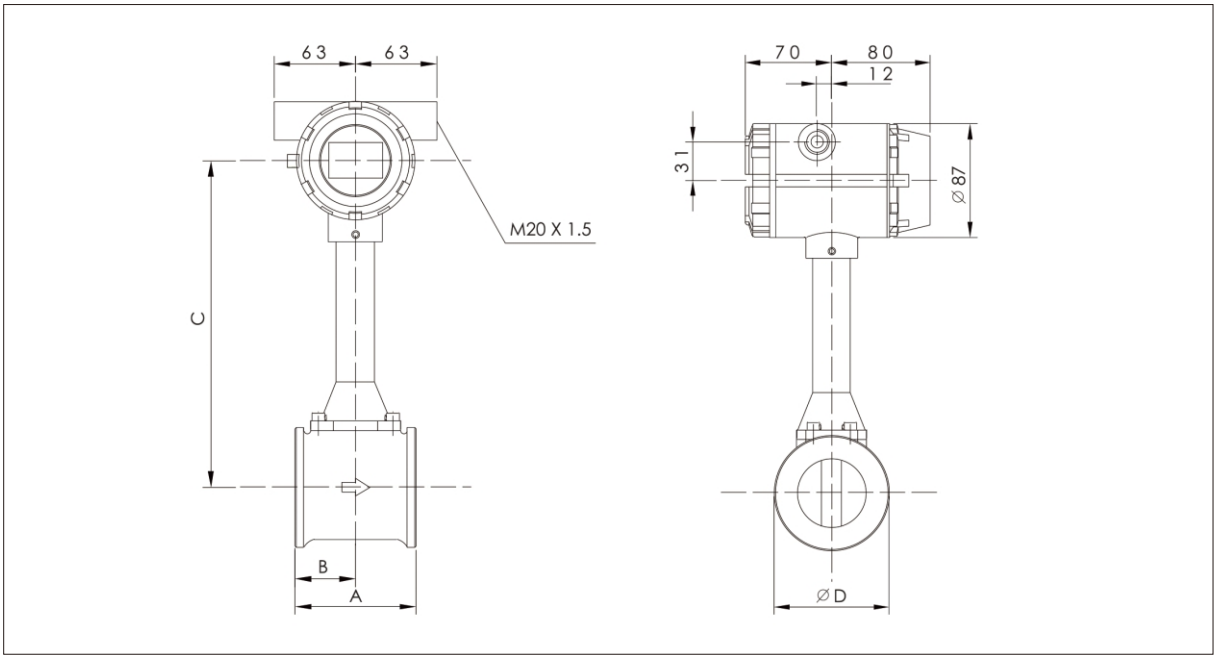
主要技术参数 Main Technical Parameters

涡街流量计TK2000 Vortex Street Flowmeter TK2000			
测量流体 Measured Fluid		气体、蒸汽 Gas、Vapor	液体 Liquid
精度 Precision		±1.0%；±1.5%（插入式Plug-in±2.5%）	±7.5%；±1.0%（插入式Plug-in±2.0%）
重复性 Repeatability		±0.5%	±0.33%
雷诺数 Reynolds number		$2\times10^4\sim7\times10^6$	
介质温度 Medium Temperature	扩展 Extended	-40℃～+350℃	
	标准 Standard	-40℃～+250℃	
量程比 Range Ratio		10：1；15:1；20:1；30:1	
口径范围 Caliber Range		DN15~DN1500	
工作压力 Working Pressure		1.0MPa / 1.6MPa / 2.5MPa / 4.0MPa，其他Other	
流速范围 Velocity Range		5～70m/s	0.5～7m/s
接液材料 Fluid Contact Material		304不锈钢 / 316L不锈钢 304 Stainless Steel / 316L Stainless Steel	
法兰材料 Flange Material		碳钢法兰 / 304法兰 / 316L法兰 Carbon Steel / Flange / Flange	
螺栓材料 Bolt Material		碳钢 Carbon Steel	
检测探头 Testing Probe		316L不锈钢 316L Stainless Steel	
连杆支架 Connecting-Rod Support		304不锈钢 304 Stainless Steel	
散热器 Radiator		铝合金/不锈钢 Aluminum Alloy/Stainless Steel	
安装形式 Installation Method		夹持式/法兰式/插入式 Clip-on Type/Flange-Type/ Plug-in Type	
防护等级 Protection Grade		IP65/IP67/IP68	
电源 Power		24VDC(18~30V)/电池供电 24VDC(18~30V)Battery Supply	
信号输出 Signal Input		4-20mA、数字脉冲 4-20Ma, Digital Pulse	
通讯 Communication		HTRT通讯/Modbus协议 Communication/ Protocol	
电气接口 Electrical Interface		2×M20*1.5(其他需定制) 2×M20*1.5(Others require to be customized)	
防爆形式 Explosion-Proof Method		非防爆型/本安/隔爆 Non Explosion-Proof/ Intrinsic Safe/Explosion-Proof	
结构形式 Structure Style		一体型/分体型 Integrated/Split	
环境温度 Environment Temperature		带LCD：-10~60℃/无LCD：-20~60℃ LCD equipped：-10~60℃/无LCD：-20~60℃	
相对湿度 Relative Humidity		湿度5%-90% Humidity 5%-90%	

涡街流量计尺寸图
Dimensional Drawing of Vortex Street Flowmeter

夹持型涡街流量计外形尺寸

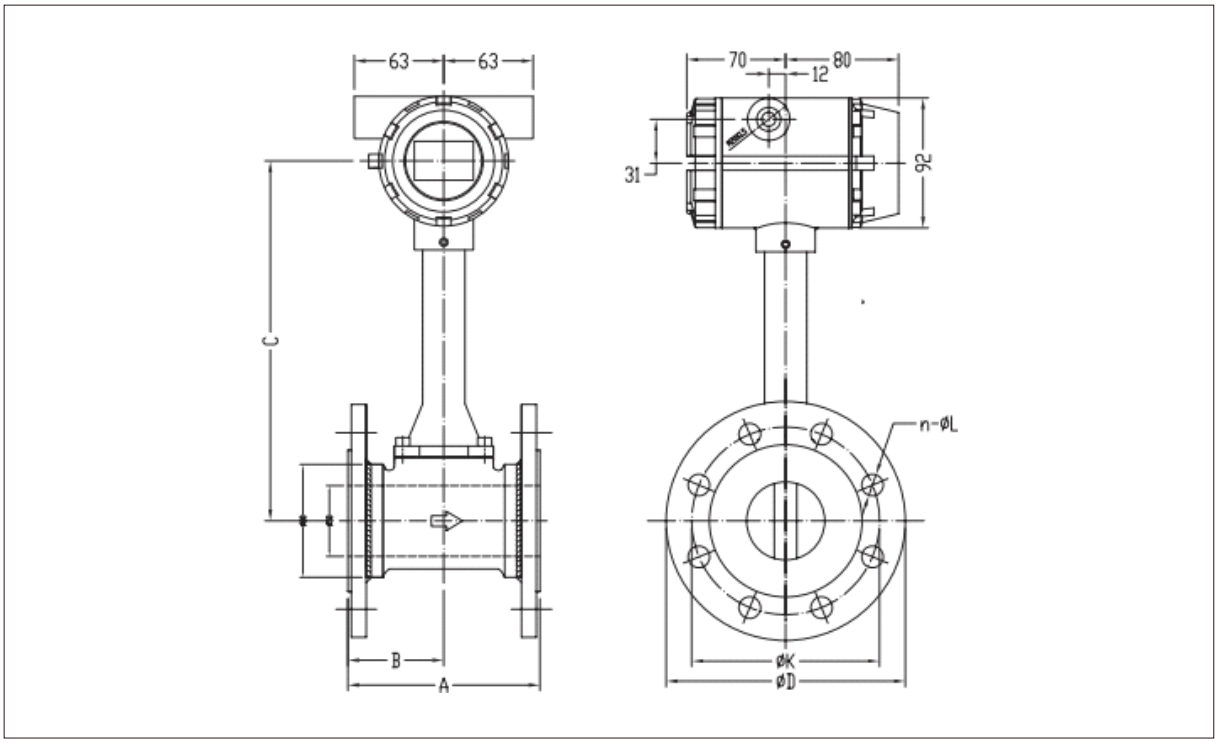
External Dimension of Clip-on Vortex Street Flowmeter



DN	A	B	C	ϕD
15	56	28	360	88
20	56	28	360	88
25	56	28	360	88
32	56	28	360	88
40	56	28	360	88
50	66	33	365	98
65	66	33	370	113
80	70	35	380	128
100	70	35	390	148
125	80	40	410	173
150	88	44	420	198
200	98	40	435	248
250	114	40	480	298
300	130	42	525	348

法兰型涡街流量计外形尺寸

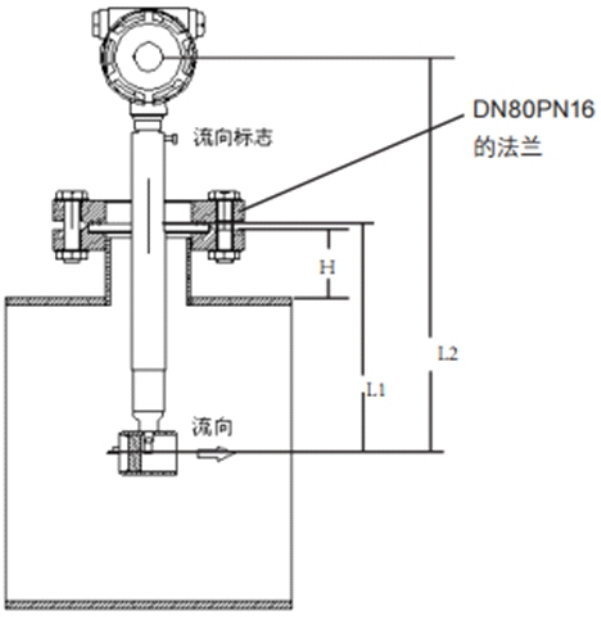
External Dimension of Flange-Type Vortex Street Flowmeter



DN	A	B	C	ΦD	ΦK	n-ΦL
15	200	100	360	95	65	4-14
20	200	100	360	105	75	4-14
25	200	100	360	115	85	4-14
32	200	100	360	140	100	4-18
40	200	100	360	150	110	4-18
50	200	100	365	165	125	8-18
65	200	100	370	185	145	8-18
80	200	100	380	200	160	8-18
100	250	125	390	220	180	8-18
125	250	125	410	250	210	8-18
150	300	100	420	285	240	8-22
200	300	125	435	340	295	12-22
250	380	150	480	405	355	12-26
300	450	175	525	460	410	12-26

插入式涡街流量计外形尺寸

External Dimension of Plug-in Vortex Street Flowmeter



DN	H	L1	L2
250	100	225	475
300	100	250	500
350	100	250	525
400	100	250	550
500	100	250	600
600	100	250	650
700	100	250	700
800	100	250	750
900	100	250	800
1000	100	250	850
1200	100	250	950
1400	100	250	1050
1500	100	250	1100
2000	100	250	1350

仪表口径的确定

仪表选型是仪表应用中非常重用的工作，仪表选型的正确与否将直接影响到仪表是否能够正常运行。因此用户和设计单位在选用本公司产品时，请仔细阅读本节资料，认真核对流体的工艺参数并随时可与我公司的销售或技术支持部门联系，以确保选型正确。

适用流量范围和仪表口径的确定

仪表口径的选择，根据流量范围来确定。不同口径涡街流量仪表的测量范围是不一样的。即使同一口径流量表，用于不同介质时，它的测量范围也是不一样的。实际可测的流量范围需要通过计算确定。

参比条件下空气及水的流量范围，见表（二），参比条件如下：

1、气体

常温常压空气，t=20℃，P=0.1MPa（绝压），ρ=1.205 kg/m3，υ=15×10-6 m2/s。

2、液体

常温水，t=20℃，ρ=998.2kg/m3，υ=1.006×10-6m2/s。

确定流量范围和仪表口径的基本步骤：

仪表口径的选择，根据流量范围来确定。不同口径涡街流量仪表的测量范围是不一样的。即使同一口径流量表，用于不同介质时，它的测量范围也是不一样的。实际可测的流量范围需要通过计算确定。

1、明确以下工作参数

（1）被测介质的名称、组份；

（2）工作状态的最小、常用、最大流量；

（3）介质的最低、常用、最高压力和温度；

（4）工作状态下介质的粘度。

2、涡街流量仪表测量的是介质的工作状态体积流量，因此，应先根据工艺参数求出介质的工作状态体积流量，相关公式，如下：

（1）已知气体标准状态体积流量，可通过以下公式求出工况体积流量：

公式（3） $$QV=Q0\times\frac{0.131025+P}{0.131025+P}\times\frac{273.15+t}{293.15}$$

（2）已知气体标准状态密度ρ，可通过以下公式求出工况密度：

公式（4） $$\rho=\rho_0\times\frac{0.101325+P}{0.131025+P}\times\frac{273.15+t}{293.15}$$

（3）已知质量流量Qm换算为体积流量Qv公式中：

公式（5） $$Q_v=Q_m\times 103/\rho$$

Confirmation of Meter Caliber

Meter model selection is a highly important task in meter application, and correctness of meter model selection will directly influence that whether meter can normally operate. Thus, when choosing and using products of our company, users and design units must carefully read material in this section, attentively verify technological parameters of fluid, and get in touch with marketing or technical support department of our company at any time, so as to ensure correctness of model selection.

