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使用说明书 Operation Instruction



ELECTROMAGNETIC FLOW METER

电磁流量计



- 标准型
 - 高精度型
 - 卫生型
 - 插入式
 - 电池供电型
 - 电磁热量计
 -
- Standard type
 - High-precision type
 - Healthy type
 - Plug-in
 - Battery-powered
 - Electromagnetic calorimeter
 -



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关于本公司

About The Company

安徽天康（集团）股份有限公司是一家国内知名的仪器仪表设计与制造公司，产品用于流程工业、过程控制，实现温度测量，压力测量、流量测量、物位测量及控制系统集成。

作为工业现场参数测量仪表的主要生产商之一，我们为国内外的客户提供应用方面的专业知识、服务及支持。

公司产品的质量、精度及性能来自于四十年的经验，以及对于最新技术的创新设计与持久开发。

Anhui Tiankang (Group) Co., Ltd is a company famous for the manufacturing and design of instruments and meters at home, its products are applied to process industry, process control, achievement of temperature measurement, stress measurement, flow measurement, level measurement and control system integration.

As one of the main producers of industrial field parameter measuring instruments, we provide professional knowledge, service and support in the application for domestic and oversea clients.

The quality, accuracy and performance of the Company's products come from forty years of experience, as well as innovative design and sustainable development of the latest technology.

健康与安全

Health And Safety

为了确保我们的产品安全，不影响健康，务必注意以下各点：

1、使用前必须仔细阅读说明书的有关章节。

2、必须遵守容器或包装上的警示标签。

3、必须由经过培训的人员按照所列信息进行安装、操作、维护及保养。一切由于违反本说明书而造成的后果均由用户承担。

4、务必遵守一般的注意事项，以避免在高压或高温下运行时发生事故。

In order to ensure our product safety and do not affect the health, make sure to pay attention to the following points:

1. Make sure to read relevant chapters of the Instructions carefully before use.

2. Make sure to follow caution Label on the container or packaging.

3. Make sure that installation, operation, maintenance and preservation are performed by trained staff according to information listed. All consequences caused by violation of the Instructions shall be assumed by users.

4. Make sure to follow general notes to avoid accident in operation under high pressure and temperature.

有关手册所述设备使用的安全事项或任何相关的危害数据表（适用时）可以从公司取得，地址如封底所示，同时提供保养及备件信息。

Safety precautions relevant to equipment use described in the Manual and any relevant hazard data table (where applicable) can be obtained from the Company. Address is shown as the back cover and information on maintenance and spare parts is provided at the same time.

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一、安全指南 Safety Guide

1.1 用途

- 本测量设备仅用于测量密闭管道中导电介质的流量。测量去离子水时，介质的最小电导率为 $20 \mu\text{S}/\text{cm}$ 。对于大部分液体，测量时需要的最小电导率可为 $5 \mu\text{S}/\text{cm}$ 。
- 除本文指定用途外，其它任何用途均会对人员和整个测量系统的安全造成威胁，禁止使用。
- 制造商对由于不恰当使用或用于非指定用途而引起的损坏不承担责任。

1.1 Use

The measuring device is only used to measure the flow of conductive medium in a closed pipe. When measuring deionized water, the minimum conductivity of the medium is $20 \mu\text{S}/\text{cm}$. For most liquids, the minimum conductivity required for measurement can be $5 \mu\text{S}/\text{cm}$.

In addition to the intended use of this article, any other use will be a threat to the safety of personnel and the entire measurement system, prohibit the use.

The manufacturer is not liable for damage caused by improper use or for non-intended use.

1.2 安装、调试和操作

- 本测量设备必须由获得授权的合格专业人员(例如电工)进行安装、连接、调试和维护，并要完全遵守《使用说明书》、适用规范、法律法规以及证书(与应用条件相关)中的规定。
- 专业人员必须事先阅读《使用说明书》，理解并遵守其中的规定。
- 安装本测量设备时，应在断电状态下且没有外部负荷或应力时进行。
- 只有在《使用说明书》明确允许的情况下，才能对本测量设备进行改动。
- 只能采用原装备件且在明确允许进行修理的情况下，才能进行维修。
- 如果对管路执行焊接操作，不可通过本测量设备实现焊接设备接地。

1.2 Installation, commissioning and operation

The measuring equipment must be installed, connected, commissioned and maintained by an authorized qualified professional (e.g., electrician) and must comply with the instructions in the User's Guide, applicable specifications, laws and regulations, and certificates (relevant to the application conditions).

Professionals must read the User's Guide in advance and understand and comply with the requirements.

When installing this measuring device, it shall be carried out in the event of a power failure and without external load or stress.

The measurement equipment can only be changed if it is expressly permitted in the "User's Guide".

The original spare parts can only be used and repairs can only be made if it is expressly permitted to be repaired.

If the welding operation is performed on the pipeline, the welding equipment can not be grounded through this measuring device.

1.3 操作安全

- 本测量设备的设计满足先进的安全要求，已经通过出厂测试，可放心使用。本设备遵守相关的法规和欧洲标准。
- 制造商保留在修改技术参数时不提前通知的权利。安徽天康(集团)股份有限公司产品销售经理将为您提供本《使用说明书》的最新信息和更新材料。
- 必须遵循设备上附带的警告标志、铭牌和接线图中所含的信息。这些信息包括允许的操作条件、测量设备应用范围以及材料参数。
- 如果设备不是用在常温环境中，则必须符合随附的设备文档中所规定的相关边际条件。

- 必须按照布线图和接线图中的规定对设备进行接线。必须允许互连。
- 设备的所有部件都必须纳入系统的电势平衡考虑范围内。
- 电缆、经鉴定的缆塞和经鉴定的堵头必须经得起普遍存在的操作条件的考验，例如过程温度范围。未使用的外壳孔必须用堵头加以密封。
- 本设备仅可用于在绝不会腐蚀任何接液部件的流体中。对于特殊流体(包括清洁用流体)，安徽天康(集团)股份有限公司将很乐意帮助您确认接液材料的耐腐蚀性。但是，过程中的温度、浓度或污染度的轻微变化可能会导致接液部件耐腐蚀性能发生改变。因此，安徽天康(集团)股份有限公司对在特定应用中发生的接液材料的耐腐蚀性问题不承担任何责任。用户应妥善选择接液材料。

- 当高温流体流经测量管时，外壳的表面温度会升高。特别是传感器部分，用户应预料到外壳表面温度可能会接近流体温度。如果流体温度较高，应采取足够的防护措施，避免灼伤或烫伤。

- 危险区域可在危险区域中使用的测量设备的铭牌上有相应的标记。在危险区内操作设备时，必须遵守相关的国家规定。包装上的Ex防爆文档是设备文档的组成部分。必须遵守该Ex防爆文档中提供的安装规范、连接参数以及安全说明。

- 在卫生领域的应用用于卫生领域的测量设备具有专用的标记。使用此类设备时，必须遵守相关的国家规定。

- 安徽天康(集团)股份有限公司非常乐意帮助您解答有关认证、应用领域以及具体实施中的问题。

1.3 Operational safety

The design of the measurement equipment to meet the advanced safety requirements has passed the factory test, can be assured that use. This device complies with applicable regulations and European standards.

The manufacturer reserves the right not to notify in advance when modifying the technical parameters. Your product sales manager of Anhui Tiankang (Group) Co., Ltd. will provide you with the latest information and updated materials of this User's Manual.

You must follow the information contained in the warning signs, nameplates, and wiring diagrams that come with the device. This information includes the permissible operating conditions, the range of measurement equipment, and the material parameters.

If the equipment is not used in a normal temperature environment, it must comply with the relevant marginal conditions specified in the accompanying documentation.

The equipment must be wired as specified in the wiring diagram and wiring diagram. Interconnection must be allowed.

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All components of the equipment must be included in the system's potential balance.
The cable, the identified cable plug, and the identified plug must withstand the prevailing operating conditions, such as the process temperature range. Unused housing holes must be sealed with plugs.

This equipment may only be used in fluids that will never corrode any of the wetted parts. For special fluids (including cleaning fluids), Anhui Tiankang (Group) Co., Ltd. will be happy to help you confirm the corrosion resistance of the wetted material. However, minor changes in temperature, concentration, or contamination may cause the corrosion resistance of the wetted parts to change. As a result, Anhui Tiankang (Group) Co., Ltd. does not assume any responsibility for the corrosion resistance of the wetted material that occurs in a particular application. Users shall choose the wetted material.

When the high temperature fluid flows through the measuring tube, the surface temperature of the shell will rise. In particular, the sensor section, the user shall expect the surface temperature of the shell may be close to the fluid temperature. If the fluid temperature is high, adequate precautions shall be taken to avoid burns or burns.

Hazardous areas may be marked on the nameplate of the measuring equipment used in the hazardous area. When operating the equipment in a hazardous area, the relevant national regulations must be observed. The Ex explosion proof document on the package is part of the device documentation. The installation instructions, connection parameters, and safety instructions provided in the Ex explosion proof document must be observed.

Applications in the field of health The measurement equipment used in the health field has a dedicated marking. When using such equipment, the relevant national regulations must be observed.

Anhui Tiankang (Group) Co., Ltd. is very happy to help you answer questions about certification, application areas and specific implementation.

1.4 安全图标

⚠ 警告！“警告”表示，如果某个操作或过程执行不当，将会导致人身伤害或安全事故。请严格遵守规范，谨慎操作。

⚠ 注意！“注意”表示，如果某个操作或过程执行不当，将会导致设备操作故障或设备损坏。请严格遵守规范。

💡 提示！“提示”表示，如果某个操作或过程执行不当，会间接影响设备运行或触发设备某部分发生意外响应。

1.4 security icon

⚠ WARNING! "WARNING" indicates that if an operation or process is performed improperly, it will result in personal injury or safety. Please strictly observe the norms, careful operation.

⚠ CAUTION! "Caution" means that if an operation or process is performed improperly, it will cause malfunction of the equipment or damage to the equipment. Please strictly observe the specifications.

💡 PROMPT! "Prompt" means that if an operation or process is improperly executed, it will indirectly affect the device to run or trigger a part of the device accidental response.

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二、TK1000系列电磁流量计 TK1000 series of electromagnetic flow meter

2.1 工作原理

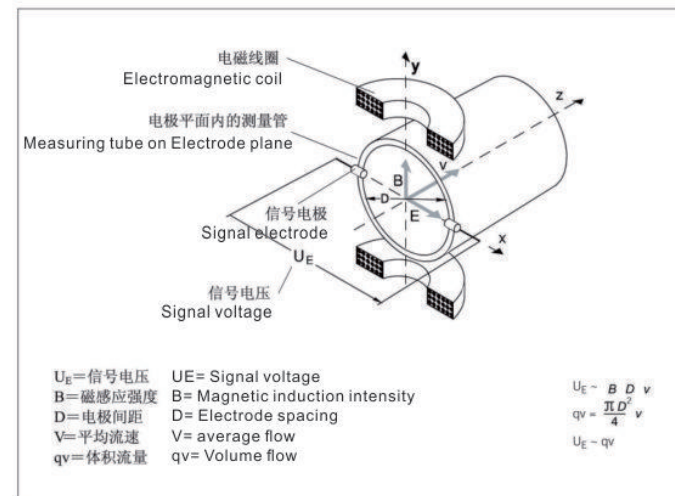
法拉第感应定律（指的是当导体通过磁场时会在导体内部产生感应电势）即为电磁流量计测量的基础原理。这种测量原理可应用于具有导电性的流体，该流体流入磁场垂直于流体方向的管道，在流体中感应生成的电势可利用对称布置的两个电极进行测量。信号电压 U_E 与磁感应强度 B ，电极间距 D 以及流体平均速度 v 成正比。由于磁感应强度 B 与电极间距 D 为常量，所以信号电压 U_E 与平均流速 v 成正比。用于计算体积流速的等式表明信号电压 U_E 与体积流量成线性正比。

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。

2.1 working principle

Faraday's law of induction (referring to when the conductor through the magnetic field will produce in the conductor within the induced potential) is the basic principle of electromagnetic flow meter measurement. This measurement principle can be applied to a fluid with conductivity that flows into a pipe perpendicular to the direction of the fluid, and the induced potentials in the fluid can be measured using symmetrically arranged two electrodes. The signal voltage U_E is proportional to the magnetic induction intensity B , the electrode pitch D , and the fluid average velocity v . Since the magnetic flux density B and the electrode pitch D are constant, the signal voltage U_E is proportional to the average flow velocity v . The equation used to calculate the volumetric flow rate indicates that the signal voltage U_E is linearly proportional to the volumetric flow rate.

The sensed signal voltage is converted into the indexing, analog, and digital output signals in the converter.