Applicable Flow Range & Confirmation of Meter Caliber

Meter caliber selection should be determined by flow range. Vortex street flowmeters of different calibers have different measuring ranges. And measuring range of flowmeters with same caliber will also change when being used for different medium. Actually measurable flow range shall be calculated and thus determined.

Flow range of air and water under reference conditions is shown in Table 2. And reference conditions are as follows:

1. Gas: air at normal temperature and pressure, t=20℃, P=0.1MPa (absolute pressure), ρ =1.205 kg/m^3, υ =15×10-6 m^2/s。

2. Liquid: water at normal temperature, t=20℃, ρ =998.2kg/m^3, υ=1.006×10-6m^2/s.

Basic Steps for Confirmation of Flow Range & Meter Caliber

Meter caliber selection should be determined by flow range. Vortex street flowmeters of different calibers have different measuring ranges. And measuring range of flowmeters with same caliber will also change when being used for different medium. Actually measurable flow range shall be calculated and thus determined.

1. Specify following working parameters.

(1)Name and components of measured medium.

(2)Minimum, common and maximum flow under working state.

(3)Lowest, common and highest pressure temperature of medium.

(4)Viscosity of medium under working state.

2. Vortex street flowmeter is used for measuring volumetric flow of medium under working state, so we should first calculate volumetric flow of medium under working state according to technological parameters. Relevant formulas are as follows:

(1) Volumetric flow of gas under standard state is given, and volumetric flow under working state can be calculated through following formula:

(2) Density ρ of gas under standard state is given, and density under working state can be calculated through following formula:

(3) Mass flow Qm can be converted to volumetric flow Qv and is given

公式中：
Qv:介质在工况状态下的体积流量(m3/h)
（Qv=3600f/K K:仪表系数）
Qo: 介质在标准状态下的体积流量(Nm3/h)
Qm: 质量流量 (t/h)
ρ:介质在工况状态下的密度(kg/m3)
ρo:介质在标准状态下的密度(kg/m3)， 质的标准状态密度，见表（三）
P: 工况状态表压(MPa)
t: 工况状态温度(℃)

In the formula:
Qv: Volumetric flow of medium under working state (m^3/h)
（Qv=3600f/K K: Meter Coefficient）
Qo:Volumetric flow of medium under standard state (Nm^3/h)
Qm:Mass flow (t/h)
ρ :Density of medium under working state (kg/m^3)
ρ_o:Density of medium under standard state (kg/m^3), density of common gas medium under standard state is shown in Table 3
P: Meter pressure under working state (Mpa)
t: Temperature under working state (℃)

3．仪表下限流量的确定。涡街流量仪表的上限适用流量一般可不计算，涡街流量仪表口径的选择主要是对流量下限的计算。下限流量的计算应该满足两个条件：最小雷诺数不应低于界限雷诺数（Re=2×104）；对于应力式涡街流量仪表在下限流量时产生的旋涡强度应大于传感器旋涡强度的允许值（旋涡强度与升力ρv2成比例关系）。这些条件可表示如下：

3. Confirmation of minimum meter flow. Applicable maximum flow of vortex street flowmeter usually cannot be calculated, and selection of vortex street flowmeter's meter mainly lies in calculation of minimum flow which shall satisfy two conditions: minimum Reynolds number shall not be lower than threshold Reynolds number(Re=2×104).Vortex intensity of stress-type vortex street flowmeter generating in minimum flow shall be more than allowable value of sensor's vortex intensity (vortex intensity is proportional to lift force ρ v2). These conditions can be shown as follows:

由密度决定的工况可测下限流量：
Measurable minimum flow under working state determined by density

公式(6) $Q\rho=Qo\times\sqrt{\rho o/\rho}$

公式中：
Qρ：满足旋涡强度要求的最小体积流量(m3/h)
ρ0：参比条件下介质的密度
Qυ：满足最小雷诺数要求的最小线性体积流量(m3/h)
ρ：被测介质工况密度（kg/m3）
Q0：参比条件下仪表的最小体积流量(m3/h)
υ：工作状态下介质的运动粘度(m2/s)
υo：参比条件下介质的运动粘度(m2/s)通过公式（6）、（7）计算出Qρ和Qv。比较Qρ和Qv，确定流量仪表可测下限流量和线性下限流量：
Qυ≥Qρ：可测流量范围为Qρ～Qmax ，线性流量范围为Qυ～Qmax
Qυ<Qρ：可测流量范围和线性流量范围为Qρ～Qmax
Qmax：涡街流量仪表的上限体积流量(m3/h)

由运动粘度决定的线性下限流量：
Linear minimum flow determined by kinematic viscosity

公式(7) $Qv=Qo\times v/vo$

In the formula:
Qρ: Satisfy minimum volumetric flow demanded by vortex intensity (m3/h)
ρ0: Density of medium under reference conditions
Qυ: Satisfy minimum linear volumetric flow demanded by minimum Reynolds number (m3/h)
ρ: Density of measured medium under working state (kg/m3)
Q0: Minimum volumetric flow of meter under reference conditions (m3/h)
υ: Kinematic viscosity of medium under working state (m2/s)
υo: Kinematic viscosity of medium under reference conditions (m2/s)
Calculate Qρ and Qv through formulas (6) and (7) .Compart Qρ with Qv, and define measurable minimum flow and linear minimum flow of flowmeter:
Qυ≥Qρ: measurable flow range is Qρ～Qmax, linear flow range is Qυ～Qmax
Qυ<Qρ: measurable flow range and linear flow range are Qρ～Qmax
Qmax: maximum volumetric flow of vortex street flowmeter (m3/h)

4．仪表上限流量以表（二）中的上限流量为准，气体的上限流速应该小于70m/s，液体的上线流速应该小于7m/s。

5．当用户测量的介质为蒸汽时，常采用的计量单位是质量流量，即：t/h或kg/h。由于蒸汽（过热蒸汽和饱和蒸汽）在不同温度和压力下的密度是不同的，因此蒸汽流量范围的确定可由公式（8）进行计算得出。

4.Maximum flow of meter shall be subject to maximum flow in Table 2. Maximum velocity of gas shall be lower than 70m/s, and maximum velocity of liquid shall be lower than 7m/s

5.When user's measured medium is vapor, common measuring unit is mass flow, namely: t/h or kg/h. Due to that vapor(superheated vapor and saturated vapor)density varies at different temperature and pressure, confirmation of vapor flow range shall be calculated through formula (8).

公式（8） $Q_{蒸汽}=1.5Q_{空气}\times\rho\times103\times\sqrt{\rho o/\rho}$

公式中：
ρ：蒸汽的密度（kg/m3）；
ρ0：1.205kg/m3；
Q蒸汽：蒸汽质量流量（t/h）；
6．计算压力损失，检测压力损失对工艺管线是否有影响，公式(单位：Pa)。

In the formula:
ρ:vapor density(kg/m3)
ρ0:1.205kg /m3
Q Vapor:mass flow of vapor（t/h)
6.Calculate pressure compensation, check that whether pressure compensation have impacts on technical pipelines, formula(Unit:Pa)

公式（9） $\Delta p=CdpV2/2$

公式中：
ρ：工况介质密度（kg/m3）；
V：平均流速（m/s）。
In the formula:
ρ:medium density under working state(kg/m3)
V: average velocity(m/s)

7．被测介质为液体时，为防止气化和气蚀，应使管道压力符合以下要求：

7.When measured medium is liquid, in order to prevent gasification and cavitation erosion,pipeline pressure shall comply with the following requirements:

公式（10） $p \geq 2.7\Delta p + 1.3p0$

公式中：
Δp: 压力损失（Pa）；
p0：工作温度下液体的饱和蒸汽压（Pa绝压）；
p0:流体的蒸汽压力 （Pa绝压）。

In the formula:
Δp: pressure compensation(Pa).
p0: saturated vapor pressure of liquid at working temperature(Pa absolute pressure).
p0: vapor pressure of fluid (Pa absolute pressure).

8、涡街流量计不适合测量高粘度液体。当计算出的可测流量下限不满足设计工艺要求时，应该考虑选用其它类型流量计。

9、通过计算如果有两种口径都可满足要求，为了提高测量效果、降低造价，应选用口径较小的表。应该注意的是，尽可能使常用量处在流量范围上限的1/2～2/3。

Δp:压力损失（Pa） Cd：压力损失系数

8.Vortex street flowmeter is not suitable for measuring high-viscosity liquid. When calculated measurable minimum flow cannot satisfy design technology requirements, other types of flowmeters shall be considered.

9.If there are two calibers satisfying requirements through calculation, in order to promote measuring effects and reduce construction cost, meters of smaller caliber shall be used. It is noticeable that common dosage shall be placed at 1/2～2/3 of maximum flow range.

Δp: pressure loss(Pa)Cd: pressure loss coefficient

表（二）
参比条件下涡街流量传感器工况流量范围

Table 2 Working-State Flow Range of Vortex Street Flow Sensor under Reference Conditions

公称通径DN(mm) Nominal Diameter DN	流量范围 (m^3/h) Flow Range（m^3/h）		
	液体 Liquid	气体 Gas	蒸汽 Vapor
15	0.4-4	4-30	3.2-18
20	0.7-7	6-40	5-32
25	1-10	11-70	9-60
32	1.5-15	17-150	15-130
40	2-25	24-240	20-200
50	3-45	37-370	32-320
65	5.5-75	65-650	55-540
80	8.5-100	95-950	81-810
100	16-180	150-1500	130-1300
125	25-270	245-2400	200-2000
150	35-350	360-3600	290-2900
200	60-600	600-6000	550-5000
250	90-900	900-9000	800-8000
300	135-1350	1350-13500	1150-11500
350	185-1850	1850-18500	1550-15500
400	240-2400	2400-24000	2100-21000
450	300-3000	3000-30000	2600-26000
500	380-3800	3800-38000	3300-33000
600	550-5500	5500-55000	5100-51000
700	750-7500	7500-75000	7000-70000
800	950-9500	9500-95000	9000-90000
900	1200-12000	12000-13700	11000-110000
1000	1400-1400	14000-140000	13500-135000
1200	2000-20000	20000-200000	19500-195000
1300	2200-22000	22000-220000	21000-210000
1400	2750-27500	27500-275000	2700-270000
1500	3150-31500	31500-315000	31000-310000

表(三)
常用气体介质的标准状态密度
（0℃，绝压P=0.1MPa)

Table 3
Standard-State Density of Common Gas Medium
(0℃，absolute pressure P=0.1MPa)

气体名称 Gas Name	密度(kg/m³) Density (kg/m3)	气体名称 Gas Name	密度(kg/m³) Density (kg/m3)
空气(干) Air (dry)	1.2928	乙炔 Acetylene	1.1717
氮气 Nitrogen	1.2506	乙烯 Ethylene	1.2604
氧气 Oxygen	1.4289	丙烯 Propylene	1.9140
氩气 Argon	1.7840	甲烷 Methane	0.7167
氖气 Neon	0.9000	乙烷 Ethane	1.3567
氨气 Ammonia	0.7710	丙烷 Propane	2.0050
氢气 Hydrogen	0.08988	丁烷 Butane	2.7030
一氧化碳 Carbon Monoxide	1.97704	天然气 Natural Gas	0.8280
二氧化碳 Carbon Dioxide	1.3401	煤制气 Coal Gas	0.8020

选型举例

例一：已知气体压力和温度及标况下的流量时某压缩空气，标况流量范围为QN=1200-12000Nm3/h,压力P=0.7MPa（表压），温度t=30℃。试确定流量计口径。

步骤一：计算压缩空气的工况体积流量

由公式（3）：

工况使用下限体积流量为：

$$Qvmin=QN\times0.101325\times(273.15+t)/293.15/(P+0.1)=1200\times0.101325\times(273.15+30)/293.15/(0.7+0.1)=157(m^3/h)$$

工况使用流量上限为: Qvmax=1570(m³/h)

步骤二：根据使用工况流量范围157-1570m³/h，查表（二），满足下限流量条件的流量计为DN80 、DN100和DN125，考虑到上限流量1270m³/h及使用效果和经济成本，初选DN100, DN100流量计的工况流量范围是100-1700m³/h，接近使用流量范围，初选DN100流量计，但应具体核算DN100流量计在该工况条件下的可测下限流量。核算DN100流量计在该工况条件下的可测下限流量：

由公式（4）及公式（6）：

$$Q\rho=Qo\times\sqrt{\rho o/\rho}=100\times\frac{0.101325\times(273.15+30)}{(0.131025+0.7)\times293.15}=37.46(m^3/h)\quad 公式(6)$$

即，流量计在该工况条件下的可测下限流量是37.46m3/h，远小于要求的工况下限流量157m³/h，确定选用DN100流量计。

例二：已知蒸汽压力和温度及工况流量时测量介质为过热蒸汽，蒸汽温度为320℃，压力为1.5MPa(绝压),流量范围为3t/h～25t/h, 试 确定流量计口径。

步骤一：计算蒸汽的等效空气参比条件下的体积流量范围，经查附表（二）,该状态下蒸汽的密度为:5.665kg/m³，由公式（8）：

Model Selection Cases

Example 1：gas pressure, temperature and flow under standard state are given, flow range under standard state of certain compressed air is QN=1200-12000Nm3/h, pressure P=0.7MPa(meter pressure), temperature t=30℃。Try to confirm flowmeter caliber.

Step 1：Calculate volumetric flow of compressed air under working state

From formula (3):

Use of minimum volumetric flow under working state is:

Use of maximum flow under working state is: Qv max=1570(m3/h)

Step 2：According to use of flow range 157-1570m3/h under working state, check Table 2 and find flowmeters satisfying minimum flow condition include DN80, DN100 and DN125. In consideration of maximum flow 1270m3/h and its using effects and economic costs, DN100 is initially selected. Flow range of flowmeter DN100 under working state is 100-1700m3/h, which is close to using flow range. Initial selection of DN100 shall further require a detailed calculation of its measurable minimum flow under such a working state. Calculate measurable minimum flow of flowmeter DN100 under such a working state.

From formula (4) and formula (6):

Namely, measurable minimum flow of flowmeter under such a working state is 37.46m3/h, which is much lower than demanded minimum flow under working state of 157m3/h. Flowmeter DN100 is finally selected.

Example 2: It's known that measured medium is superheated vapor when vapor pressure and temperature and flow under working state are known. Vapor temperature is 320℃, pressure is 1.5MPa（absolute pressure）, and flow range is 3t/h～25t/h. Try to confirm caliber of flowmeter.

Step 1：Calculate volumetric flow range under reference conditions of vapor's equivalent air. Upon checking Table 2, vapor density under such a state is 5.665kg/m3. From formula (8):

$$Q_{空气}=Q_{蒸汽}\times 10^3/1.5\sqrt{\rho o/\rho} \qquad Q_{空气max}=6379(m^3/h)$$

$$Q_{空气min}=3000/1.5\times\sqrt{5.665\times 1.205}=765(m^3/h)$$

步骤二：根据等效参比流量范围765-6379m³/h，查表（二），比较适合该流量范围为DN200口径。

Step 2: According to equivalent reference flow range of 765-6379m3/h, upon checking Table 2, DN200 caliber is relatively appropriate for such a flow range.

安装

安装注意事项

在测量液体时，务必使流量计传感器始终完全充满介质，无夹带气体。

在仪表上下游提供足够的直管段并确保非弯曲的对称外形。尽可能在仪表下游安装阀门。

竖直安装通常是优先选择的，向上流动的液体能确保仪表总是满管，且介质中的固态成分能够均匀分布。

如有可能产生气泡，应提供气体分离器。

在易于振动的长管路中进行安装时，应在流量计的上下游安装消除器。

对于蒸汽应用，仪表安装应避免安装在U形弯底部，避免因吸收冷凝而在开车时导致的水锤现象，水锤的强度导致传感机构过分受力，致使传感器永久损坏。

特别注意

传感器安装点的上游较近处若装有阀门，不断地开关阀门，对传感器的使用寿命影响极大，非常容易对传感器造成永久性损坏。

传感器尽量避免在架空的非常长的管道上安装，这样时间一长后，由于传感器的下垂非常容易造成传感器与法兰间的密封泄露，若不得已要安装时，必须在传感器的上下游2D处分别设置管道紧固装置。

入口与出口直管段部分

为了确保完整的功能，入口处的流型应不受干扰。

上游直管段部分的长度应为流量计口径（D）的大约15倍，下游直管段部分的长度应为流量计口径（D）的大约5倍。以确保仪表在变化的过程条件下符合其精度指标（如图3）。

注：如您的应用不能提供足够的上游直管段，我们将在最短10D上游直管段的条件下，向您提供修正方案以使仪表满足您的精度要求。

Installation

Installation Precautions

When measuring liquid, make sure that flowmeter sensor is always fully filled with medium without any gas.

Provide enough straight pipeline segments in upstream and downstream of meter, and ensure non- bending symmetrical contour. It might be better to install valve in downstream of meter.

Vertical installation is usually the preferred choice. Liquid of upward mobility can ensure full content of meter, and solid-state components in the medium can be uniformly distributed.

If bubbles are produced, gas separator shall be provided.

In implementing installation in easy-to-vibrate long pipelines, eliminator shall be installed in upstream and downstream of flowmeter.

For vapor application, meter installation shall avoid to be installed in the bottom of U-shaped bend, so as to prevent water hammer phenomenon in driving caused by condensation absorption: intensity of water hammer may lead to overload of sensor agencies and permanent damage of sensor.

Special Notices

If there is valves close to upstream of sensor mount point, constant opening and closing of valve may pose great impacts on sensor's service life and become very easy to cause permanent damage to sensor.

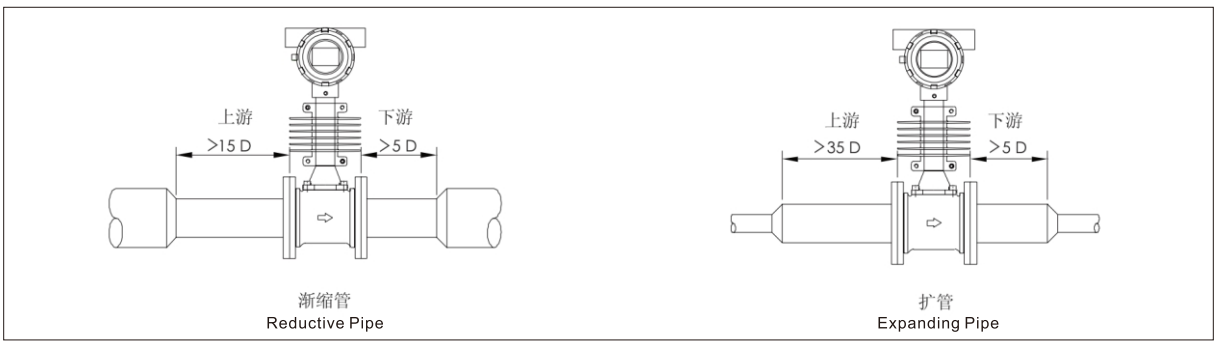
Sensor shall avoid to be installed in very long overhead pipelines: after a long time, senor's droop may be very easy to cause seal leakage between sensor and flange. If its installation becomes a must, pipeline clamping devices shall be respectively installed in upstream and downstream of sensor's 2D point.

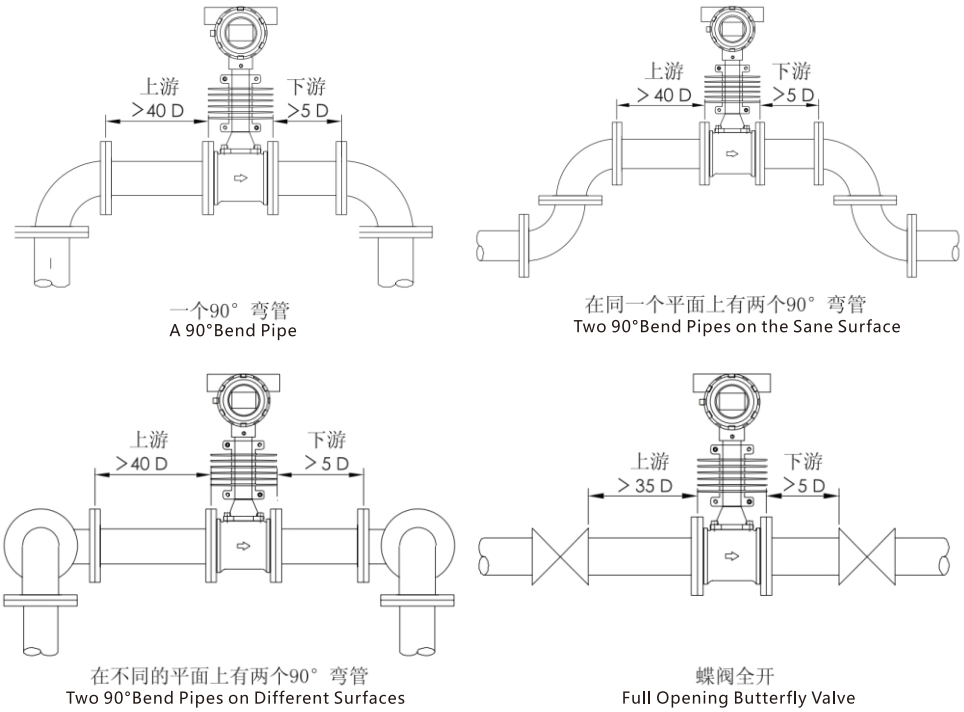
Inlet and outlet straight pipe section

In order to ensure complete functions, flow pattern at entry shall not be interfered.

Length of upstream straight pipeline segment is around 15 times of flowmeter caliber (D), and length of downstream straight pipeline segment is around 5 times of flowmeter caliber (D), so as to ensure that meter can conform to its precision index during the changing process (shown in Figure 3).

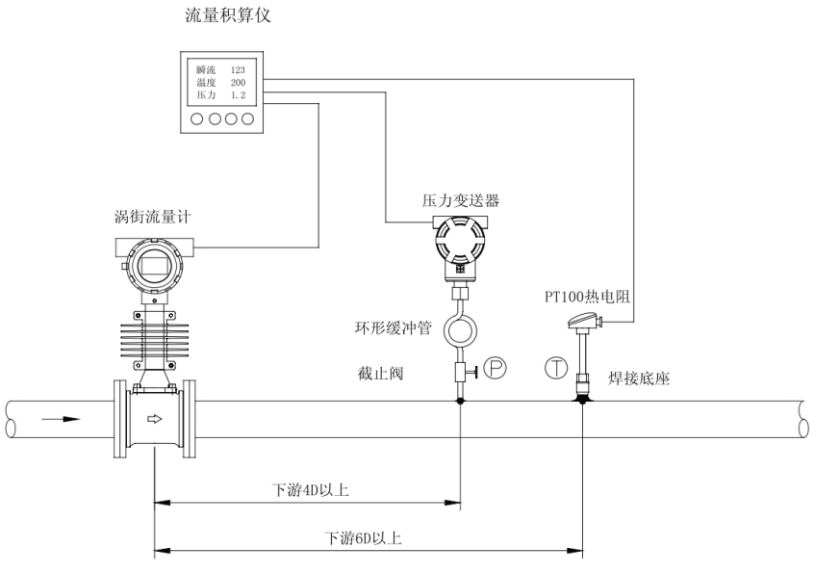
Note: If your application cannot provide enough upstream straight pipeline segments, we will provide you with revision plan in condition of shortest 10D upstream straight pipeline segment, so as to enable meter to satisfy your precision requirements.





理想安装所要求的直管段（图3）
Straight Pipeline Segments Required by Ideal Installation (Figure 3)

当需要将实测压力和温度信号用于补偿质量流量或标准流量时，请在涡街流量计下游安装压力和温度变送器(图4)。
When measured pressure and temperature signals are used for compensating for mass flow or standard flow, please install pressure and temperature transmitter in the downstream of vortex street flowmeter (Figure 4).