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2.2 应用领域

电磁流量计主要应用在以下领域：测量洁净水、污水、生活水、原水，各种酸、碱、盐等溶液，泥浆、矿浆、纸浆，以及食品方面的液体等流体流量，广泛应用于冶金、造纸、水处理、化工、轻工、纺织、食品及饮料、餐饮、农业灌溉、水电站、油田、电力和采矿等行业。

2.2 Application areas

Electromagnetic flow meter is mainly used in the following areas: measuring clean water, sewage, living water, raw water, all kinds of acid, alkali, salt and other solutions, mud, pulp, and food liquids such as fluid flow, widely used in metallurgy, Paper, water treatment, chemical, light industry, textile, food and beverage, catering, agricultural irrigation, hydropower, oil, electricity and mining industries.

2.3 产品特点

- 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。
- 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。
- 在现场可根据用户实际需要在线修改量程。
- 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。
- Ex防爆设计，符合国家防爆技术要求，已通过鉴定验收，可应用与各类防爆场所。
- 高阻快速响应设计，无失真采集微弱信号和快速反应流量变化，量程比可达100:1。

1. 采用电容式技术的空、满管检测技术，杜绝误报警的出现。
- 具备转换器互换的一致性，无须重新输入参数。
- 宽范围电源模式可供选择（DC: 20V~36V AC: 85V~250V）。
- 采用出厂保存设置功能，使仪表各参数万无一失。
- 红外遥控功能以及按键操作，操作更加方便。
- 提供传感器零点修正以及自动校零功能。
- 全中文（英文）友好界面，满足各方使用要求。
- 具备转换器本机自校、自检功能。
- 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。
- 具有 RS485、RS232、Hart、Modbus 和 Profibus 等数字通讯信号输出。
- 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。
- 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。

2.3 Product Features

Using the world's leading excitation technology, excitation circuit is simple, stable and reliable, with artificial intelligence performance.

There are no moving parts in the pipe, no resistance flow components, almost no additional pressure loss in the measurement.

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The measurement results are independent of the physical parameters such as velocity distribution, fluid pressure, temperature, density, viscosity and so on.

In the field can be based on the actual needs of users to modify the range.

For a variety of conductive liquid flow measurement, such as tap water, sewage, mud, all kinds of beverages, chemical raw materials, viscous liquid and suspended solids.

Ex explosion-proof design, in line with national explosion-proof technical requirements, has been identified through the acceptance, can be applied with various types of explosion-proof places.

High impedance fast response design, no distortion to collect weak signal and rapid response flow changes, range ratio up to 100:1.

The use of capacitive technology, empty, full tube detection technology, to prevent the emergence of false alarms;

Consistent with converter swapping, no need to reenter the parameters.

Wide range of power modes to choose from (DC: 20V-36V AC: 85V-250V).

Using the factory to save the settings function, so that the parameters of the instrument foolproof.

Infrared remote control function and key operation, the operation more convenient;

Provides sensor zero correction and automatic zero calibration.

Full Chinese (English) friendly interface to meet the requirements of the parties.

With the converter from the school, self-test function.

With lightning protection design circuit, efficient anti-jamming circuit for a variety of harsh environments;

Converters and sensors with a variety of protection levels and installation methods, there are suitable for diving installation IP68 grade.

Plug-in electromagnetic flow meter in the large pipeline flow detection, the installation is simple, no drying, the scene can be pressure with openings, with absolute installation advantages and price advantage. Plug-in electromagnetic flow measurement is only related to the depth of insertion, so the flow meter versatility, interchangeability. A model can be applied to a variety of specifications of the pipeline fluid measurement requirements.

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2.4 电磁流量计的主要技术参数

2.4.1 标准型和高精度型技术参数

型号	TK1100标准型系列	TK1200高精度系列
口径	DN3-DN2200	DN10-DN1200
精度	0.50%	0.2%, 0.3%
安装方式	夹持, 法兰	夹持, 法兰
重复性	0.10%	0.06%, 0.1%
测量范围	0-12m/s (流量单位可改变)	0-12m/s (流量单位可改变)
连接法兰	GB/T9119 或其他选择	GB/T9119 或其他选择
压力	4.0MPa~0.25 MPa (按口径分)	4.0MPa~0.25 MPa (按口径分)
衬里材料	PO, PTFE, PFA (耐负压), 橡胶, 聚氨酯	PO, PTFE, PFA (耐负压), 橡胶, 聚氨酯
电极材料	316L, HC, HB, 钛, 钽, 铂金	316L, HC, HB, 钛, 钽, 铂金
电极形式	标准, (刮刀, 可更换DN>350)	标准, (刮刀, 可更换DN>350)
传感器防护等级	IP65, IP67, IP68	IP65, IP67, IP68
电导率	>5 μ S/cm (水>20 μ S/cm)	>2 μ S/cm (水>20 μ S/cm)
介质最高温度	一体型 $\leq$ 90°C, 分体型 $\leq$ 160°C (橡胶、PO $\leq$ 70°C)	一体型 $\leq$ 90°C, 分体型 $\leq$ 160°C (橡胶、PO $\leq$ 70°C)
环境最高温度	-30°C~+65°C	-30°C~+65°C
转换器安装形式	一体, 分体	一体, 分体
输出信号	4-20mA电流信号, 频率/脉冲输出	4-20mA电流信号, 频率/脉冲输出
电源	AC: 85V~250V, DC: 20V~36V	AC: 85V~250V, DC: 20V~36V
自诊断	有	有
空管置零	有	有
通讯	RS485/Modbus, HART, PROFIBUS	RS485/Modbus, HART, PROFIBUS
防爆	非防爆/隔爆	非防爆/隔爆
语言	中文, 英语	中文, 英语
产品标准	JB/T 9248-2015	JB/T 9248-2015

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2.4 The main technical parameters of electromagnetic flow meter

2.4.1 Standard and high precision technical parameters

Model	Tk1100 standard series	Tk1200 high precision series
Caliber	DN3-DN2200	DN10-DN1200
Accuracy	0.5%	0.2%, 0.3%
Installation method	Hold, flange	Hold, flange
Repeatability	0.1%	0.06%, 0.1%
Measuring range	0-12m/s(The flow unit can be changed)	0-12m/s(The flow unit can be changed)
Connecting flange	GB/T9119 or other options	GB/T9119 or other options
Pressure	4.0MPa~0.25 Mpa(By caliber)	4.0MPa~0.25 Mpa(By caliber)
Lining material	PO,PTFE,PFA (Negative pressure), rubber, poly, Urethane	PO,PTFE,PFA (Negative pressure), rubber, poly,Urethane
Electrode material	316L,HC,HB, Titanium, tantalum, platinum	316L,HC,HB, Titanium, tantalum, platinum
Electrode form	Standard, (scraper, replaceableDN>350)	Standard, (scraper, replaceableDN>350)
Sensor protection class	IP65,IP67,IP68	IP65,IP67,IP68
Conductivity	>5 μ S/cm(water>20 μ S/cm)	>2 μ S/cm(water>20 μ S/cm)
Medium maximum temperature	Integral $\leq$ 90°C,split type $\leq$ 160°C (rubber Plastic, PO $\leq$ 70°C)	Integral $\leq$ 90°C, split type $\leq$ 160°C (rubber Plastic, PO $\leq$ 70°C)
Maximum ambient temperature	-30°C~+65°C	-30°C~+65°C
Converter installation form	One, split	One, split
Output signal	4-20mA Current signal, frequency/pulse output	4-20mA Current signal, frequency/pulse output
Power	AC:85V~250V,DC:20V~36V	AC:85V~250V,DC:20V~36V
Self-diagnosis	Yes	No
Empty tube zero	Yes	No
Communication	RS485/Modbus, HART, PROFIBUS	RS485/Modbus, HART, PROFIBUS
Explosion protection	Non-explosion proof/flameproof	Non-explosion proof/flameproof
Language	Chinese, English	Chinese, English
Product Standards	JB/T 9248-2015	JB/T 9248-2015

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2.4.2 卫生型和电池供电型技术参数

型号	TK1300卫生型系列	TK1500电池供电系列
口径	DN3-DN150	DN10-DN1200
精度	0.2%, 0.5%	0.50%
安装方式	螺纹, 卡箍	夹持, 法兰,
重复性	0.06%, 0.1%	0.15%
测量范围	0-12m/s (流量单位可改变)	0-10m/s (流量单位可改变)
连接法兰		GB/T9119 或其他选择
压力	最高4.0MPa	4.0MPa~0.6MPa (按口径分)
衬里材料	PFA (耐负压)	PO, PTFE, PFA (耐负压), 橡胶, 聚氨酯
电极材料	316L, HC, HB, 钛, 钽, 铂金	316L, HC, HB, 钛, 钽, 铂金
电极形式	标准	标准, (刮刀, 可更换 DN>350)
传感器防护等级	IP65, IP67, IP68	IP65, IP67, IP68
电导率	>2 μS/cm (水>20 μS/cm)	>5 μS/cm (水>20 μS/cm)
介质最高温度	一体型 ≤90°C, 分体型 ≤160°C	一体型 ≤90°C, 分体型 ≤160°C (橡胶、PO ≤70°C)
环境最高温度	-30°C~+65°C	-30°C~+65°C
转换器安装形式	一体, 分体	一体, 分体
输出信号	4-20mA电流信号, 频率/脉冲输出	频率 0-5kHz
电源	AC:85V~250V, DC:20V~36V	3.6V
自诊断	有	有
空管置零	有	有
通讯	RS485/Modbus、HART、PROFIBUS	RS485/Modbus、GPRS
防爆	非防爆/隔爆	
语言	中文, 英语	中文, 英语
产品标准	参照 JB/T 9248-2015	参照 JB/T 9248-2015

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2.4.2 Health and battery-powered technical parameters

Model	Tk1300 healthy series	TK1500Battery power supply system
Caliber	DN3-DN150	DN10-DN1200
Accuracy	0.2%, 0.5%	0.5%
Installation method	Threaded, clamped	Threaded, clamped
Repeatability	0.06%, 0.1%	0.15%
Measuring range	0-12m/s(The flow unit can be changed)	0-10m/s(The flow unit can be changed)
Connecting flange		GB/T9119 or other options
Pressure	Max. 4.0MPa	4.0MPa~0.6 Mpa(By caliber)
Lining material	PFA(Negative pressure), rubber, poly	PO,PTFE,PFA(Negative pressure), rubber, poly
Electrode material	316L,HC,HB, Titanium, tantalum, platinum	316L,HC,HB, Titanium, tantalum, platinum
Electrode form	Standard	Standard, (scraper DN>350)
Sensor protection class	IP65,IP67,IP68	Ip65,IP67,IP68
Conductivity	>2μS/cm(water>20μS/cm)	>5μS/cm(water>20μS/cm)
Medium maximum temperature	Integral ≤ 90°C,split type ≤ 160°C (rubber Plastic, PO ≤ 70°C)	Integral ≤ 90°C, split type ≤ 160°C (rubber Plastic, PO ≤ 70°C)
Maximum ambient temperature	-30°C~+65°C	-30°C~+65°C
Converter installation form	One, split	One, split
Output signal	4-20mACurrent signal, frequency/pulse output	Frequency 0-5kHz
Power	AC:85V~250V,DC:20V~36V	3.6V
Self-diagnosis	Yes	No
Empty tube zero	Yes	No
Communication	RS485/Modbus、HART、PROFIBUS	RS485/Modbus、GPRS
Explosion protection	Non-explosion proof/flameproof	
Language	Chinese, English	Chinese, English
Product Standards	Based on JB/T 9248-2015	Based on JB/T 9248-2015

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2.4.3 插入式和电磁热能表技术参数

型号	Tk1400插入式系列	Tk1600电磁热能表系列
口径	DN250-DN3000	DN15-DN1200
精度	1.5%	0.5%, 1.0%
安装方式	法兰, 螺纹, 在线	夹持, 法兰, 螺纹
重复性	0.1%	0.15%
测量范围	0-10m/s (流量单位可改变)	0-12m/s (流量单位可改变)
连接法兰	GB/T9119-2000或其他选择	GB/T9119-2000或其他选择
压力	1.6 MPa	4.0MPa~0.6 MPa (按口径分)
衬里材料	POM,PTFE,PFA	PO, PTFE, PFA (耐负压), 橡胶, 聚氨酯
电极材料	316L,HC,HB, 钛, 钽, 铂金	316L,HC,HB, 钛, 钽, 铂金
电极形式	标准	标准
传感器防护等级	IP65, IP67, IP68	IP65, IP67, IP68
电导率	>5 μS/cm (水>20 μS/cm)	>5 μS/cm (水>20 μS/cm)
介质最高温度	一体型≤90℃, 分体型≤130℃ (POM≤100℃)	一体型≤90℃, 分体型≤160℃ (橡胶、PO≤70℃)
环境温度	-30℃~+65℃	-30℃~+65℃
转换器安装形式	一体, 分体	一体, 分体
输出信号	4-20mA电流信号, 频率/脉冲输出	4-20mA电流信号, 频率/脉冲输出
电源	AC: 85V~250V, DC: 20V~36V	AC: 85V~250V, DC: 20V~36V
自诊断	有	有
空管置零	有	有
通讯	RS485/Modbus, HART, PROFIBUS	RS485/Modbus, HART, PROFIBUS
防爆	非防爆/隔爆	非防爆/隔爆
语言	中文, 英语	中文, 英语
产品标准	参照JB/T9248-2015	参照JB/T9248-2015