由涡街流量计、流量积算仪、压力变送器以及温度测量装置组成的蒸汽测量系统(图4)。
Vapor Measurement System Consisting of Vortex Street Flowmeter, Flow Accumulator, Pressure Transmitter and Temperature Measuring Equipment （Figure 4）

测量饱和蒸汽时，可选用温度补偿或压力补偿，流量积算仪查表功能进行运算，流量积算仪根据涡街流量计提供的体积流量输出信号值、温度补偿测量值或压力补偿测量值（饱和蒸汽测量中，补偿信号只需选择温度补偿或压力补偿一种即可），流量积算仪自动查对其内部预置的饱和蒸汽密度补偿表格进行高精度的补偿运算，最终显示、输出饱和蒸汽质量累积值。

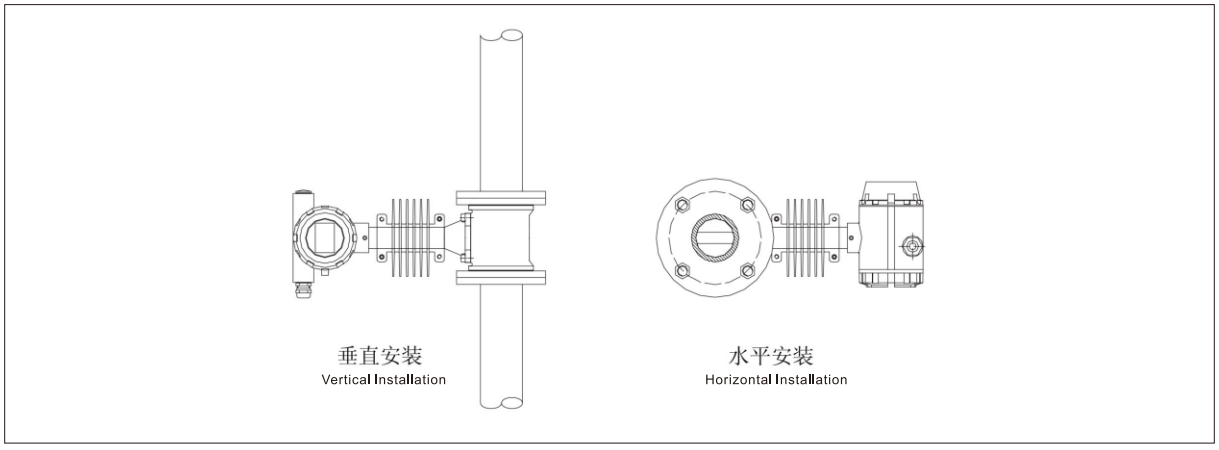
测量过热蒸汽时，流量积算仪查表功能进行运算。流量积算仪根据涡街流量计提供的体积流量输出信号值、温度补偿测量值和压力补偿测量值（过热蒸汽测量中，温度补偿和压力补偿同时选择，两者缺一不可），流量积算仪自动查对其内部预置的过热蒸汽密度补偿表格进行高精度的补偿运算，最终显示、输出过热蒸汽质量累积值。

In measuring saturated vapor, temperature compensation or pressure compensation shall be applied, and table checking-up function of flow accumulator shall be used for calculation. During flow accumulator's measuring process according to volumetric flow input signal value and temperature compensation or pressure compensation measurement value provided by vortex street flowmeter (in measuring saturated vapor, either temperature compensation or pressure compensation can be simply selected as a compensating signal), flow accumulator will automatically check up its interior compensation table of saturated vapor density, then implement high-precision compensatory calculation, and finally display and output mass accumulated value of saturated vapor.

In measuring superheated vapor, table checking-up function of flow accumulator can implement calculation. During flow accumulator's measuring process according to volumetric flow input signal value, temperature compensation measurement value and pressure compensation measurement value provided by vortex street flowmeter (in measuring superheated vapor, temperature compensation and pressure compensation must be concurrently selected, and both are indispensable), flow accumulator will automatically check up its interior compensation table of superheated vapor density, then implement high-precision compensatory calculation, and finally display and output mass accumulated value of superheated vapor.

高温度介质的安装（图5）

High-Temperature Medium Installation (Figure 5)

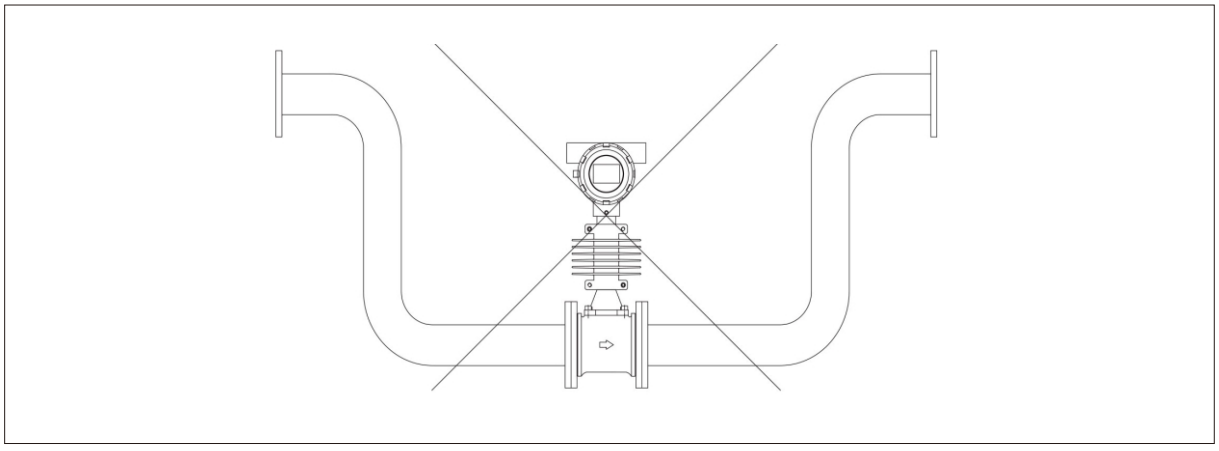


高介质温度时仪表的安装应使得电子部件在管道的一侧或管道的下方，在管道周围要求隔热使得温度保持在85℃以下。

Under high medium temperature, meter installation shall place electronic components on either side or bottom of pipeline, and pipeline surrounding environment requires hear-proof capability to keep temperature below 85℃.

蒸汽测量时应该避免以下安装方式

The following installation methods should be avoided when measuring steam



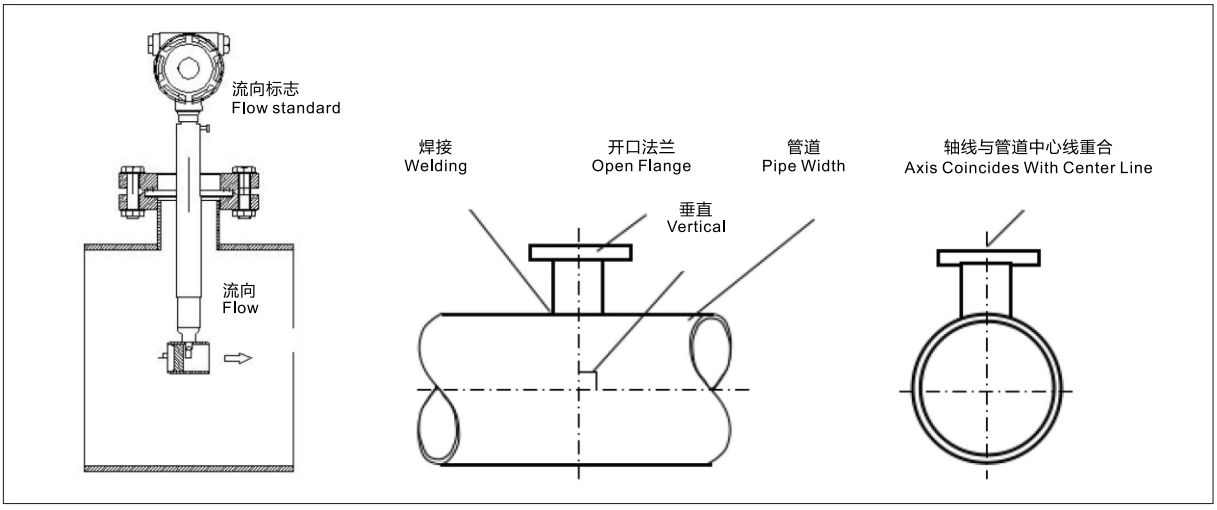
插入式安装方式

插入式涡街流量计安装在管道上,需要在安装处开一个φ87圆孔。在圆孔处焊上随流量计提供的连接法兰，要求开口法兰短管必须垂直管道并且短管的轴线与管道中心线重合。如图五所示。

连接法兰的短管上有加工的凸台，凸台和管道外壁对齐然后进行焊接。

Plug-in Installation Method

Plug-in vortex street flowmeter shall be installed on pipeline, and a φ87 round hole should be opened in installation position.
To weld connecting flange provided by flowmeter at the round hole requires that open flange short pipe must be perpendicular to the pipe, and axis of short pipe shall be coincident with its center line, as in shown in Figure 5.
There is a processed convex stage on the short pipe connecting with flange, convex stage shall be aligned and then welded with outer wall of pipeline.



电气接线

连线准备：检查安装，确保流体的流动方向与表体上标明的方向一致，检查电源电压不超过36V。

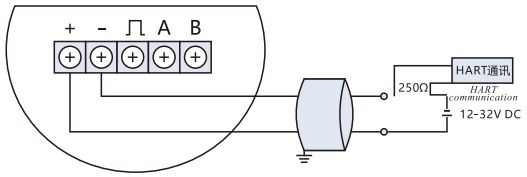
连线步骤：打开后端盖，将电缆从电缆密封套引入，根据接线端子标示连接电源线及信号线，将电缆密封线紧固，电缆入表前提供U型弯用于滴水，盖好后端盖。

注意事项：所有密封处应紧固相连，电缆的外径应与电缆密封套成密封配合，保证仪表的密封性能。

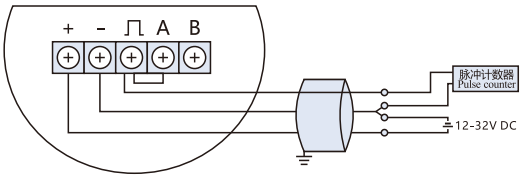
Electrical Wiring

Wiring Preparation: check installation so as to ensure that flow direction of fluid shall conform to that labelled in meter surface, and check that power voltage shall be under 36V.
Wiring Steps: Open rear end lid, draw into cable from cable seal sleeve, connect power cord and signal cord according to labels on wiring terminal, fasten cable sealing strand, provide U-shaped bend for water dripping before cable connects to meter, and lastly cover the rear end lid.
Cautions: All sealed positions shall be firmly connected. Outer diameter of cable shall be closely sealed with cable seal sleeve, so as to guarantee sealing performance of meter.

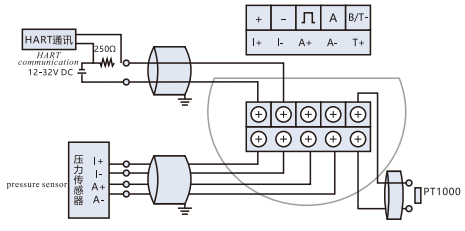
使用 4~20mA 输出 + HART
Using 4~20mA to output + HART



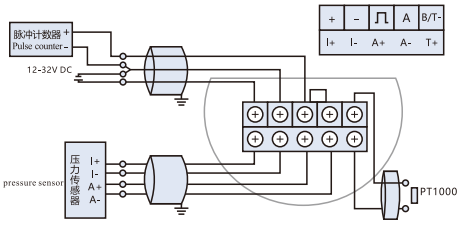
使用脉冲输出
Using the pulse output



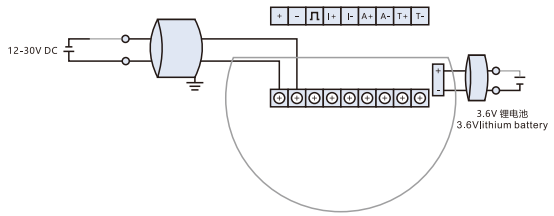
使用 4~20mA 输出+HART+压力传感器+温度传感器
Using 4~20mA output+HART+pressure sensor+temperature sensor



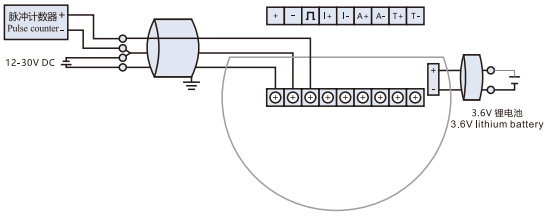
使用脉冲输出+压力传感器+温度传感器
Using pulse output+pressure sensor+temperature sensor



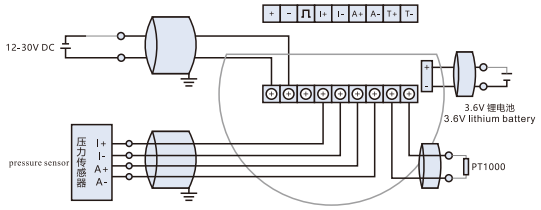
电池和24V双供电
Battery and 24V dual power supply



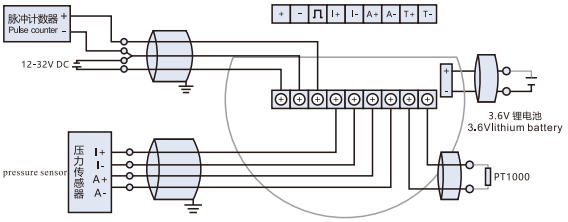
电池和24V双供电+脉冲输出
Battery and 24V dual supply + pulse output



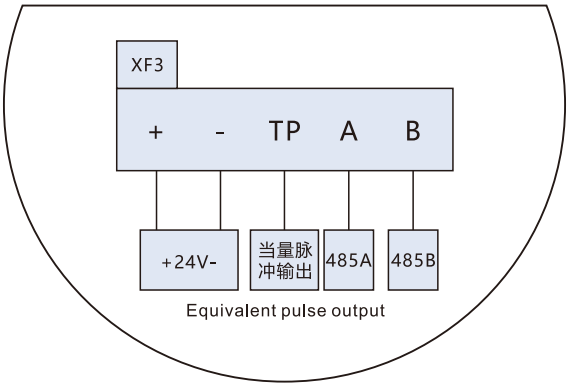
电池和24V双供电+脉冲输出
Battery and 24V dual supply+pulse output



电池和24V双供电+使用脉冲输出+压力传感器+温度传感器
Battery and 24V dual supply+pulse output
+pressure sensor+temperature sensor



485输出接口
485 output interface



涡街流量计TK2100订购信息
Ordering Information of Vortex Street Flowmeter TK2100

TK2100系列涡街流量计DN15-DN500
精度 ≤1.0%，气体/蒸汽精度≤1.5%。

Vortex Street Flowmeter TK2100 DN15-DN500
Liquid Precision≤1.0% Gas/Vapor Precision≤1.5%

型号 Model	TK2100													

安装方式 Installation method	
夹持型 Holding type	W
法兰型 Flange type	F

介质 Medium	
液体 Liquid	1
气体 Gas	2
饱和蒸汽 / 过热蒸汽 Saturated Vapor/Superheated Vapor	3

接液材料 Fluid Contact Material 壳体/探头 Shell/ Probe	
304不锈钢/316L不锈钢 304 Stainless Steel/316L Stainless Steel	A
316L不锈钢/316L不锈钢 316L Stainless Steel/316L Stainless Steel	B

口径	
DN15	15
DN20	20
DN25	25
DN32	32
DN40	40
DN50	50
DN65	65
DN80	80
DN100	1H
DN125	1Q
DN150	1F
DN200	2H
DN250	2F
DN300	3H
DN350	3F
DN400	4H
DN450	4F
DN500	5H

型号 Model	TK2100														

法兰材料（DIN）Flange Material（DIN）		螺栓（碳钢）Bolt（Carbon Steel）	
碳钢 Carbon Steel	1.6Mpa	有 Yes	A
	2.5Mpa	有 Yes	B
	4.0Mpa	有 Yes	C
304不锈钢 304 Stainless Steel	1.6Mpa	有 Yes	D
	2.5Mpa	有 Yes	E
	4.0Mpa	有 Yes	F
316L不锈钢 316L Stainless Steel	1.6Mpa	有 Yes	E
	2.5Mpa	有 Yes	G
	4.0Mpa	有 Yes	I
其他 Other			Z

传感器过程温度范围 Process Temperature Range of Sensor		
	标准-40~250℃ 304 Stainless Steel	N
	扩展-40~350℃ 304 Stainless Steel	E

转换器形式 Converter form		
	一体 Integrated type	T
	分体 Split type	R

输出模式 Output mode		
	4-20mA	01
	4-20mA +HART 通讯 4-20mA+HART communication	02
	脉冲+Modbus 协议 Pulse+Modbus protocol	03
	4-20mA+脉冲 4-20mA+Pulse	04
	现场显示无输出 No on-site input	05

流量补偿功能 Flow Compensation Function		
	无补偿 No Compensation	B0
	温度补偿 Temperature Compensation	B1
	压力补偿 Pressure Compensation	B2
	温度压力补偿 Temperature and Pressure Compensation	B3

供电电源 Power supply		
	24VDC	K
	电池供电	Y

防护等级 Protection level		
	Ip65	0
	Ip67	1
	Ip68	2

防爆等级 Explosion proof grade		
	无 No	0
	本安安全认证 Intrinsic Safety Certification	I3
	隔爆认证 Explosion-Proof Certification	EX

其他 Others	Z

数字显示表头 Digital Displaying Meter Head	M5

电缆长度 Cable Length		
	5米 Digital Displaying Meter Head	R5
	客户指定（最长20米） Customer Specified（maximum of 20 meters）	RX

插入式涡街流量计TK2200订购信息
Ordering Information of Plug-in Vortex Vortex Street Flowmeter TK2200

TK2200系列涡街流量计DN300-DN2200
精度 ≤2.0%，气体/蒸汽精度≤2.5%。

Vortex Street Flowmeter TK2200 DN300-DN2200
Liquid Precision≤2.0% Gas/Vapor Precision≤2.5%

型号 Model	TK2200													

安装方式 Installation method

法兰型 Flange type	W
夹持型 Holding type	F

介质 Medium

液体 Liquid	1
气体 Gas	2
饱和蒸汽 / 过热蒸汽 Saturated Vapor/Superheated Vapor	3

接液材料 Fluid Contact Material 壳体/探头 Shell/ Probe

304不锈钢/316L不锈钢 304 Stainless Steel/316L Stainless Steel	A
316L不锈钢/316L不锈钢 316L Stainless Steel/316L Stainless Steel	B

口径

DN200	2H
DN250	2F
DN300	3H
DN350	3F
DN400	4H
DN450	4F
DN500	5H
DN600	6H
DN700	7H
DN800	8H
DN1000	1T
DN1200	2M
DN1400	4M
DN1600	6M
DN1800	8M
DN2000	0M
DN2200	2P

型号 Model		TK2200														
法兰材料（DIN）Flange Material（DIN）		**螺栓（碳钢）Bolt（Carbon Steel）**														
碳钢 Carbon Steel	1.6Mpa	有 Yes	A													
	2.5Mpa	有 Yes	B													
	4.0Mpa	有 Yes	C													
304不锈钢 304 Stainless Steel	1.6Mpa	有 Yes	D													
	2.5Mpa	有 Yes	E													
	4.0Mpa	有 Yes	F													
316L不锈钢 316L Stainless Steel	1.6Mpa	有 Yes	E													
	2.5Mpa	有 Yes	G													
	4.0Mpa	有 Yes	I													
其他 Other			Z													
传感器过程温度范围 Process Temperature Range of Sensor		标准-40~250℃ 304 Stainless Steel	N													
		扩展-40~350℃ 304 Stainless Steel	E													
转换器形式 Converter form		一体 Integrated type	T													
		分体 Split type	R													
输出模式 Output mode		4-20mA		01												
		4-20mA ＋ HART 通讯 4-20mA ＋ HART communication		02												
		脉冲＋ Modbus 协议 Pulse ＋ Modbus protocol		03												
		4-20mA ＋ 脉冲 4-20mA ＋ Pulse		04												
		现场显示无输出 No on-site input		05												
流量补偿功能 Flow Compensation Function		无补偿 No Compensation			B0											
		温度补偿 Temperature Compensation			B1											
		压力补偿 Pressure Compensation			B2											
		温度压力补偿 Temperature and Pressure Compensation			B3											
供电电源 Power supply		220VAC				G										
		24VDC				K										
防护等级 Protection level		Ip65					0									
		Ip67					1									
		Ip68					2									
防爆等级 Explosion proof grade		无 No						0								
		本安安全认证 Intrinsic Safety Certification						I3								
		隔爆认证 Explosion-Proof Certification						EX								
其他 Others								Z								
数字显示表头 Digital Displaying Meter Head									M5							
电缆长度 Cable Length		3米 Digital Displaying Meter Head								R3						
		客户指定 Customer Specified（maximum of 20 meters）								RX						

注：

1、测量介质选项为2、3时，可选流量补偿功能选项B1、B2、B3；

2、转换器形式选项为R时，可选其它选项中电缆长度R3、R5、R8、RX。

Note:

1, the measurement of media options for 2, 3, optional flow compensation options B1, B2, B3

2,the converter form option is R, optional other options in the cable length R3, R5, R8, RX

过热蒸汽密度表（kg/m³）

Superheated Vapor Density Table（kg/m³）

压力（绝压）Mpa	温度(℃) Temperature(℃)							
	150	170	190	210	230	250	270	290
0.10	0.5164	0.4925	0.4707	0.4507	0.4323	0.4156	0.400l	0.3857
0.15	0.778l	0.7412	0.7079	0.6777	0.6500	0.6246	0.6010	0.5795
0.20	1.0423	0.9918	0.9466	0.9056	0.8684	0.8342	0.8027	0.7736
0.25	1.3089	1.2444	1.1869	1.1349	1.0849	1.0445	1.0048	0.9682
0.30	1.5783	1.4990	1.4287	1.3653	1.3079	1.2540	1.2077	1.1634
0.40	2.1237	2.014l	1.9166	1.8297	1.7513	1.6527	1.6152	1.5554
0.50	2.6658	2.5380	2.4121	2.2997	2.1992	2.1081	2.0255	1.9495
0.80	4.3966	4.1676	3.9372	3.7400	3.5665	3.4110	3.2718	3.1453
1.10	6.1313	5.8332	5.5342	5.2356	4.9719	4.7459	4.5445	4.3612
1.40	7.8785	7.5163	7.1540	8.4130	7.9352	6.1147	5.8437	5.6006
1.70	9.8464	9.3688	9.2473	9.2473	6.4288	7.5219	7.1713	6.8607
2.00	11.6295	11.0985	10.5676	10.0366	7.9352	8.9744	8.5350	8.1447
2.50	15.1890	14.4516	13.7150	12.9776	9.5054	11.5036	10.8794	10.3500
3.00	18.4168	17.5709	16.7243	15.8776	12.2406	14.1842	13.3377	12.6359
3.50	22.7008	21.5713	20.4427	19.313l	15.0367	17.0530	15.9243	15.0163
4.00	27.164	25.7470	24.3303	22.9129	18.2266	20.0778	18.6603	17.4997
4.50	30.3852	28.9163	27.4475	25.9784	21.4954	23.0407	21.5717	20.1028
5.00	35.4243	33.6293	31.8342	30.0384	24.5096	26.4483	24.6532	22.8580
6.00	43.8954	41.7475	39.5988	37.4508	28.2433	33.154l	31.0062	28.8574
4.00	56.7201	53.6991	50.6780	47.6561	35.3020	41.6133	38.5922	35.5704
8.00	65.4713	62.1800	58.8883	55.5968	44.6352	49.0145	45.723l	42.4316
9.00	84.5457	79.8261	75.1061	70.3863	52.306l	60.9465	51.5077	51.5077
10.00	108.6250	102.0289	95.4346	88.8412	65.6665	75.6543	65.7699	62.4676
12.5	158.3486	148.7516	139.1578	129.5629	82.2486	110.3842	95.7769	91.1964
15.00	206.4175	194.4276	182.4477	170.4577	158.4766	146.4967	127.6820	122.5268
17.5	250.3934	236.6910	222.8603	209.1592	195.4568	181.626l	163.4280	154.2312
20.00	327.8165	309.9521	391.2953	273.4409	255.5786	236.9217	219.0574	201.2031
21.50	384.6647	363.2975	341.9027	320.5455	299.1880	277.7931	256.4260	235.0688

压力 (绝压) Mpa	温度(℃) Temperature(℃)							
	310	330	350	370	390	410	430	450
0.10	0.3724	0.4925	0.3484	0.3375	0.3272	0.3176	0.3086	0.4357
0.15	0.5594	0.5404	0.5230	0.5066	0.4912	0.4767	0.463l	0.4502
0.20	0.7465	0.7214	0.6980	0.6759	0.6553	0.6360	0.6178	0.6005
0.25	0.9343	0.9027	0.8732	0.8456	0.8198	0.7955	0.7726	0.7507
0.30	1.1224	1.0844	1.0488	1.0156	0.9845	0.9552	0.9277	0.8989
0.40	1.5000	1.4701	1.4010	1.3563	1.3144	1.2753	1.2377	1.2035
0.50	1.8802	1.8147	1.7545	1.6983	1.6456	1.596l	1.5498	1.5060
0.80	3.0283	2.9215	2.8227	2.7305	2.6440	2.5635	2.4884	2.417l
1.10	4.1943	4.0419	3.9030	3.7722	3.6512	3.5384	3.4335	3.3345
1.40	5.3794	5.1777	4.9945	4.8260	4.6673	4.5220	4.3857	4.2575
1.70	6.5815	6.3309	6.0998	5.7779	5.6936	5.5120	5.3441	5.1863
2.00	7.806l	7.4955	7.2186	6.9619	6.7260	6.5117	6.3090	6.1203
2.50	9.8888	9.4806	9.1139	8.7802	8.4750	8.1938	7.9332	7.6898
3.00	11.9979	11.5143	11.0494	10.6308	10.2493	9.9000	9.5775	9.2816
3.50	14.2565	13.8501	13.0286	12.6162	12.0528	11.6308	11.2425	10.8842
4.00	16.5527	15.749	15.0539	14.4392	13.8862	13.3077	12.9991	12.5087
4.50	18.9333	17.9608	17.1279	16.4018	15.7527	14.7579	14.6679	14.1507
5.00	21.4221	20.2508	19.2627	18.4108	17.6565	16.9827	16.3719	15.8139
6.00	26.7091	25.0502	23.7006	22.5570	21.5629	20.6900	19.9062	19.198l
4.00	32.5488	30.2231	28.4037	29.9035	25.6330	24.5224	23.4021	22.6635
8.00	39.1399	35.8485	33.4179	31.4825	29.8698	28.4969	27.2913	26.0170
9.00	46.7877	42.0680	38.8083	36.3217	34.3044	32.2947	31.1593	29.8733
10.00	59.6648	49.2802	44.7560	41.5274	39.0006	36.9344	35.1684	33.6447
12.5	81.6034	72.0105	62.4178	56.1496	51.8212	48.5015	45.8023	43.5431
15.00	110.5369	98.553l	86.5688	74.5840	66.8341	61.5530	57.5137	54.2497
17.5	140.3919	126.6895	116.3142	100.8176	85.3228	76.6185	70.5711	65.9331
20.00	182.5462	174.3185	166.0907	137.7965	108.5430	94.4945	85.3276	78.7759
21.50	213.6739	192.3164	171.8651	150.0074	128.1614	106.6360	95.1366	87.0939