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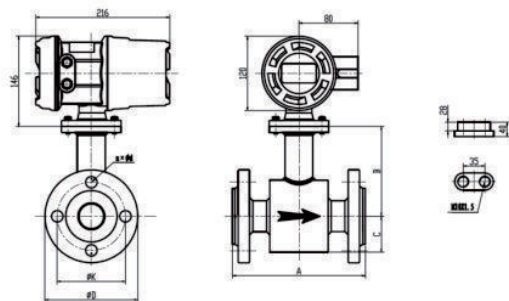


2.4.3 Plug-in and electromagnetic heat meter technical parameters

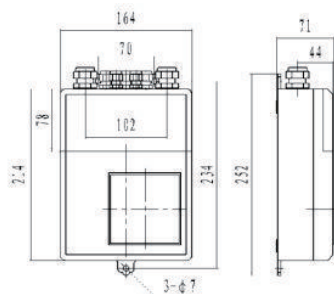
Model	Tk1400 plug-in series	Tk1600 electromagnetic heat meter series
Caliber	DN250-DN3000	DN15-DN1200
Accuracy	0.1%	0.15%
Installation method	Flange, thread, online	Flange, thread, online
Repeatability	0.1%	0.15%
Measuring range	0-10m/s(The flow unit can be changed)	0-12m/s(The flow unit can be changed)
Connecting flange	GB/T9119-2000 or other options	GB/T9119-2000 or other options
Pressure	1.6 MPa	4.0MPa~0.6 MPa (By caliber)
Lining material	POM,PTFE,PFA	PO,PTFE,PFA(Negative pressure), rubber, poly
Electrode material	316L,HC,HB, Titanium, tantalum, platinum	316L,HC,HB, Titanium, tantalum, platinum
Electrode form	Standard	Standard
Sensor protection class	IP65, IP67, IP68	IP65, IP67, IP68
Conductivity	>5μS/cm(water>20μS/cm)	>5μS/cm(water>20μS/cm)
Medium maximum temperature	Integral ≤ 90℃, split type ≤ 160℃ (rubber Plastic, PO ≤ 70℃)	Integral ≤ 90℃, split type ≤ 160℃ (rubber Plastic, PO ≤ 70℃)
Maximum ambient temperature	-30℃~+65℃	-30℃~+65℃
Converter installation form	One, split	One, split
Output signal	4-20mA Current signal, frequency/pulse output	4-20mA Current signal, frequency/pulse output
Power	AC:85V~250V,DC:20V~36V	AC:85V~250V,DC:20V~36V
Self-diagnosis	Yes	Yes
Empty tube zero	Yes	Yes
Communication	RS485/Modbus, HART, PROFIBUS	RS485/Modbus, HART, PROFIBUS
Explosion protection	Non-explosion proof/flameproof	Non-explosion proof/flameproof
Language	Chinese, English	Chinese, English
Product Standards	Based on JB/T 9248-2015	Based on JB/T 9248-2015

2. 5电磁流量计外形尺寸图

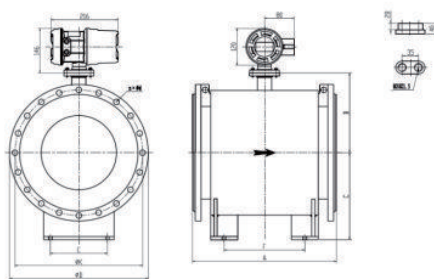
2. 5. 1 法兰型电磁流量计外形尺寸图 (详见表一)



DN15-DN450管道法兰式电磁流量计



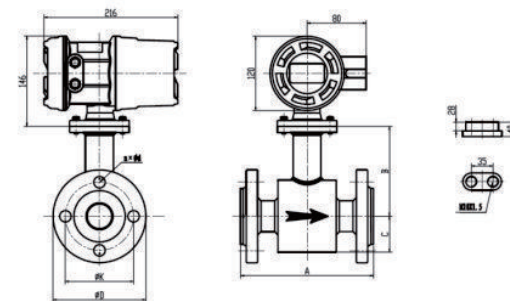
分体式变送器



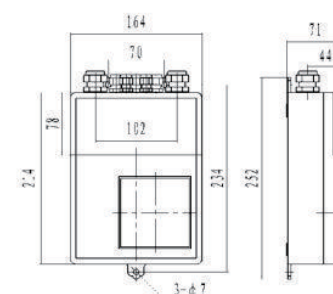
Dn500以上管道法兰式电磁流量计

2. 5 Electromagnetic flow meter outline drawing

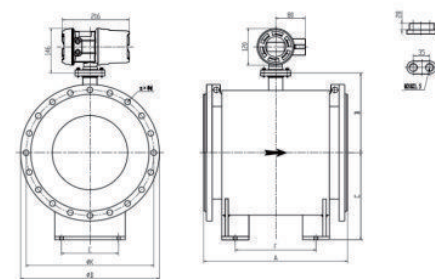
2.5.1 flange type electromagnetic flow meter dimensions (see Table 1)



DN15-DN450 pipe flange electromagnetic flow meter



Split transmitter

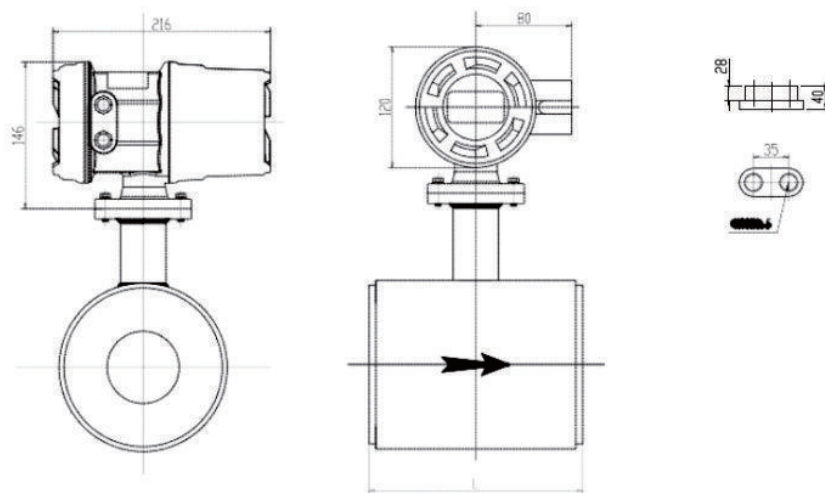


Above DN500 pipeline flange electromagnetic flow meter

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2.5.2夹持式电磁流量计外形尺寸 2.5.2 Clamping electromagnetic flow meter dimensions



DN10~DN200夹持式电磁流量计
DN10-DN200 clamping electromagnetic flow meter

公称通径 (mm) Nominal diameter(mm)	Dn10	Dn15	Dn20	Dn25	Dn32	Dn40	Dn50
L(mm)	90	90	90	100	100	100	120
公称通径 (mm) Nominal diameter(mm)	Dn65	Dn80	Dn100	Dn125	Dn150	Dn200	
L(mm)	120	120	150	150	160	220	

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表一
Table I

DN	额定压力 Rated pressure gauge	仪表外形尺寸单位: mm Dimensions Unit mm							
	MPa	A	B	C	E	F	φD	φK	n×φd
10	4	150	90	50			90	60	4×φ12
15		200	95	53			95	65	4×φ14
20			62				105	75	4×φ14
25			100	62			115	85	4×φ14
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			145	99			220	180	8×φ18
125	1.6	250	161	115			250	210	8×φ18
150		300	171	130			285	240	8×φ22
200	1	350	199	158			340	295	8×φ22
250		400	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	565	20×φ26
500		600	360	321		300	240	670	620
600		600	410	374			270	780	725
700		700	467	560		400	350	895	840
800		800	517	610			400	1010	950
900		900	567	660			470	1110	1050
1000		1000	617	712			570	1225	1160
1200	0.6	1200	719	814		600	710	1400	1340
1400		1400	819	914			900	1625	1560
1600		1600	919	1036		800	1040	1825	1760
1800		1800	1021	1138			1180	2045	1970
2000		2000	1121	1238			1350	2265	2180

三、产品选型指南

3.1 口径选择

当测量管道的常用流速超过 0.5 米 / 秒时，选择与测量管道相同直径的流量计。

在以下情况下选择直径小于测量管道的流量计：测量管道中流速较缓，无法满足流量计的测量要求或者在该流速下其测量精度无法满足（要取得相对较高精度，流速下限应大于 1m/s）。

口径	压力	最小流量范围 流速0-0.5m/s	最大流量范围 流速0-10m/s
3	4	0-0.2 L/min	0-4 L/min
4	4	0-0.4 L/min	0-8 L/min
6	4	0-1.0 L/min	0-20 L/min
8	4	0-1.5 L/min	0-30 L/min
10	4	0-2.25 L/min	0-45 L/min
15	4	0-5 L/min	0-100 L/min
20	4	0-7.5 L/min	0-150 L/min
25	4	0-10 L/min	0-200 L/min
32	4	0-20 L/min	0-400 L/min
40	4	0-30 L/min	0-600 L/min
50	4	0-3m3/h	0-60 m3/h
65	4	0-6m3/h	0-120m3/h
80	4	0-9m3/h	0-180 m3/h
100	1.6	0-12m3/h	0-240 m3/h
125	1.6	0-21m3/h	0-420 m3/h
150	1.6	0-30m3/h	0-600 m3/h
200	1.6	0-54m3/h	0-1080 m3/h
250	1.6	0-90m3/h	0-1800 m3/h
300	1	0-120m3/h	0-2400 m3/h
350	1	0-165m3/h	0-3300 m3/h
400	1	0-255m3/h	0-4500 m3/h
500	1	0-330m3/h	0-6600 m3/h
600	1	0-480m3/h	0-9600 m3/h
700	1	0-660m3/h	0-13200 m3/h
800	1	0-900m3/h	0-18000 m3/h
900	1	0-1200m3/h	0-24000 m3/h
1000	1	0-1350m3/h	0-27000 m3/h
1200	0.6	0-2100m3/h	0-42000 m3/h
1400	0.6	0-2700m3/h	0-54000 m3/h
1600	0.6	0-3600m3/h	0-72000 m3/h
1800	0.6	0-4500m3/h	0-90000 m3/h
2000	0.6	0-5700m3/h	0-114000 m3/h

三、TK1000 series of electromagnetic flow meter

3.1 caliber selection

When measuring the flow rate of the pipe more than 0.5 m/s, select the flow meter with the same diameter as the measuring pipe.

In the following cases, the flow meter with diameter smaller than the measuring pipe is selected: the flow rate in the measuring pipe is too slow to meet the measurement requirements of the flow meter or the measurement accuracy can not be satisfied at the flow rate (to obtain relatively high accuracy, the lower limit of the flow rate shall be greater than 1 m/s).