饱和蒸汽密度表（kg/m³）

单位-ρ=Kg/m3；压力（绝压）-ρ=Mpa；温度-T=℃

Saturated Vapor Density Table（kg/m³）

Units:-ρ=Kg/m3；Pressure（Absolute Pressure）-ρ=Mpa；Temperature-T=℃

温度 Temperature	0		1		2	
(t, ℃)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)
100	0.1013	0.5977	0.1050	0.7515	0.1339	0.7758
110	0.1433	0.8265	0.1481	0.1025	0.1863	1.057
120	0.1985	1.122	0.2049	1.375	0.2543	1.415
130	0.2701	1.497	0.2783	1.815	0.3414	1.864
140	0.3464	1.967	0.3718	2.361	0.4510	2.422
150	0.4760	2.5487	0.4888	3.032	0.5872	3.106
160	0.6181	3.260	0.6339	3.847	0.7544	3.937
170	0.7920	4.123	0.8114	4.829	0.9573	4.937
180	1.0197	5.160	1.0259	6.003	1.2010	6.312
190	1.2551	6.397	1.2829	7.398	1.4909	7.551
200	1.5548	7.864	1.5876	9.045	1.8326	9.225
210	1.9077	9.593	1.9462	10.98	2.2323	11.19
220	2.3198	11.62	2.3645	13.24	2.6963	13.49
230	2.7975	14.00	2.8491	15.89	3.2316	16.18
240	3.3477	16.76	3.4070	18.97	3.8448	19.30

饱和蒸汽密度表三

Saturated Vapor Density Table 3

温度 Temperature	6		7		8		9	
(t, ℃)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)
100	0.1250	0.7277	0.1294	0.7515	0.1339	0.7758	0.1385	0.8008
110	0.1746	0.9948	0.1804	0.1025	0.1863	1.057	0.1923	1.089
120	0.2393	1.336	0.2467	1.375	0.2543	1.415	0.2621	1.455
130	0.3222	1.766	0.3317	1.815	0.3414	1.864	0.3513	1.915
140	0.4271	2.301	0.4389	2.361	0.4510	2.422	0.4633	2.484
150	0.5577	2.958	0.5723	3.032	0.5872	3.106	0.6025	3.182
160	0.7183	3.758	0.7362	3.847	0.7544	3.937	0.7730	4.029
170	0.9137	4.723	0.9353	4.829	0.9573	4.937	0.9797	5.048
180	1.1487	5.877	1.1746	6.003	1.2010	6.312	1.2278	6.264
190	1.4289	7.248	1.4596	7.398	1.4909	7.551	1.5225	7.706
200	1.7597	8.868	1.7959	9.045	1.8326	9.225	1.8699	9.408
210	2.1474	10.77	2.1896	10.98	2.2323	11.19	2.2757	11.41
220	2.5981	13.00	2.6469	13.24	2.6963	13.49	2.7466	13.74
230	3.1185	15.61	3.1746	15.89	3.2316	16.18	3.2892	16.47
240	3.7155	18.64	3.7797	18.97	3.8448	19.30	3.9107	19.64

饱和蒸汽密度表三

Saturated Vapor Density Table 3

温度 Temperature	6		7		8		9	
(t, ℃)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)	压力(P) Pressure(P)	密度(ρ) Density(ρ)
100	0.1250	0.7277	0.1294	0.7515	0.1339	0.7758	0.1385	0.8008
110	0.1746	0.9948	0.1804	0.1025	0.1863	1.057	0.1923	1.089
120	0.2393	1.336	0.2467	1.375	0.2543	1.415	0.2621	1.455
130	0.3222	1.766	0.3317	1.815	0.3414	1.864	0.3513	1.915
140	0.4271	2.301	0.4389	2.361	0.4510	2.422	0.4633	2.484
150	0.5577	2.958	0.5723	3.032	0.5872	3.106	0.6025	3.182
160	0.7183	3.758	0.7362	3.847	0.7544	3.937	0.7730	4.029
170	0.9137	4.723	0.9353	4.829	0.9573	4.937	0.9797	5.048
180	1.1487	5.877	1.1746	6.003	1.2010	6.312	1.2278	6.264
190	1.4289	7.248	1.4596	7.398	1.4909	7.551	1.5225	7.706
200	1.7597	8.868	1.7959	9.045	1.8326	9.225	1.8699	9.408
210	2.1474	10.77	2.1896	10.98	2.2323	11.19	2.2757	11.41
220	2.5981	13.00	2.6469	13.24	2.6963	13.49	2.7466	13.74
230	3.1185	15.61	3.1746	15.89	3.2316	16.18	3.2892	16.47
240	3.7155	18.64	3.7797	18.97	3.8448	19.30	3.9107	19.64

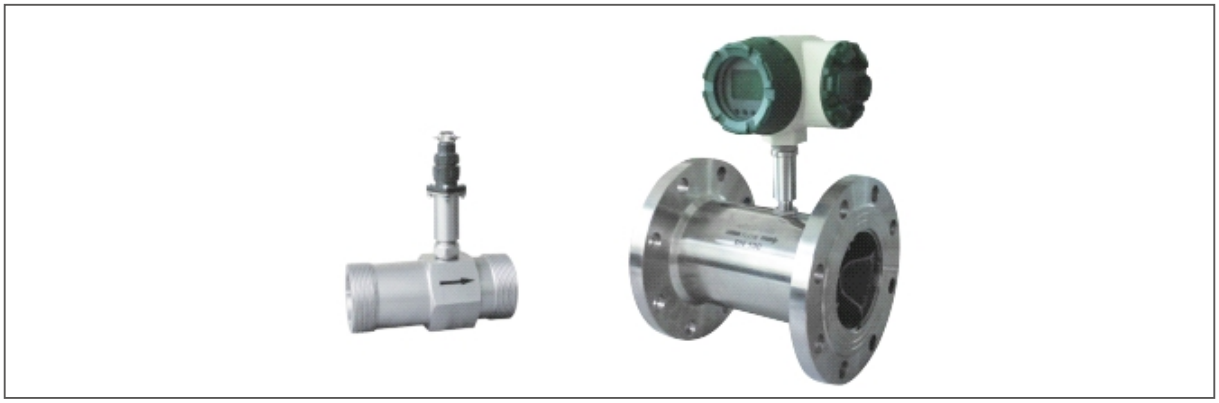
组态数据表
Data table of configuration

客户名称: **Client name**		**日 期:** **Date**	
联系人: **Client name**		**部 门:** **Department**	
电 话: **TEL**		**传 真:** **FAX**	
产品型号: **Product model**		**位号:** **No.**	
测量介质: **Measuring medium**	☐ 液体 Liquid	☐ 气体 Gas	☐ 蒸汽 Vapor
流量范围: **Flow range**	☐ 最大 Maximum	☐ 正常 Normal	☐ 最小 Minimum
工作压力: **Working pressure**	☐ 最大 Maximum	☐ 正常 Normal	☐ 最小 Minimum
介质温度: **Working pressure**	☐ 最大 Maximum	☐ 正常 Normal	☐ 最小 Minimum
工艺管径: **Working pressure**			
法兰材质: **Flange material**	☐ 碳钢 Carbon steel	☐ 304不锈钢 304Stainless steel	☐ 316L不锈钢 316LStainless steel
转换器: **Converter**	☐ 一体 One type	☐ 分体（电缆长度） Split type(cable length)	
供电电源: **Power supply**	☐ 220V AC	☐ 电池供电 Battery Supply	
补偿功能: **Compensation Function**	☐ 无 None	☐ 温度补偿 Temperature Compensation	☐ 压力补偿 Pressure Compensation ☐ 温度压力补偿 Temperature & Pressure Compensation
防爆要求: **Explosion proof requirement**	☐ Yes	☐ No	
电气输出: **Electrical output**	☐ 4-20mA 电流+脉冲 Current + pulse		
	☐ HART	☐ MODBUS	☐ PROFIBUS

涡轮流量计

TK5100系列标准型液体涡轮流量计

TK5100 Series Standard Liquid Turbine Flowmeter



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5×10-6m²/s的介质，对于粘度大于5×10-6m²/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，克服摩擦力矩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：

式中：

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。

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 5×10-6m²/s under operation temperature. When the liquid viscosity is larger than 5×10-6m²/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 conductibility, 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:

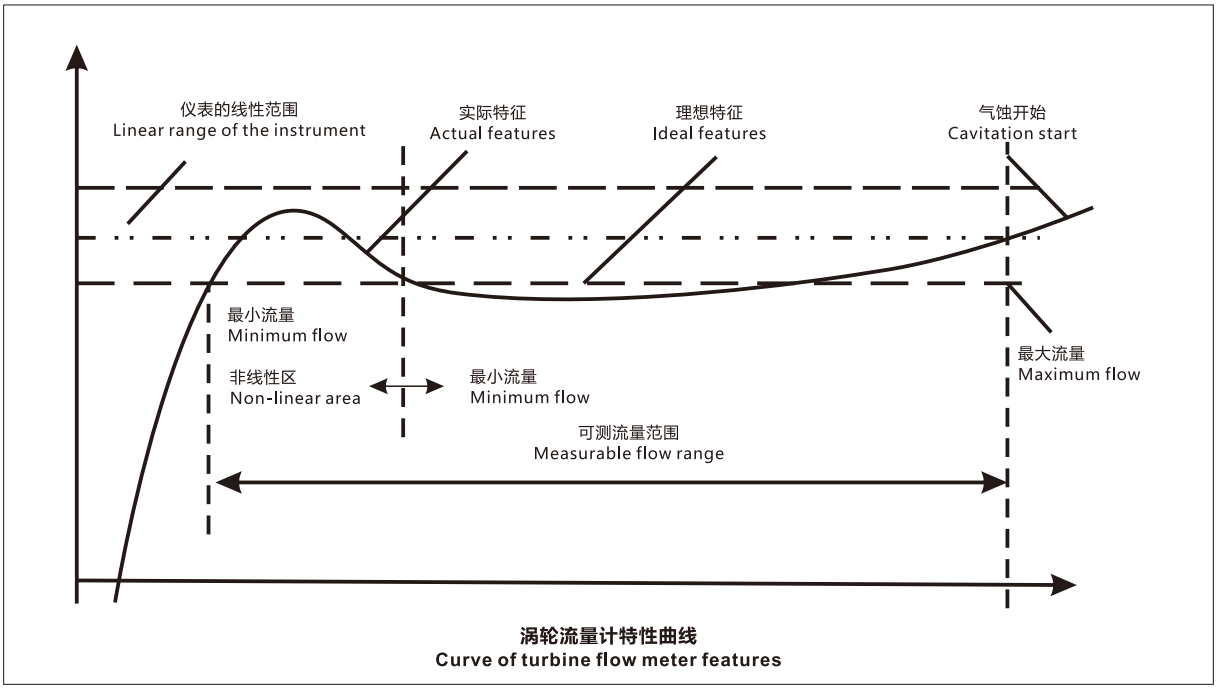
f——pulse frequency [Hz];

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.



涡轮流量计特性曲线
Curve of turbine flow meter features

TK5100系列涡轮流量计的显著特点

1、高精确度，一般可达±1%R、±0.5%R，高精度型可达±0.2%R；（R指读数误差）

2、重复性好，短期重复性可达0.05%～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；

3、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；

4、原始脉冲频率范围（10Hz～1.5KHz），信号分辨力强；

5、量程比宽，10:1~20:1；

6、结构紧凑轻巧，安装维护方便，流通能力大；

7、适用高压测量，传感器表体上不必开孔，易制成高压型仪表；

8、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 m

Distinctive features of TK5100 series turbine flow meter
High accuracy, usually up to ±1%R, ±0.5%R, high accuracy up to ±0.2%R; (R refers to the reading error)
Good repeatability, short term repeatability can be up to 0.05%～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 (10Hz～1.5KHz), strong signal resolution;
Wide range ratio, 10:1~20:1;
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） 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 temperaturetype, 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.