Caliber DN	Pressure MPA	Minimum Flow Range Flow rate 0-0.5m/s	Maximum Flow Range Flow rate 0-10m/s
3	4	0-0.2 L/min	0-4 L/min
4	4	0-0.4 L/min	0-8 L/min
6	4	0-1.0 L/min	0-20 L/min
8	4	0-1.5 L/min	0-30 L/min
10	4	0-2.25 L/min	0-45 L/min
15	4	0-5 L/min	0-100 L/min
20	4	0-7.5 L/min	0-150 L/min
25	4	0-10 L/min	0-200 L/min
32	4	0-20 L/min	0-400 L/min
40	4	0-30 L/min	0-600 L/min
50	4	0-3m3/h	0-60 m3/h
65	4	0-6m3/h	0-120m3/h
80	4	0-9m3/h	0-180 m3/h
100	1.6	0-12m3/h	0-240 m3/h
125	1.6	0-21m3/h	0-420 m3/h
150	1.6	0-30m3/h	0-600 m3/h
200	1.6	0-54m3/h	0-1080 m3/h
250	1.6	0-90m3/h	0-1800 m3/h
300	1	0-120m3/h	0-2400 m3/h
350	1	0-165m3/h	0-3300 m3/h
400	1	0-255m3/h	0-4500 m3/h
500	1	0-330m3/h	0-6600 m3/h
600	1	0-480m3/h	0-9600 m3/h
700	1	0-660m3/h	0-13200 m3/h
800	1	0-900m3/h	0-18000 m3/h
900	1	0-1200m3/h	0-24000 m3/h
1000	1	0-1350m3/h	0-27000 m3/h
1200	0.6	0-2100m3/h	0-42000 m3/h
1400	0.6	0-2700m3/h	0-54000 m3/h
1600	0.6	0-3600m3/h	0-72000 m3/h
1800	0.6	0-4500m3/h	0-90000 m3/h
2000	0.6	0-5700m3/h	0-114000 m3/h

3. 2电磁流量计的电极材料选择

根据被测流体的腐蚀性来选择电极的材料

材料	耐腐蚀性
316L	适用：1. 生活用水，工业用水，原水井水，城市用水 2. 稀酸，稀碱等弱腐蚀性，碱盐液
哈氏合金B	适用：1. 盐酸(浓度小于10%)等非氧化性酸 2. 氢氧化钠(浓度小于50%)一切浓度的氢氧化铵碱溶液 3. 磷酸，有机酸 不适用：硝酸
哈氏合金C	适用：1. 混合酸如铬酸与硫酸的混合溶液 2. 氧化性盐类如Fe ⁺⁺⁺ 、Cu ⁺⁺ 、海水 不适用：盐酸
钛(Ti)	适用：1. 盐。如(1)氯化物(氯化物/镁/铝/钙/铵/铁等) (2)钠盐，铵盐，次氯酸盐，海水 2. 浓度小于50%氢氧化钾，氢氧化铵，氢氧化钡碱溶液 不适用：盐酸，硫酸，磷酸，氢氟酸等还原性酸
钽(Ta)	2. 适用：1. 盐酸(浓度小于40%)，稀硫酸和浓硫酸(不包括发烟硫酸) 2. 二氧化氯，氯化铁，次氯酸，氰化钠，乙酸铅等 3. 硝酸(包括发烟硝酸)等氧化性酸，温度低于80℃的王水 不适用：碱，氢氟酸
铂(Pt)	适用：几乎所有酸，碱，盐溶液(包括发烟硫酸、发烟硝酸) 不适用：王水，铵盐
碳化钨	适用：纸浆，污水，能抗固体颗粒干扰 不适用：无机酸，有机酸，氯化物

3.2 Electromagnetic flow meter electrode material selection

The material of the electrode is selected according to the corrosiveness of the fluid to be measured

Material	Corrosion resistance
316L	Applicable: 1. Domestic water, industrial water, raw water, urban water 2. Dilute acid, dilute alkali and other weak corrosive, alkaline salt solution
Hastelloy B	Applicable: 1. Hydrochloric acid (concentration less than 10%) and other non-oxidizing acid 2. Sodium hydroxide (concentration less than 50%) of all concentrations of ammonium hydroxide solution 3. Phosphoric acid, organic acids Not applicable: nitric acid
Hastelloy C	Applicable: 1. A mixed solution of a mixed acid such as chromic acid and sulfuric acid 2. Oxidizing salts such as Fe ⁺⁺⁺ , Cu ⁺⁺ , seawater Not applicable: hydrochloric acid
Titanium (Ti)	Applicable: 1. salt. Such as (1) chloride (chloride/magnesium/aluminum/calcium/ammonium/iron, etc.) (2) sodium salt, ammonium salt, hypochlorite, sea water 2. Concentration of less than 50% potassium hydroxide, ammonium hydroxide, barium hydroxide alkaline solution Not applicable: hydrochloric acid, sulfuric acid, phosphoric acid, hydrofluoric acid and other reducing acids
Tantalum (Ta)	Applicable: 1. Hydrochloric acid (concentration less than 40%), dilute sulfuric acid and concentrated sulfuric acid (not including fuming sulfuric acid) 2. Chlorine dioxide, ferric chloride, hypochlorous acid, sodium cyanide, lead acetate and the like 3. Nitric acid (including fuming nitric acid) and other oxidizing acid, the temperature is lower than 80 °C of aqua regia Not applicable: Alkaline, hydrofluoric acid
Platinum (Pt)	Applicable: almost all acid, alkali, salt solution (including fuming sulfuric acid, fuming nitric acid) Not applicable: aqua regia, ammonium salt
Tungsten carbide	Applicable: pulp, sewage, can interfere with solid particles Not applicable: inorganic acid, organic acid, chloride

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3. 3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℃。

衬里材料	主要功能	适用范围
硬橡胶	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. 低于70℃ 2. 一般的酸、碱、盐溶液
软橡胶	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. 低于70℃ 2. 测一般水、污水、泥浆、矿浆
聚四氟乙烯 (PTFE) 改性聚四氟乙烯 (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. -40℃~+130℃ (PTFE) -40℃~+160℃ (PFA) 2. 酸、碱等强腐蚀介质 3. 卫生类介质
P0	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. 低于70℃ 2. 一般的酸、碱、盐溶液 3. 一般水、污水、泥浆、矿浆

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3.3 Selection of lining material

It shall be based on the corrosion of the measured medium, wear and temperature to choose. Hard/soft rubber can be resistant to the general weak acid, alkali corrosion, temperature 65℃, soft rubber wear resistance, PTFE (PTFE) almost resistant to heat acid other than strong acid, alkali corrosion, medium temperature up to 130℃, but not wearable. Polyurethane rubber has good wear resistance, but not acid, alkali corrosion, temperature resistance is also poor, the medium temperature is less than 65℃.

Lining material	Main function	Applicable scope
Hard rubber	1. Can be resistant to hydrochloric acid at room temperature, acetic acid, oxalic acid, ammonia, phosphoric acid and 50% sulfuric acid, sodium hydroxide, potassium hydroxide. 2. Bogey strong oxidizer.	Hard rubber 1. Below 70℃ 2. General acid, alkali, salt solution
Soft rubber	1. Have better flexibility, wear resistance 2. Resistant to low concentrations of acid, alkali, Salt medium corrosion, intolerance to oxidation Corrosion of media.	1. Below 70℃ 2. Measured in general water, sewage, mud, mine Pulp
Polytetrafluoroethylene (PTFE) Modified polytetrafluoroethylene (PFA)	1. Plastic chemical properties of the most stable of a material, the ability to boil hydrochloric acid, sulfuric acid, nitric acid and aqua regia. Also resistant to concentrated alkali and a variety of organic solvents. 2. Abrasion resistance and poor adhesion.	1. -40℃~+ 130℃ (PTFE) -40℃ to + 160℃ (PFA) 2. Acid, alkali and other strong corrosive media 3. Health media
P0	1. Can be resistant to hydrochloric acid at room temperature, vinegar Acid, oxalic acid, ammonia, phosphoric acid and sulfur Acid, sodium hydroxide, potassium hydroxide. 2. Ability to concentrate and various organic solvents agent.	1. Below 70℃ 2. General acid, alkali, salt solution 3. General water, sewage, mud, pulp

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3.4 温度等级选择

流量传感器有四种工作温度等级，是70℃、130℃、160℃，最大要求可达180℃。

为使流量计工作在理想状态下，请选择最接近介质实际工作温度的温度等级。例如介质最高工作温度为50℃时，就选择温度等级为70℃的传感器。

3.4 temperature level selection

Flow sensor has four operating temperature levels, is 70℃, 130℃, 160℃, the maximum requirements up to 180℃.

To operate the flow meter ideally, select the temperature level that is closest to the actual operating temperature of the media. For example, when the maximum operating temperature of the medium is 50℃, a sensor with a temperature rating of 70℃ is selected.

3.5 接地环选择

当管道接地条件不良时（包括绝缘管道），传感器两侧应安装接地环。若介质磨损性较强，应选择对衬里具有保护作用的带颈接地环。

3.5 grounding ring selection

When the pipe grounding conditions are poor (including the insulation pipe), the sensor shall be installed on both sides of the grounding ring; if the media wear is strong, shall choose to protect the lining of the neck with a grounding ring.

3.6 防护等级的选择

按照国际GB/T4208-2008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。

3.6 Protection level selection

In accordance with the international GB/T4208-2008 on the shell protection level can be divided into:

IP65 for the spray type, you can allow the faucet from any direction of the instrument water, spray pressure of 30kPa, the water is 12.5 liters/min, spray from the instrument from the distance of 3 meters.

IP67 for the anti-flooding type, that is, the instrument can be immersed in water for a short time, the highest point shall be underwater at least 150cm, duration of at least 30 minutes.

IP68 for the diving type, shall be able to work long hours in the water, the maximum depth of its immersion by the manufacturer and the user consultation.

Protection principle selection principle shall be based on the above requirements and the actual conditions of the instrument selected. If the instrument below the ground, often flooded, shall use IP68; if the instrument on the ground, you can use IP65.

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3.7 结构选择

考虑到安装和使用方面的便利，优先选择一体式流量计。当流量计安装在地下或者很容易被水淹没的地方，选择防护等级为IP67或IP68的分体式流量计。当流量计被安装在高温管道或高腐蚀环境下，选择分体式流量计。

3.7 Structure selection

When the flow meter is installed underground or is easily submerged, select the degree of protection IP67 Or IP68 split flow meter. When the flow meter is installed in high temperature piping or high corrosive environment, select the split flow meter.

3.8 输出信号选择

有源频率输出意味着不需要外接电源来完成输出功能，而无源频率输出意味着需要外接电源来完成输出功能。

频率输出口可以配置为报警输出来指示流量为反向（一直输出低电平）或正向（一直输出高电平），或频率输出来指示瞬时流量或累积流量的值。

4-20mA可以用于输出瞬时流量数值信号。

3.8 Output signal selection

Active frequency output means that no external power supply is required to complete the output function, and the passive frequency output means that an external power supply is required to complete the output function.

The frequency output can be configured as an alarm output to indicate whether the flow is reverse (always output low) or positive (always output high), or frequency output to indicate the value of the instantaneous flow or cumulative flow.

4-20mA can be used to output instantaneous flow rate signals.

3.9 供电电源选择

可使用220VAC或24VDC供电电源。从便于安装与使用的角度考虑，应优先选择220V AC。

3.9 Power supply selection

Can use 220V AC or 24V DC power supply. 220V AC shall be preferred from the point of view of ease of installation and use.

四、安装

Installation

4. 1环境条件:

流量计,特别是带智能液晶显示屏幕的流量计,安装位置应该尽量避免阳光直射,环境温度要在 $5^{\circ}\text{C}\sim 55^{\circ}\text{C}$ 之间。

4.1 Environmental conditions:

Flow meter, especially with intelligent LCD display flow meter, the installation location shall try to avoid direct sunlight, the ambient temperature to $5^{\circ}\text{C}\sim 55^{\circ}\text{C}$ between.

4. 2 避开强干扰源

要选择无强电磁场辐射的场所安装流量计,避开例如电动机、变压器、变频器等一些容易引致电磁干扰的设备。流量计的测量原理基于法拉第电磁感应定律,它产生的原始信号非常微弱,不足毫伏。如果流量计附近有强电磁场辐射,将会影响测量的精确度,甚至无法正常工作。

4.2 Avoid strong sources of interference

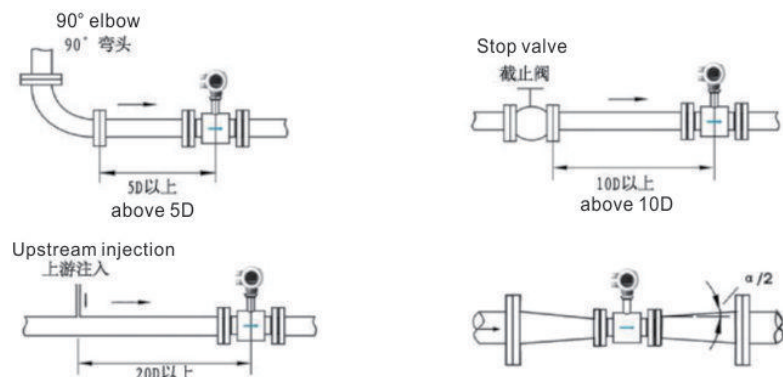
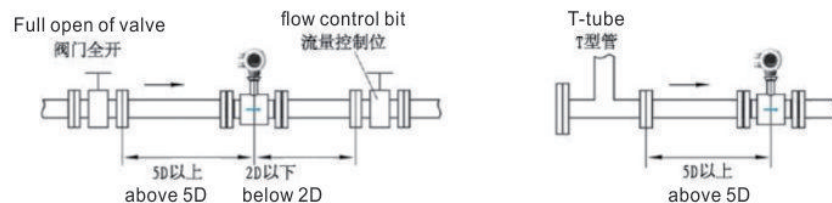
To choose a place where there is no strong electromagnetic field radiation to install the flow meter, to avoid such as motors, transformers, frequency converters and other devices that are prone to electromagnetic interference. The measurement principle of the flow meter is based on Faraday's law of electromagnetic induction, which produces the original signal is very weak, less than millivolt. If there is strong electromagnetic field near the flow meter radiation, will affect the measurement accuracy, or even not work properly.

4. 3 直管段长度

注意尽量避开涡流产生部件,如各种阀门、弯头、旁路等,尽量延长流量计上下游直管段,必要时安装整流管,确保流量计的上游直管段必须为5个DN(测量管径)以上,下游保证在2个DN以上。

4.3 Straight pipe length

Pay attention to try to avoid the vortex-generating components, such as a variety of valves, elbows, bypass, etc., as far as possible to extend the upstream and downstream flow meter section, if necessary, install the rectifier tube to ensure that the upstream flow tube section must be 5 DN (measuring tube Diameter) above, the downstream guarantee in more than 2 DN.



在上游有化学物质注入的情况下,极易导致电导率的不均匀性,流量计应远离注入口。

above 20D

In the case of chemical substances in the upstream, it will easily lead to uneven conductivity, so the flow meter shall be away from the injection port

流量管上下游采用异径管时,异径管中心锥角 α 应小于 15° 。

When the reducer tube is used in the upstream and downstream of flow tube, the center angle of the reducer center shall be smaller than 15°

4. 4 液体电导率必须均匀稳定

不要把流量计安装在被测流体电导率极不均匀的地方。如果上游有不同介质注入,将会导致电导率不均匀,而且会影响测量。这种情况下,建议将注入口移到下游;如果必须从上游注入,则应该尽量远离流量计。一般保持20个DN以上的距离为佳,以保证液体充分混合均匀。

4.4 Liquid conductivity must be uniform and stable

Do not install the flow meter in places where the measured fluid conductivity is extremely uneven. If there are different media into the upstream, will lead to uneven conductivity, and will affect the measurement. In this case, it is advisable to move the injection port downstream; if it must be injected from the upstream, it shall be as far away as possible from the flow meter. Generally keep more than 20 DN distance is better to ensure that the liquid is fully mixed evenly.

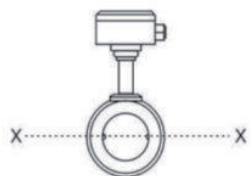
4. 5 保持电极轴线处于水平

测量电极平面必须保持水平,这样可以防止由于气泡而导致的两个电极之间的短时间绝缘。

4.5 Keep the electrode axis at the level

The measuring electrode plane must be kept level, which prevents short time insulation between the two electrodes due to air bubbles.

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注：如果受现场安装条件限制，请保持允许倾斜角度 $\leq 45^\circ$ 。

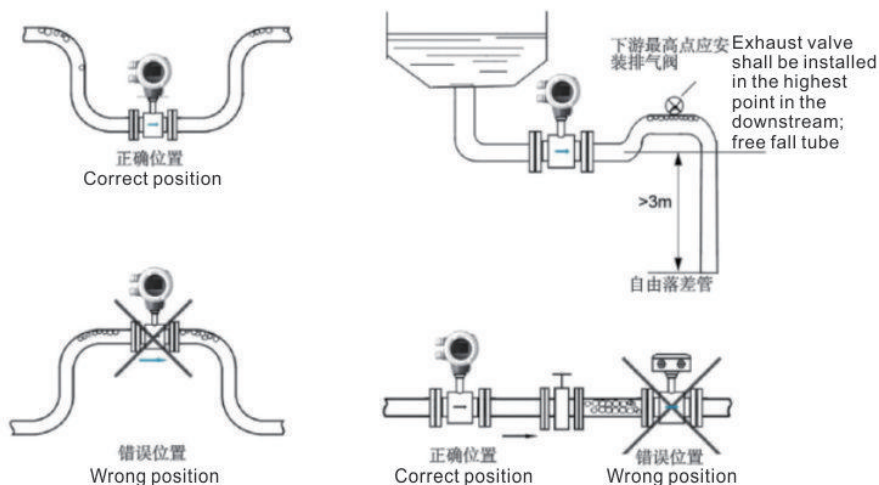
Note: If the site installation conditions are limited, please keep the tilt angle $\leq 45^\circ$.

4.6 无气泡

在流量计安装管道设计时应确保无气泡产生。

4.6 No air bubbles

The design of the flow meter installation pipe shall ensure that no bubbles are generated.



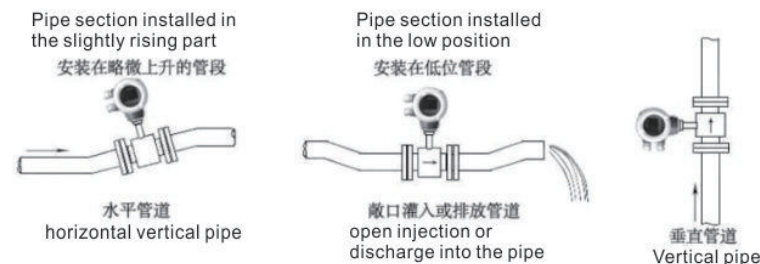
4.7 流量计管路满管

流量计可以水平、垂直和倾斜安装。但是管路结构应保证测量管必须始终充满液体（满管）。管路设计时注意确保测量管段无气泡，否则将会造成测量不稳定和偏差过大。

4.7 flow meter pipe full tube

The flow meter can be installed horizontally, vertically and tilt. But the piping structure shall ensure that the measuring tube must always be filled with liquid (full tube). Pipeline design ensures that the measurement tube section without bubbles, otherwise it will cause measurement instability and excessive deviation.

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4.8 安装方式的选择

如果被测介质含有固体颗粒或浆液，建议垂直安装（流向自下而上），避免固体颗粒沉积在流量计测量管内。流量计在水准或倾斜安装时，其电极轴线应该处于水准位置。假如电极轴线与地面垂直，则上方的电极附近容易聚集气泡。

4.8 installation options

If the test medium contains solid particles or slurry, it is recommended to install vertically (from bottom to top) to avoid deposition of solid particles in the flow meter measuring tube. When the flow meter is installed in a horizontal or inclined position, the electrode axis shall be in a horizontal position. If the electrode axis is perpendicular to the ground, bubbles are easily gathered near the upper electrode.

4.9 管道安装

避免流量计上下游管道不对中或倾斜，并保持与上下游法兰对准。安装前清除焊接残渣和凸起物，并垫上垫片。流量计装到管道上后应禁止在该管段上进行电焊作业，防止衬里受损。

4.9 Pipeline installation

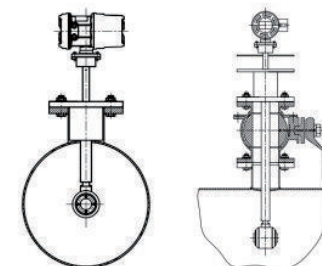
Avoid upstream or tilting of the flow meter upstream and downstream and keep aligned with the upstream and downstream flanges. Clean the welding residue and protrusions before installation and place the gasket on the pad. After the flow meter is installed on the pipe, it shall be prohibited from welding on the pipe section to prevent damage to the lining.

4.10 插入式电磁流量计安装图

现场管道上开取DN100/DN50口径的孔，再焊接通径DN100/DN50的管和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。

注意：插入式的电极需和管道介质流动方向垂直！



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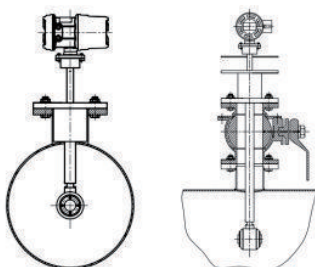


4.10 Insertion electromagnetic flow meter installation diagram

DN100/DN50 diameter holes are opened on the site pipe, and the pipe with DN100/DN50 and DN100 PN1.6MPa/DN50 PN1.6MPa method The standard flange fixed plug-in electromagnetic flow meter is mounted on the flange.

In the standard flange fixed plug-in electromagnetic flow meter installation flange on the basis of the addition of all-DN100/DN50 ball valve. Users can not cut off the media in the case of the standard online plug-in electromagnetic flow meter to the highest point, close the ball valve, remove the flow meter.

Note: The plug-in electrode must be perpendicular to the flow direction of the pipe media!



五、接地

Grounding

由于电磁式流量计的感应信号很弱，易受杂讯影响。因此，传感器、转换器的基准电位必须与被测液体相同，共同接地。电磁式流量计两侧安装接地环或接地电极的作用就是建立流量计壳体和液体的等电位。

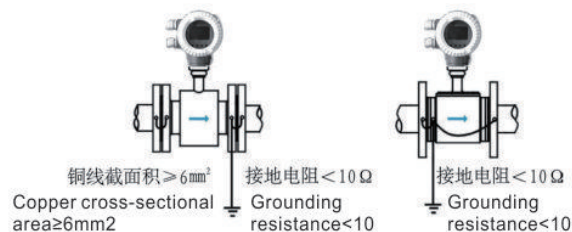
As the electromagnetic flow meter sensor signal is weak, vulnerable to noise. Therefore, the sensor, converter reference potential must be the same with the measured liquid, common ground. Electromagnetic flow meter on both sides of the installation of grounding ring or ground electrode role is to establish the flow meter shell and liquid equipotential.

5.1 普通金属管道（一般不需要装接地环）

管道本身接地良好时，接地线可省略，但必须通过流量计所配的接地线使壳体和液体相通。

5.1 Ordinary metal pipes (generally do not need to install the ground ring)

When the pipe itself is well grounded, the grounding wire can be omitted, but the casing must be connected to the liquid through the ground wire provided by the flow meter.



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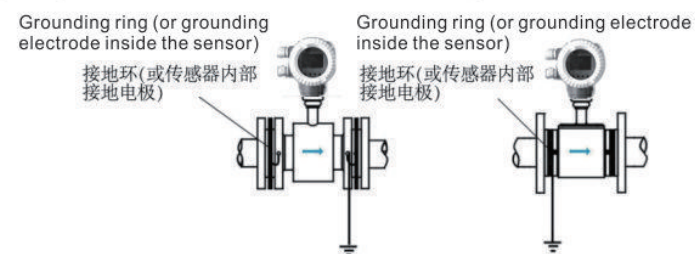


5.2 绝缘管道（塑胶管、衬胶管等）

传感器两端应安装接地环（或接地电极）并通过接地线使被测介质与大地短接。

5.2 Insulated pipe (plastic pipe, lined hose, etc.)

At both ends of the sensor shall be installed grounding ring (or ground electrode) and through the ground wire to the measured medium and the ground shorted.

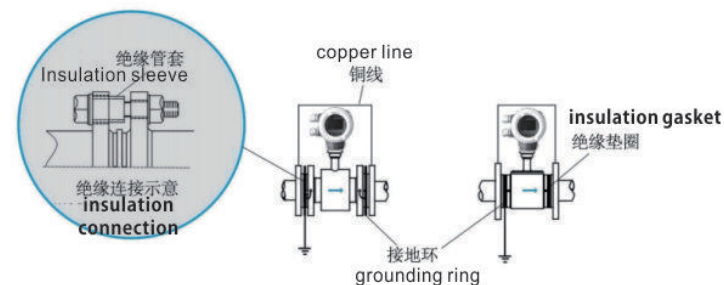


5.3 阴极保护管道

管道法兰之间用铜线相连，但必须与接地线绝缘。

5.3 Cathodic protection piping

The pipe flanges are connected with copper wire, but must be insulated from the ground wire.



注：当传感器安装在绝缘管道时，可免安装接地环。

Note: When the sensor is installed in the insulated pipe, can not install the grounding ring.

5.4 电磁热能表的安装

- 供暖系统应在入楼处安装过滤器。供热前对系统管道进行清洗，防止安装管道时落入的杂物堵塞热量表。传感器最好垂直安装（流体自下而上流动），在这种位置下，当液体不流动时，固体物质沉淀，而油类物质上浮，都不会附着在电极上。如果水平安装，必须保证管道内充满液体，以避免由气穴而影响测量精确度；
- 管道内径应与传感器内径保持一致，以避免节流现象；
- 安装环境应远离强磁场设备以防干扰。（如发动机，变压器，无线电发射机，电解池或者其他引起电磁干扰的场所）；
- 热量表可安装在进水管也可以安装在回水管，安装位置应方便查表。传感器的上游应有不小于5DN的直管段长度，若上游有非全开的闸门或调节阀，则连接闸阀与传感器的直管段长度应增加到10DN，下游直管段长度一般不小于3DN即可；
- 传感器与转换器之间连接电缆最大长度为100m；
- 动用电气焊时，焊口必须远离传感器，严防因传感器过热或因焊渣飞入而损坏衬里；
- 温度传感器电缆线长为4米，回水温度传感器的位置与热量表的位置不能超过线长，如超过可协议供货；
- 接地线线径应不小于2.5mm²，且尽可能的短，并且避免和其它设备公用接地（推荐使用单独接地）。

5.4 Installation of electromagnetic heat meter

- The heating system shall be fitted with a filter at the floor. Heat the system before the pipeline to clean, to prevent the installation of pipes into the debris when the heat block card. The sensor is preferably mounted vertically (the fluid flows from bottom to top). If installed horizontally, it is necessary to ensure that the piping is filled with liquid to avoid measurement accuracy by cavitation;
- The pipe diameter shall be consistent with the inside diameter of the sensor to avoid throttling.
- The installation environment shall be kept away from strong magnetic field equipment to prevent interference. (Such as engines, transformers, radio transmitters, electrolytic cells, or other places that cause electromagnetic interference);
- The heat meter can be installed in the inlet pipe can also be installed in the return pipe, the installation location shall be easy to look up the table. The upstream of the sensor shall be not less than 5DN straight pipe length, if the upstream has a non-full open gate or control valve, then connect the gate valve and the sensor straight pipe length shall be increased to 10DN, downstream straight pipe length is generally not less than 3DN;
- The maximum length of the cable between the sensor and the converter is 100m;
- When using electrical welding, the weld must be kept away from the sensor to prevent damage to the lining due to overheating of the sensor or flying due to welding slag;
- The temperature sensor cable length is 4 meters, the return water temperature sensor position and heat meter position can not exceed the line length, such as more than the agreement can be supplied;
- The ground wire diameter shall be no less than 2.5mm², and as short as possible, and avoid grounding with other equipment (recommended for separate grounding).