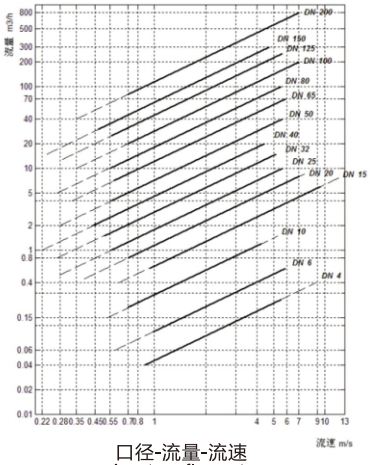
涡轮流量计的应用领域

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



口径-流量-流速
Aperture-flow-rate

测量范围及耐压等级

Measuring range and pressure level

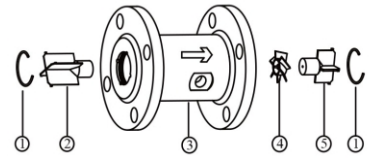
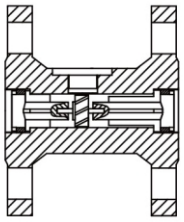
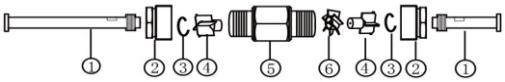
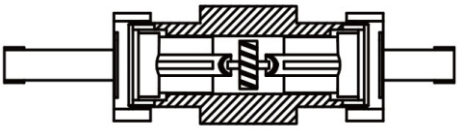
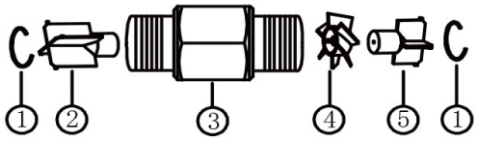
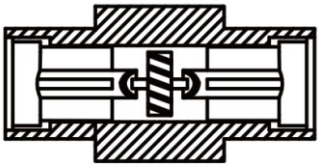
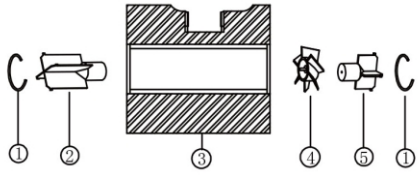
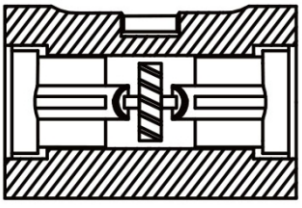
仪表口径（mm） Instrument Caliber (mm)	正常流量范围（m^3/h） Normal Flow range (m^3/h)	扩展流量范围（$m^3/h0$） Expanded Flow range ($m^3/h0$)	常规耐受压力（MPa） Conventional Pressure Tolerance	特制耐压等级（MPa）（法兰连接方式） Special Pressure Class (MPa) (flange connection type)
DN 4	0.04~0.25	0.04~0.4	6.3	12、16、25
DN 6	0.1~0.6	0.06~0.6	6.3	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

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	 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	
螺纹连接型 Thread Connection Type	 1 鸟屡峨篓歇 2 钟距 3 匪獯 4 定愿杞 5 蕙伶 6 屋輛 1. Front and rear straight pipe section. 2. Lock nut 3. Pressure ring 4.Guide ring 5. Meter body 6. Impeller	 DN4-DN10
	 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	 DN15-DN50
夹装连接型 Clamping Connection Type	 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	

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)	
法兰连接型 Flange Connection Type	表体 Meter body	304不锈钢 304 stainless steel	法兰 Flange	202不锈钢 202 stainless steel	法兰 Flange	304/316
	导向架 Guide frame				表体/导向架 Meter body/guide frame	316不锈钢 316 stainless steel
	卡簧 Jump ring		叶轮 Impeller	2Cr13不锈钢 2Cr13 stainless steel	叶轮 Impeller	双相钢 Duplex steel
螺纹连接型 Thread Connection Type	直管段 Straight pipe section	304不锈钢 304 stainless steel	表体 Meter body	304不锈钢 304 stainless steel	表体 Meter body	316不锈钢 316 stainless steel
	导向架 Guide frame		锁母 Lock nut		导向架 Guide frame	316不锈钢 316 stainless steel
	压环/卡簧 Compression ring/jump ring		叶轮 Impeller	2Cr13不锈钢 2Cr13 stainless steel	叶轮 Impeller	双相钢 Duplex steel
夹装连接型 Clamping Connection Type	导向架 Guide frame	304不锈钢 304 stainless steel	表体 Meter body	304不锈钢 304 stainless steel	表体 Meter body	304不锈钢 304 stainless steel
	卡簧 Jump ring		叶轮 Impeller	2Cr13不锈钢 2Cr13 stainless steel	叶轮 Impeller	双相钢 Duplex steel

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

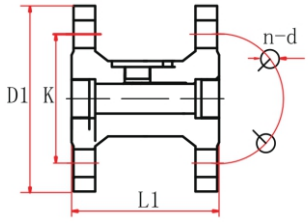


图4.1 DN15～DN200法兰连接型涡轮流量传感器尺寸图
Fig. 4.1 Dimensions of DN15～DN200 flange connection turbine flow sensor

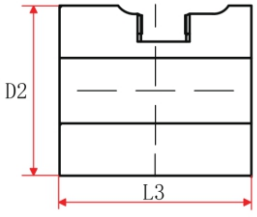


图4.2 DN4～DN200螺纹连接型涡轮流量传感器(含直管段部分)尺寸图
Fig.4.2 Dimensions of DN4～DN200 thread connection turbine flow sensor (including the straight pipe section)

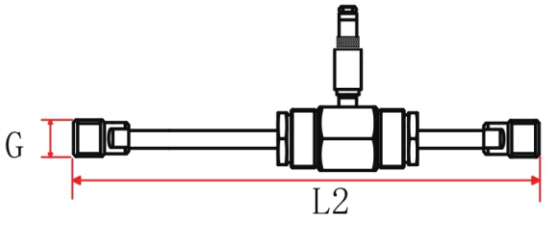


图4.3 DN4～DN10螺纹连接型涡轮流量传感器（不含直管段部分）尺寸图
Fig.4.3 Dimensions of DN15～DN50 thread connection turbine flow sensor (excluding the straight pipe section)

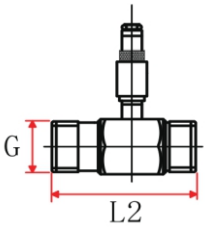


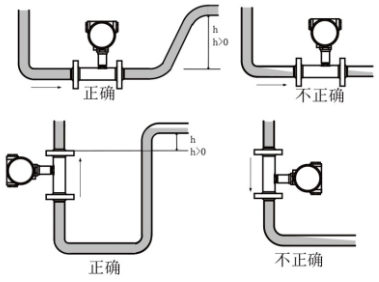
图4.4 DN15～DN50夹装连接型涡轮流量传感器（不含直管段部分）尺寸图
Fig.4.4 Dimensions of DN15～DN50 thread connection turbine flow sensor (excluding the straight pipe section)

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

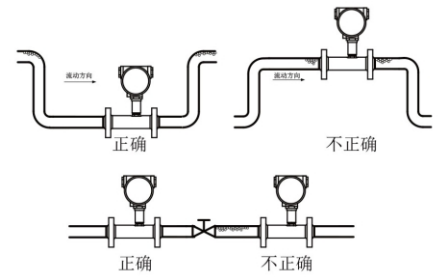
管道必须完全充满液体。重要的是，在任何时候，保持管道内完全充满液体，否则流量显示会受到影响，可能会导致测量误差。

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.



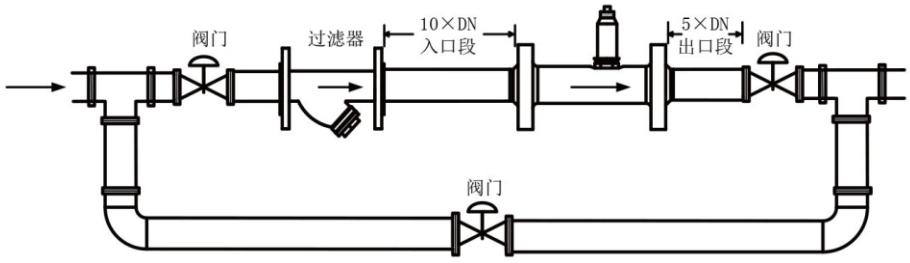
避免气泡。如果有气泡进入测量管，流量显示可能会受到影响，可能会导致测量误差。

Avoid bubble. When bubble enters the measurement pipe, the flow display 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 it is easy to maintain, no pipeline vibration, no strong electromagnetic interference andthermal radiation influence.

► 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.

► 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 thepipeline 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消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 sedimentimpurity; 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.

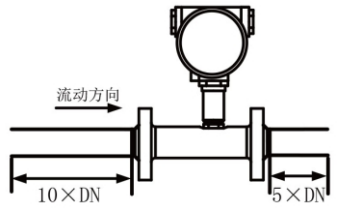
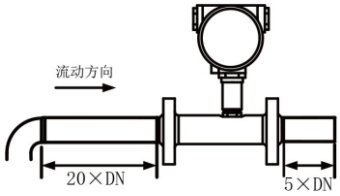
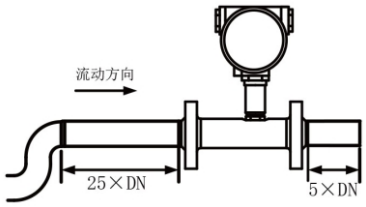
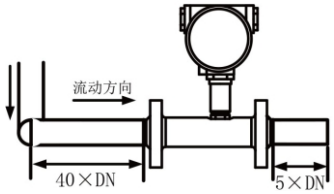
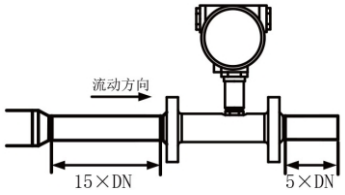
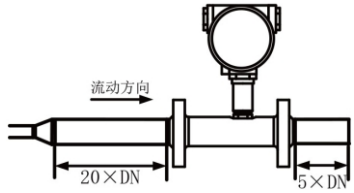
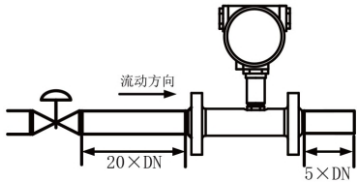
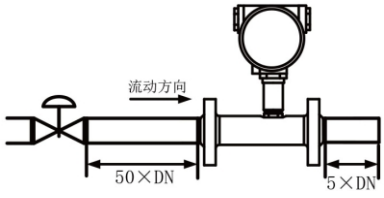
► 传感器安装在室外时，应有避免直射阳光和防止雨淋的措施。
When the sensor is installed outside, measures to avoid direct sunlight and rain shall be taken.

所需上下游直管段长度

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。

Required length of upstream and downstream straight pipe section

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.

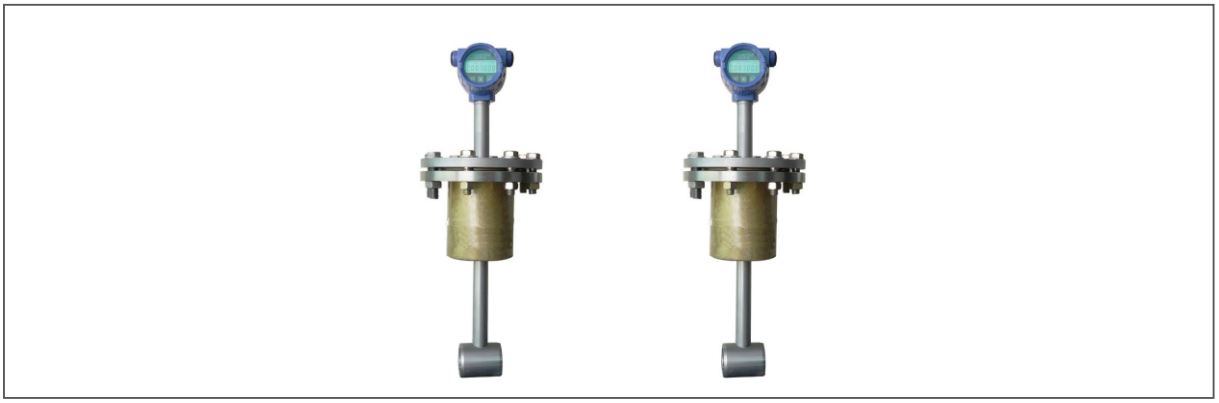
入口段阻流件类型 Baffle Type at the Entry Section	安装条件 Installation Conditions		入口段阻流件类型 Baffle Type at the Entry Section	安装条件 Installation Conditions	
	入口段 Entry section	出口段 Exit section		入口段 Entry section	出口段 Exit section
一般情况 General situation			90°弯头 90° elbows		
同一平面上两个90°弯头 Two 90° elbows onthe same plane			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



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。

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.