六、连接

Connect

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 $\geq 0.75\text{mm}^2$ ）。接线完成后必须检查外壳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AC220V还是直流DC24V。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。

It must be in accordance with the "electromagnetic flow meter installation manual" legend and the requirements of wiring.

All cables must be 5 to 8mm outside the jacket line, power supply with 2-core jacket line (conductor cross-sectional area $\geq 0.75\text{mm}^2$). After the wiring is completed, check the housing cover and the cable to tighten the blue connector to avoid dust and water entry. After wiring, tighten the blue head can not be replaced to prevent leakage and moisture.

Field alignment using threading pipe, shall pay attention to the bottom of the threading tube to set aside the drain, to prevent water through the threading pipe into the electromagnetic flow meter electronic unit and the body.

Power supply Note the distinction is AC AC 220V or DC DC 24V. Note the polarity of the power supply. A power supply error can cause malfunction or damage to the instrument.

It will support the grounding wire and upstream and downstream metal pipe connected to maintain the sensor shell and the measured medium potential.

6. 1接线图

电磁流量计端子接线图

6.1 Wiring diagram

Electromagnetic flow meter terminal wiring diagram

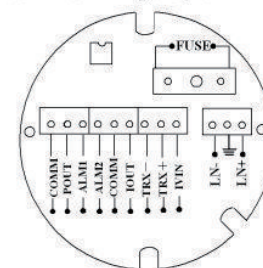


图4. 3. 2接线端子图
Figure 4.3.2 Terminal block diagram

电磁流量计使用说明书

Electromagnetic Flow Meter Operation Instruction



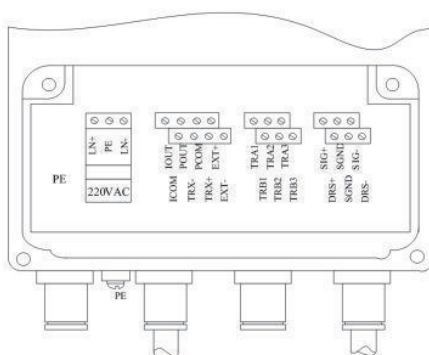
各接线端子标示含义如下：

The terminals are marked as follows:

POUT:	双向流量频率 / 脉冲输出 Bidirectional 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 (ground)
COMM:	频率、脉冲、电流公共端（地线） Frequency, pulse, current common (ground)
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

电磁热能表端子接线图

Electromagnetic heat meter terminal connection diagram



电磁流量计使用说明书

Electromagnetic Flow Meter Operation Instruction



各接线端子标示含义如下：

The terminals are marked 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	TRB1	出口温度输入 Outlet temperature input
TRB2	出口温度输入 Outlet temperature input	TRB3	出口温度输入 Outlet temperature input
TRA4	预留 Reserved	TRB4	预留 Reserved
SIG +	信号1 Signal 1	SGND	信号地 Signal ground
SIG -	信号2 Signal 2	DRS +	激励屏蔽1 Excitation shield 1
DRS-	激励屏蔽2 Excitation shield 2	MTDR	保留 Reserved
EXT +	励磁电流 + Excitation current +	EXT-	励磁电流 - Excitation current -
POUT	频率输出正 Frequency output positive	PCOM	频率输出地 Frequency output ground
IOUT	电流输出正 Current output positive	ICOM	电流输出地 Current output ground
TRX-	电流输出正 Communication interface (RS485-B)	TRX+	电流输出地 Communication interface (RS485-A)
LN -	220V电源输入 220V power input	LN +	220V电源输入 220V power input
Switch A	开关A Thermal resistance selection	DIOP	预留 Reserved

注：图1.3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。

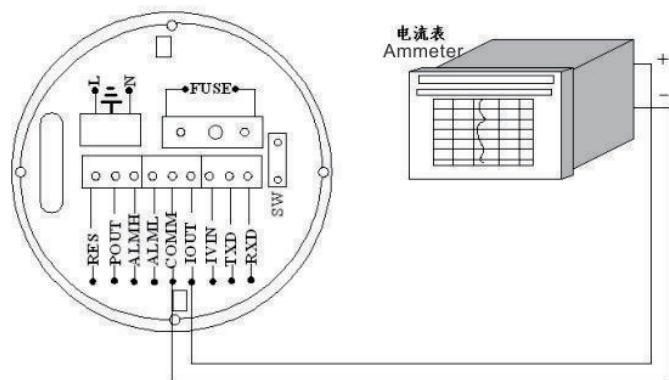
Note: Figure 1.3 Switch A is the pt1000 thermal resistance with the pt100 thermal resistance selector switch. Factory default pt1000 thermal resistance, switch 1 and 2 are set to OFF. If the user uses Pt100 thermal resistance, you need to switch 1 and 2 can be set to ON.

6.2 连接电线电缆特性及连接要求

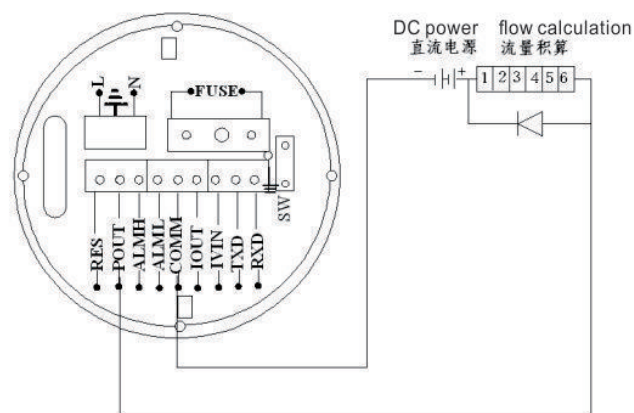
电磁流量计脉冲电流输出、报警电流输出外接供电电源和负载见图4.4.4。使用感性负载时应如图加续流二极管。

6.2 Connection of wire and cable characteristics and connection requirements

Electromagnetic flow meter pulse current output, alarm current output External power supply and load are shown in Figure 4.4.4. Use the inductive load as shown in Fig.



电流输出接线图 Current output wiring diagram



电磁计数器接线 Electromagnetic counter wiring

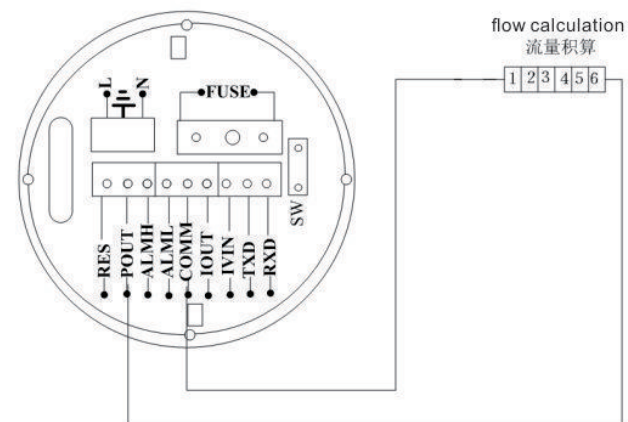
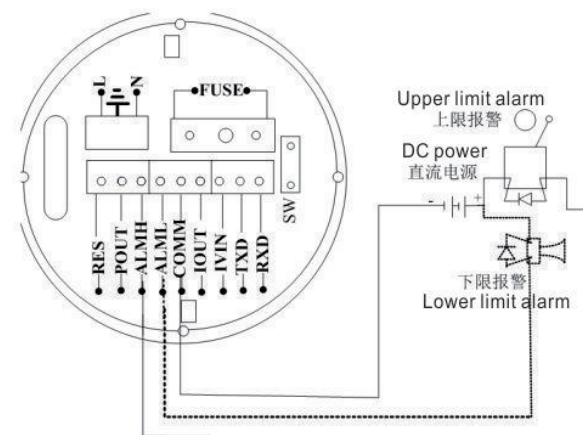
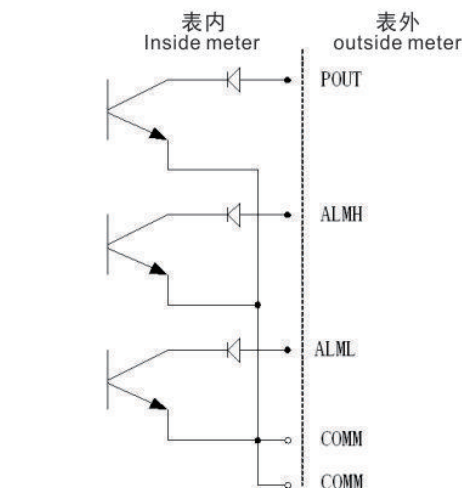


图4.4.4 (c) 电子计数器接线 Figure 4.4.4 (c) Electronic counter wiring



报警输出接线 Alarm output wiring



表内OC门连接方式 Inside OC door connection

电磁热能表频率、脉冲输出外接供电电源和负载见下图。使用感性负载时应如图加续流二极管。

Electromagnetic heat meter frequency, pulse output external power supply and load are as shown below. Fly-wheel diode shall be added when using the inductive load

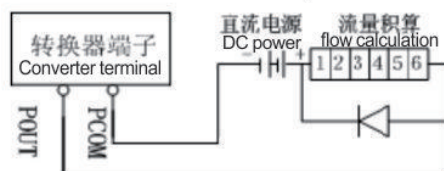


图1.3 外供电电源接电子计数器
Figure 1.3 External power supply to the electronic counter

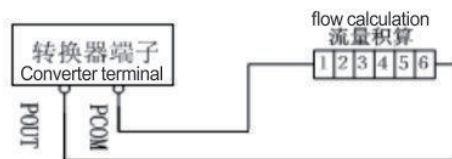


图1.4 内供电电源接电子计数器
Figure 1.4 Power supply connected to the electronic counter

电流输出接线 Current output wiring

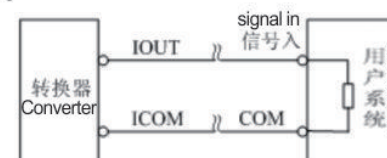


图1.5 电流输出
Figure 1.5 Current output

表内OC门连接方式 Inside OC door connection

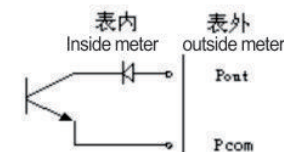


图1.6 表内OC门连接方式
Figure 1.6 Inside OC door connection

6.3 转换器安装接地要求

转换器壳体接地端子应采用不小于1.6mm²接地铜线接大地。从转换器壳体到大地的接地电阻应小于10Ω。

首先将Φ20紫铜管，切割成1700mm长（根据需要可加长）做成地钉埋地1500mm（注意：埋地钉时，在地钉尖端撒一层碎木炭，再浇灌盐水）；

其次将4mm²紫铜线焊接在地钉上，最后将地线连接到传感器法兰、接地环、管道法兰上，见图1.7。

注意：固定地线螺钉、弹垫、平垫要求用不锈钢材料。

6.3 Converter installation grounding requirements

Converter shell grounding terminal shall be used not less than 1.6mm² grounding copper wire connected to the earth. The grounding resistance from the converter housing to the ground shall be less than 10Ω.

First Φ20 copper tube, cut into 1700mm long (according to need to be lengthened) made of nail buried 1500mm (Note: buried nails, spat on the tip of the sprinkle a layer of wood, and then irrigation salt);

Followed by 4mm² copper wire welded to the nail, and finally the ground wire connected to the sensor flange, grounding ring, pipe flange, see Figure 1.7.

Note: fixed ground screw, spring pad, flat pad requirements with stainless steel.