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。

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 ad 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 ad 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			
	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℃~+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

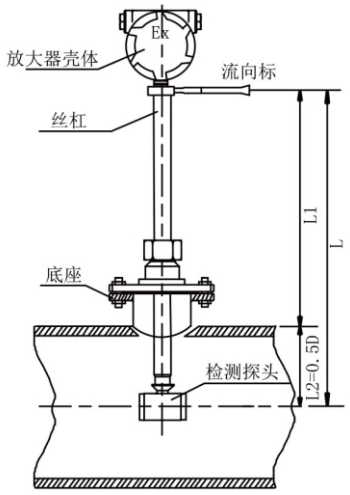
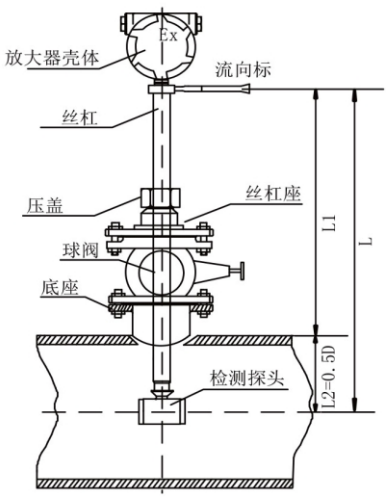
口径 (mm) Caliber (mm)	被测管道实测内径 (mm) Actual inner diameter of the measured pipeline (mm)	插入杆长度 (mm) Length of plug-in rod (mm)	对应于公称通径DN的流量范围m3/h Flow range corresponding to the inside nominal diameter m3/h	
			精确度为显示值的±5%R的流量范围 The flow range with the accuracy of ±5%R of the display value	精确度为显示值的±5%R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m3/h Flow range corresponding to the inside nominal diameter m3/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
► 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. ► 用Φ109×4.5mm底座的下管段与管道上开好口的缺焊接，基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. ► 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. ► 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.	►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. ►用Φ109×4.5mm底座的下管段与管道上开好口的缺焊接，基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. ►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 ►把球阀打开，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. ►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. ►紧固压盖，防止介质由丝杠与丝杠坐处泄露。 Fasten the gland to prevent the medium from leaking from screw rod and screw rod base.

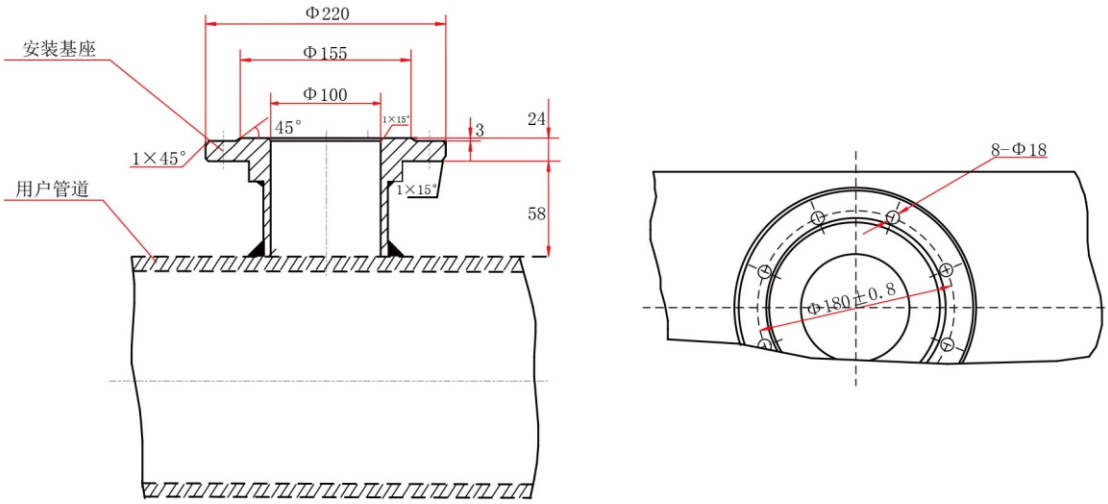
注：

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 features

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.

适用场合

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

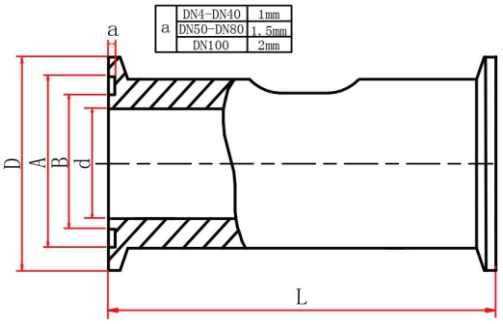
Pharmaceutical industry: filling and metering of transfusion products like saline, glucose water, etc.
Food and drinking industry: filling and metering of liquid food like vegetable juice, fruit juice, wind, beer, product oil, etc.

技术参数 Technical parameters

结构形式与安装方法 Structure type and installation method

测量介质 Measured 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 Instrument Caliber and Connection Type	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 Meter 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℃~+70℃	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.

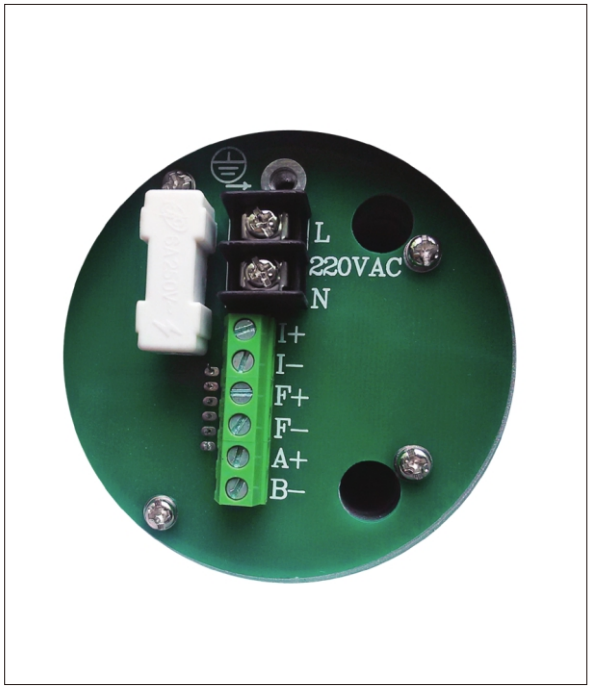
TK5000系列涡轮流量转换器接线及操作

Wiring and operation of TK5000 series turbine flow converter

电气接线

Electric wiring

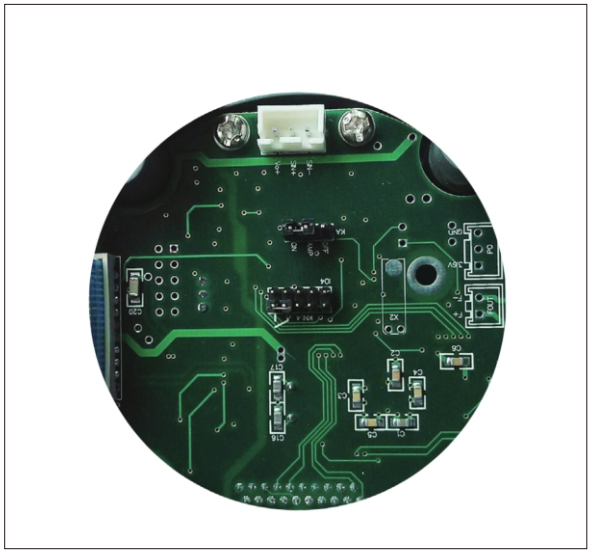
一体型端子接线图
Integrated terminal wiring diagram



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 During Hart communication, 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 -	/

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



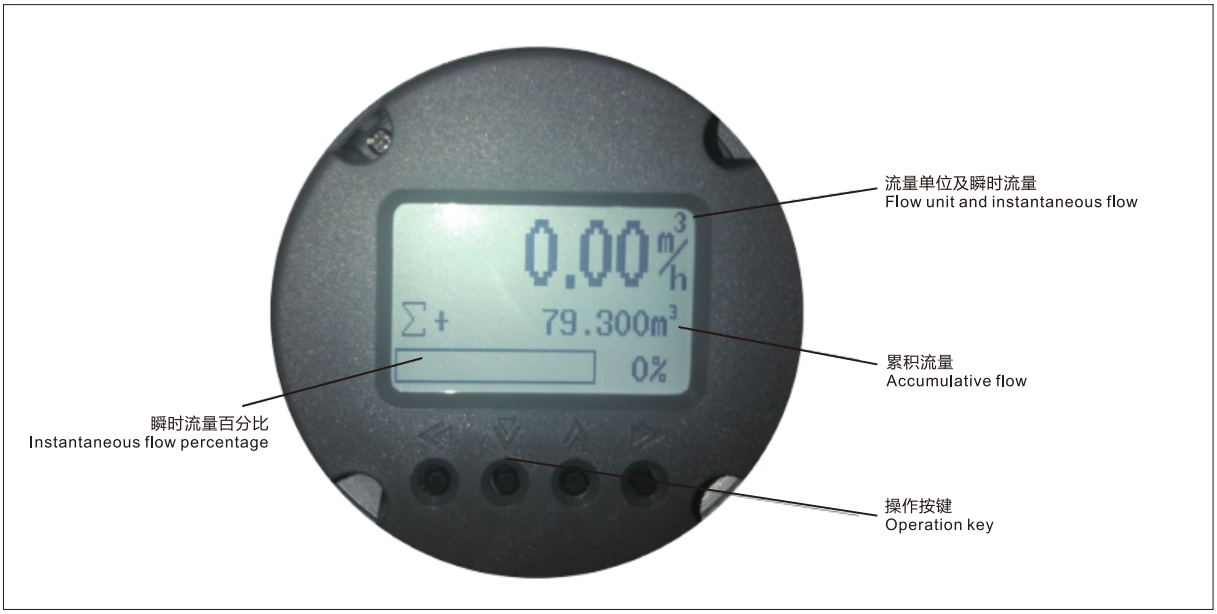
序号 No.	标示 Marking	功能 Function	备注 Note
v	V0+	电压输出 Voltage output	3V电压输出（接霍尔传感器） 3V voltage output (connected with Hall sensor)
-	SIN-	信号线- Signal line -	传感器信号- Sensor signal -
+	SIN+	信号线+ Signal line +	传感器信号+ Sensor signal +

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 m3/s m3/m m3/h gal/s gal/m gal/h 默认值 = m3/h Default value = m3/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 m3 gal Options: L m3 gal 默认值 = m3 Default value = m3
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 定义累计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m3/h Scale flow m3/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=(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=(flow*D*D)/353.67765 比如当前口径=100mm，则: For example, when the current caliber =100mm, then max = 424.115 m3/h min = 5.655 m3/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(m3/h)/刻度流量(m3/h))×频率上限(Hz) Output frequency (Hz) = (current flow (m3/h)/scale flow (m3/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(m3/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 (m3/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 累计管理 Accumulative management	2.7.2 预置正向累计m3 Pre-set the positive accumulative m3	浮点数： 9999999999 – 0 Floating point number: 9999999999 – 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 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.

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	F
夹持型 Holding type	W
螺纹型 Thread type	M

本体材质 Material of the body	
304不锈钢 304 Stainless steel	T
316L不锈钢 316L Stainless steel	S
PP	P
PTFE	F
其他 Other	Z

口径 Caliber	
DN4	06
DN6	06
DN10	10
DN15	15
DN20	20
DN25	25
DN32	32
DN40	40
DN50	50
DN65	65
DN80	80
DN100	1H
DN125	1Q
DN150	1F
DN200	2H

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

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℃ Standard temperature <80℃	0
标准温度<120℃ Standard temperature <120℃	1
标准温度<150℃ Standard temperature <150℃	2

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 十 HART通讯 Communication	02
4-20mA 十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

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 Other	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

型号 Model	TK5200															

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

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 十 HART通讯 Communication	02
4-20mA 十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

TK5300系列插入式涡轮流量计选型编码说明
Selection and coding of TK5300 series plug-in turbine flow meters

型号 Model	TK5300													

安装方式 Installation method

法兰型 Flange type	F
卡箍型 Clamp type	C

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 Other	Z

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

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

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

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；

► 存放地点具有防雨防水设施；

► 存放地点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℃～+60℃	相对湿度 Relative humidity	5%～90%

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 .

安装场所注意事项

1、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。

2、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。

3、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。

4、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

序号	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 thesignal 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，可以判读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 electromagentic 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 notaccurate 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 notcorrect 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.