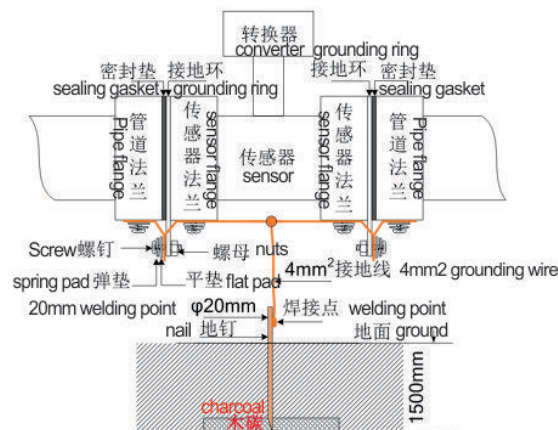


图1.7 转换器接地示意图
Figure 1.7 schematic diagram of converter grounding

6.4 数字量输出及计算

数字输出是指频率输出和脉冲输出。频率输出和脉冲输出在接线用的是同一个输出点，因此，用户不能同时选用频率输出和脉冲输出，而只能选用其中的一种。

6.4.1 频率输出：

频率输出的范围为0~5000HZ，频率输出对应的是流量百分比，频率输出的上限可调。用户可选0~5000HZ，也可选低一点的频率：如0~1000HZ或0~5000HZ等。

频率输出方式一般用于控制应用，因为它反映百分比流量，若用户用于计量应用，则应选择脉冲输出方式。

6.4.2 脉冲输出方式：

脉冲输出方式主要用于计量方式，输出一个脉冲，代表管道流过一个当量的流体，如一个脉冲代表1L或代表1M3等。

脉冲当量分成：0.001L，0.01L，0.1L，1L，0.001 M3，0.01 M3，0.1 M3，1 M3。用户在选择脉冲当量时，应注意流量计流量范围和脉冲当量相匹配。

对于体积流量，计算公式如下：

$$QL = 0.0007854 \times D^2 \times V \quad (L/S)$$

$$QM = 0.0007854 \times D^2 \times V \times 10^{-3} \quad (M^3/S)$$

这里：D-管径 (mm)

V-流速 (m/s)

如果，管道流量过大而脉冲当量选的过小，将会造成脉冲输出超上限，所以，脉冲输出频率应限制在3000Hz以下。管道流量小而脉冲当量选的过大又会造成仪表很长时间才能输出一个脉冲。

另外，必须说明一点，脉冲输出不同于频率输出，脉冲输出是累积够一个脉冲当量就能输出一个脉冲，因此，脉冲输出不是很均匀的。一般测量脉冲输出应选用计数器仪表，而不应选用频率计仪表。

数字量输出的接线

数字量输出有二个接点：数字输出接点，数字地线接点，符号如下：

POUT ----- 数字输出接点；

PCOM ----- 数字地线接点；

POUT为集电极开路输出，用户接线时可参照如下电路：

6.4 Digital output and calculation

Digital output refers to the frequency output and pulse output. Frequency output and pulse output on the wiring with the same output point, therefore, the user can not use the frequency output and pulse output, but can only use one of them.

6.4.1 Frequency output:

Frequency output range of 0-5000HZ, the frequency output corresponds to the flow percentage, The upper limit of the frequency output is adjustable. Users can choose 0-5000HZ, also choose a lower frequency: such as 0-1000HZ or 0-5000HZ and so on.

The frequency output mode is typically used to control the application because it reflects the percentage flow, and if the user is using the metering application, the pulse output mode shall be selected.

6.4.2 Pulse output mode:

Pulse output is mainly used for measurement, the output of a pulse, on behalf of the pipeline through an equivalent of fluid, such as a pulse on behalf of 1L or on behalf of 1M3 and soon.

Piezoelectric equivalents: 0.001 L, 0.01 L, 0.1 L, 1 L, 0.001 M3, 0.01 M3, 0.1 M3, 1 M3. When selecting the pulse equivalent, the user shall pay attention to the flow meter flow range and the pulse equivalent match.

For volume flow, the formula is as follows:

$$QL = 0.0007854 \times D^2 \times V \quad (L/S)$$

$$QM = 0.0007854 \times D^2 \times V \times 10^{-3} \quad (M^3/S)$$

Here: D-diameter (mm)

V-flow rate (m/s)

If the pipeline flow is too large and the pulse equivalent selection is too small, will cause the pulse output over the upper limit, so the pulse output frequency shall be limited to 3000Hz below. Pipeline flow is small and the pulse equivalent is too large to cause the instrument for a long time to output a pulse.

In addition, it must be noted that the pulse output is different from the frequency output, the pulse output is accumulated enough for a pulse equivalent can output a pulse, so the pulse output is not very uniform. General measurement pulse output shall use the counter meter, and shall not use the frequency meter.

Digital output wiring

Digital output has two contacts: digital output contacts, digital ground contacts, symbols are as follows:

POUT ---- digital output contacts;

PCOM ---- digital ground contact;

POUT for the collector open circuit output, the user wiring can refer to the following circuit:

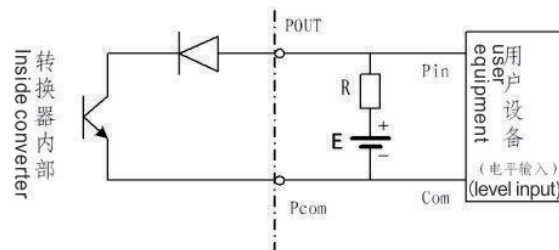
电磁流量计使用说明书

Electromagnetic Flow Meter Operation Instruction



数字量电平输出接法

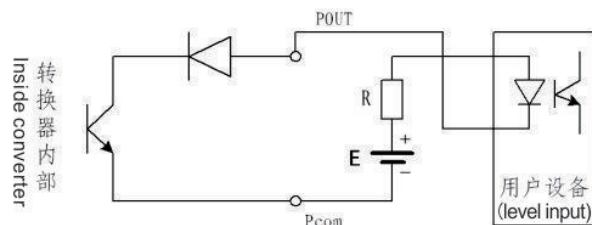
Digital level output connection



数字量电平输出接法
Digital level output connection

数字量输出接光电耦合器（如PLC等）

Digital output optocoupler (such as PLC)



数字量输出接光电耦合器
Digital output optocoupler

一般，用户光耦需10mA左右电流，因此， $E/R=10\text{mA}$ 左右。 $E=5\sim 24\text{V}$ 。

电磁流量计操作键盘定义与液晶显示

In general, the user optocoupler to about 10mA current, therefore, $E/R=10\text{mA}$ or so. $E=5\sim 24\text{V}$.

Electromagnetic flow meter operation keyboard definition and liquid crystal display

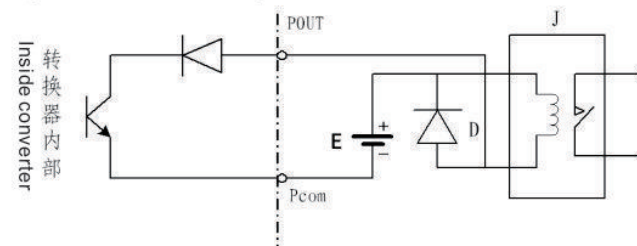
电磁流量计使用说明书

Electromagnetic Flow Meter Operation Instruction



数字量输出接继电器

Digital output connected to the relay



数字量输出参数表如下：
The digital output parameter table is as follows:

一般中间继电器需要的E为12V或24V。D为续流二极管，目前大多数的中间继电器内部有这个二极管。若中间继电器自身不含有这个二极管，用户应在外部接一个。

The general intermediate relay needs E is 12V or 24V. D for the freewheeling diode, the current majority of the middle of the relay inside the diode; if the intermediate relay itself does not contain this diode, the user shall connect one external.

数字量输出参数表如下：

The digital output parameter table is as follows:

POUT参数
POUT parameter

参 数 Parameters	测试条件 Test Conditions	最小值 Min	典型值 Typical	最大值 Max	单 位 Unit
工作电压 Operating Voltage	IC=100 mA	5	24	36	V
工作电流 Working current	$V_{ol}\leq 1.4\text{V}$	0	300	350	mA
工作频率 Working frequency	IC=100mA $V_{cc}=24\text{V}$	0	5000	7500	HZ
高电平 High level	IC=100mA	V_{cc}	V_{cc}	V_{cc}	V
低电平 Low level	IC=100mA	0.9	1.0	1.4	V

电磁流量计使用说明书 Electromagnetic Flow Meter Operation Instruction



6. 5模拟量输出及计算

模拟量输出

模拟量输出只有一种信号制：4~20mA信号制。使用时，用户通过参数设置在两种信号制中选择一种即可。

模拟量电流输出内部为24V供电，在4~20mA信号制下，可驱动750Ω的负载电阻。

模拟量电流输出对应流量的百分比流量，即：

对于4~20mA信号制，电流零点为4mA。

因此，为提高输出模拟量电流的分辨率，用户应适当选择流量计的量程。

流量计在出厂时，制造厂已将模拟量输出的各参数校准好。一般情况下，不需要用户再作调整。若出现异常情况，需要用用户校准模拟量输出时，可按下列操作规程进行。

模拟输出量调校

(1) 仪表调校准备：

仪表开机运行15分钟，使仪表内部达到热稳定。准备0.1%级电流表，或250Ω电阻和0.1%电压表，按下图接好。

6.5 analog output and calculation

Analog output

Analog output only one signal system: 4-20mA signal system. When used, the user can select one of the two signal systems by parameter setting.

Analog current output internal 24V power supply, in the 4-20mA signal system, can drive 750Ω load resistance.

Analog current output corresponds to the percentage flow of flow, ie:

For 4-20mA signal system, the current zero point of 4mA.

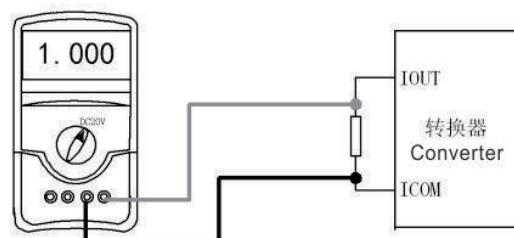
Therefore, in order to improve the output analog current resolution, the user shall be appropriate to select the flow meter range.

When the flow meter is shipped, the manufacturer has calibrated the parameters of the analog output. Under normal circumstances, users do not need to make adjustments. If an abnormality occurs, the user needs to perform the following procedure when calibrating the analog output.

Adjust the analog output

(1) Instrument calibration preparation:

The instrument is running for 15 minutes, so that the internal stability of the instrument. Prepare 0.1% ammeter, or 250Ω resistor and 0.1% voltmeter, press the figure to connect.



电磁流量计使用说明书 Electromagnetic Flow Meter Operation Instruction



(2) 电流“0”点修正：

将转换器设置到参数设置状态，选择“电流零点修正”项，进入，将标准信号源拨到“0”档，调整修正系数值，使电流表正好指示4mA ($\pm 0.004\text{mA}$)。

(3) 电流满度修正

选择“电流满度修正”参数，进入，将标准信号源拨到满量程档，调整转换器修正系数，使电流表正好指示20mA ($\pm 0.004\text{mA}$)。

调整好电流的“0”点和满量程值后，转换器的电流功能就能保证达到精度。转换器的电流输出线性度在0.1%以内。

(4) 电流线性度检查：

将标准信号源拨到75%，50%，25%，检查输出电流的线性度。

(2)Current "0" point correction:

Set the converter to the parameter setting state, select "Current zero correction" item, enter, set the standard signal source to "0", adjust the correction coefficient value, so that the ammeter just indicates 4mA ($\pm 0.004\text{mA}$).

(3)Current full scale correction

Select the "full current correction" parameter, enter, the standard signal source to full scale, adjust the converter correction factor, so that the ammeter just indicates 20mA ($\pm 0.004\text{mA}$).

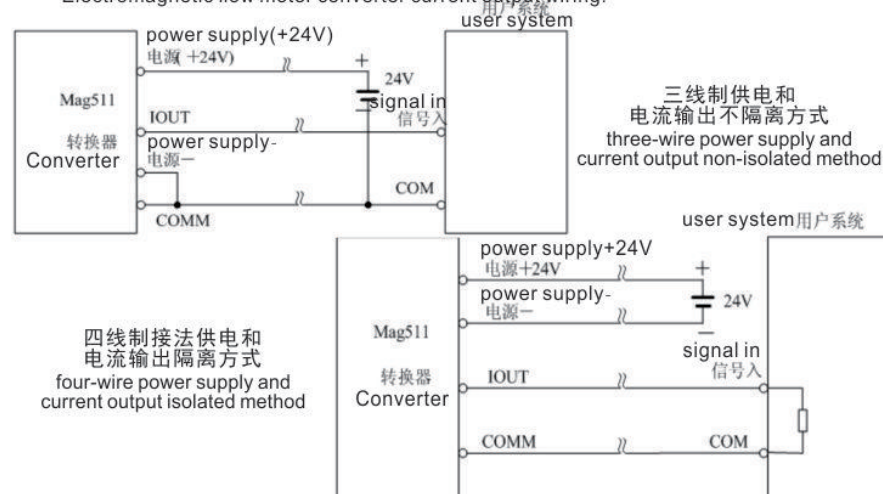
Adjust the current "0" point and full-scale value, the converter's current function can guarantee to achieve accuracy. The current output linearity of the converter is less than 0.1%.

(4)Current linearity check:

Set the standard source to 75%, 50%, 25%, check the output current linearity.

电磁流量计转换器电流输出接线：

Electromagnetic flow meter converter current output wiring:



七、安装注意事项

Installation precautions

7.1 搬运及衬里保护

切忌用棒或绳子穿过流量计测量管道将其吊运，因为测量管内衬一旦受到损坏，将造成流量计报废。

对DN80口径以上流量计，切忌用手或绳子拎着流量计的转换器或接线盒，因为转换器或接线盒的材质是强度较脆的铝合金，无法承受较大的重量。在储运、安装流量计的过程中，应时刻注意保护流量传感器的衬里，以免受到损坏。

7.1 Handling and lining protection

Do not use rods or ropes through the flow meter to measure the piping to lift it, because once the measuring tube lining is damaged, it will cause the flow meter to be scrapped.

DN80 caliber above the flow meter, shall not hand or rope carrying a flow meter converter or junction box, because the converter or junction box material is more brittle aluminum alloy, can not afford a larger weight. In the storage and transportation, installation of flow meter in the process, shall always pay attention to protect the flow sensor lining, so as not to be damaged.

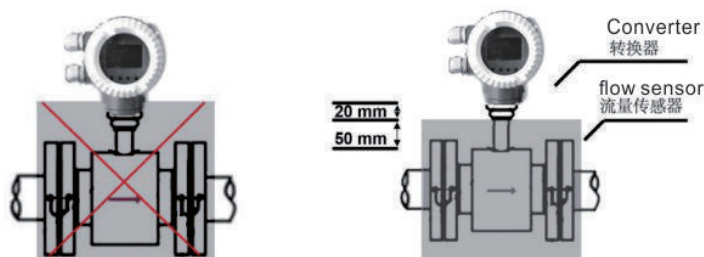


7.2 管道保温

在下图所示的位置用保温棉包裹好流量传感器。

7.2 pipe insulation

Place the flow sensor with insulation at the position shown below.



注：阴影部分指示应该被保温棉覆盖的地方。如果流量计像左图一样被错误地包裹住，那么流量计将会太热以至不能正常工作。应像右图一样进行包裹：保温棉与转换器底部保持有20mm的线性距离以利于有效冷却，同时流量传感器需被全部包裹住以良好隔热。

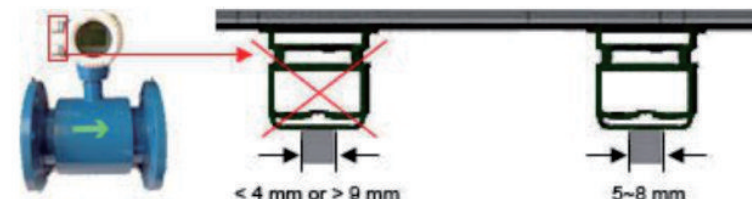
Note: The shaded section indicates where the insulation shall be covered. If the flow meter is wrapped as wrong as the left figure, the flow meter will be too hot to function properly. It shall be wrapped as shown on the right: the insulation cotton and the bottom of the converter to maintain a linear distance of 20mm in order to facilitate effective cooling, while the flow sensor needs to be wrapped in a good insulation.

7.3 线缆压盖

- 所有线缆压盖均是 M16×1.5，电缆外径适用范围是 5~8mm。
- 接线后，用胶水（例如硅胶）密封线缆与进线孔。
- 密封后请拧紧线缆压盖。否则，冷空气将进入接线盒形成冷凝水而损坏仪表。

7.3 Cable glands

- All cable glands are M16 × 1.5, cable outside the scope of application is 5-8mm.
- After wiring, seal the cable and the inlet hole with glue (e.g., silicone).
- Tighten the cable glands after sealing. Otherwise, the cold air will enter the junction box to form condensate and damage the instrument.



注意：必须密封线缆压盖入口，否则不能保证防水安装。

Note: The mouth must be sealed using the sealing cable; otherwise, the waterproof installation cannot be guaranteed.

7.4 连接后检查

- 电缆或设备是否受损（目视检查）？
- 供电电压与铭牌上的信息是否相符？
- 所用的电缆是否符合必要的技术规范？
- 安装的电缆是否具有恰当的松紧度？是否敷设得可靠？
- 电缆是否分类敷设并完全隔离？是否有环路和交叉点？
- 所有的螺丝端子是否安全拧紧？
- 是否已正确执行所有用于确保接地和电势平衡的措施？
- 是否已安装、安全紧固和正确密封所有电缆入口？
- 电缆布线是否使其成为环路中的“聚水器”？
- 是否安装并安全紧固所有的外壳盖板？

此外，对于采用现场总线通信的测量设备：

- 所有的连接组件（接线盒、接线箱、连接器等）是否正确地互连？
- 每个现场总线段在两端是否使用终端电阻？
- 现场总线电缆的最大长度是否符合技术规范？
- 电缆分支的最大长度是否符合技术规范？
- 现场总线电缆是否完全屏蔽并正确接地？

7.4 Check after connection

Is the cable or equipment damaged (visual inspection)?

Is the supply voltage consistent with the information on the nameplate?

Are the cables used to meet the necessary technical specifications?

Is the installed cable with proper tightness? Is it reliable?

Is the cable sorted and completely isolated? Are there loops and intersections?

Are all the screw terminals securely tightened?

Has all measures taken to ensure grounding and potential balance have been properly implemented?

Is it installed, secure tightened and properly sealed all cable entry?

Is the cable wiring making it a "water trap" in the loop?

Do you install and secure all the housing cover?

In addition, for the use of fieldbus communication measurement equipment:

Are all connection components (junction boxes, junction boxes, connectors, etc.) properly interconnected?

Does each fieldbus segment use terminating resistors at both ends?

Is the maximum length of the fieldbus cable compliant with the technical specifications?

Is the maximum length of the cable branch conforming to the technical specifications?

Is the fieldbus cable fully shielded and properly grounded?

八、仪表参数设置

Instrument parameter settings

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。

TK1000 series of electromagnetic flow meter converter, the sensor connected to the fluid pipe (whether it is calibrated or used), shall first do the following:

The pipe before and after the sensor with a good copper wire fastening connection

Grounding the sensor well

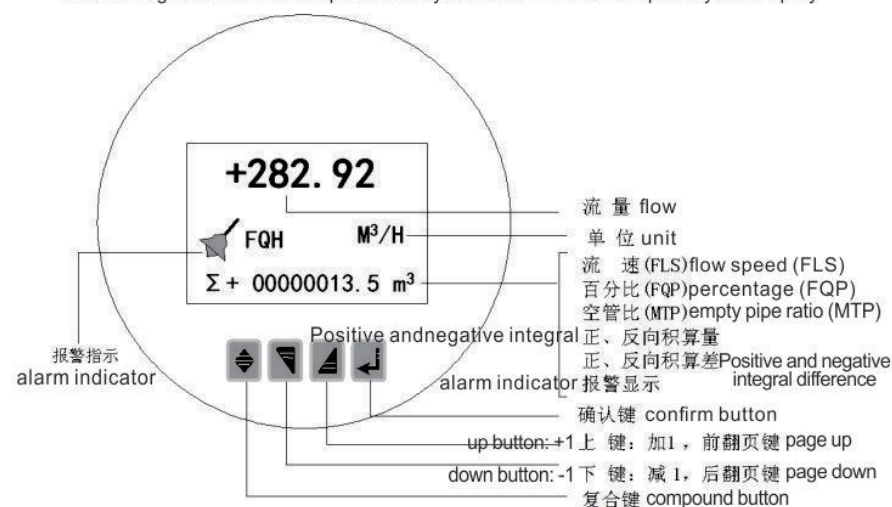
Adjust the instrument at zero to ensure that the fluid is stationary.

To ensure that the sensor electrode oxide film stable generation (electrode and fluid continuous contact 48 hours)

TK1000 series of electromagnetic flow meter LCD screen, user-friendly interface, easy to use, can display instantaneous flow, forward/reverse cumulative flow and various types of alarm information.

电磁流量计操作键盘定义与液晶显示

Electromagnetic flow meter operation keyboard definition and liquid crystal display



电磁流量计使用说明书 Electromagnetic Flow Meter Operation Instruction

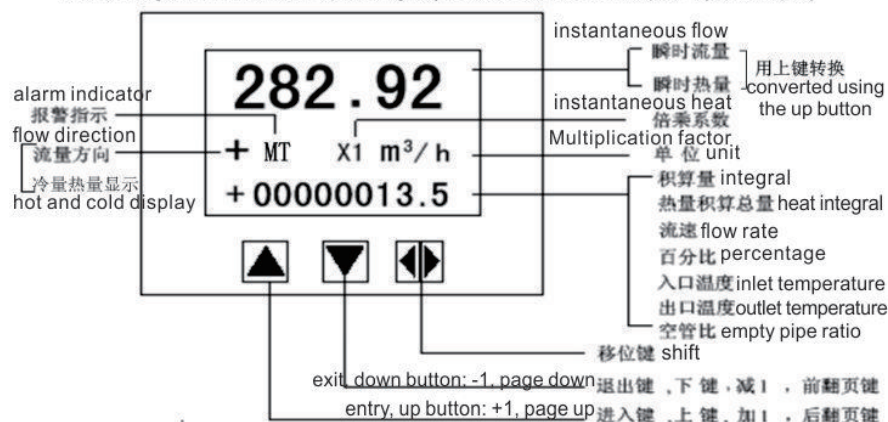


说明：在测量状态下，按“复合键 + 确认键”，出现转换器功能选择画面“参数设置”，按一下确认键，仪表出现输入密码状态，根据保密级别，按本厂提供的密码对应修改。再按“复合键 + 确认键”后，则进入需要的参数设置状态。如果想返回运行状态，请按住确认键数秒。

Note: In the measurement state, press the "composite key + confirm button", the converter function selection screen "parameter settings", press the OK button, the instrument appears enter the password status, according to the confidentiality level, according to the factory to provide the corresponding password changes. The And then press the "complex key + confirm button", then enter the required parameter setting state. If you want to return to the running state, press and hold the Enter key for a few seconds.

电磁热能表操作键盘定义与液晶显示

Electromagnetic heat meter operating keyboard definition and liquid crystal display



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 powered on, it automatically enters the measurement state. In the automatic measurement state, the instrument automatically completes the measurement function and displays the corresponding measurement data. In the parameter setting state, the user uses the three panel keys to complete the instrument parameter setting.

8. 1转换器参数及操作

8. 1. 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。

按键功能

自动测量状态下键功能

上 键：循环选择屏幕下行显示内容；

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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。

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”。

（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。

8.1 converter parameters and operation

8.1.1 Electromagnetic flow meter converter parameters and operation

When the instrument is powered on, it automatically enters the measurement state. In the automatic measurement state, the instrument automatically completes the measurement function and displays the corresponding measurement data. In the parameter setting state, the user uses the four panel keys to complete the instrument parameter setting.

Key function

Automatic measurement of state key function

On the key to select the screen to display the contents of the screen;

Complex key + confirm key: enter the parameter setting state;

Confirm key: Returns the automatic measurement status.

In the measurement state, LCD display contrast adjustment method, through the "key + key" or "key + key" to adjust the appropriate contrast;

Parameter setting state of the key function

The next key: the number of the cursor minus 1;

On the key: the number of the cursor plus 1;

Key + key: the cursor to the left;

Compound key + up key: cursor right shift;

Confirm key: enter/exit submenu;

Acknowledgment key: In any state, press for two seconds to return to the automatic measurement state.

Note: (1) When using "compound key", press the compound key and hold down the "up key" or "down key" at the same time.

(2) In the parameter setting state, no key operation within 3 minutes, the instrument automatically returns to the measurement state.

(3) Flow zero correction flow direction selection, you can move the cursor to the left of the "+" or "-", with "up" or "down" to switch to the actual flow to the opposite.

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8. 2参数设置功能及功能键操作

8. 2. 1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；

参数编号	功能内容	说 明
1	参数设置	选择此功能，可进入参数设置画面
2	总量清零	选择此功能，可进行仪表总量清零操作
3	系数更改记录	选择此功能，可进行查看流量系数修改记录

8.2Parameter setting functions and function key operation

8.2.1Function selection screen

Press the "key + confirm key" to enter the function selection screen, and then press the "up key" or "down key" to select, in this screen a total of three functions to choose;

Parameter Number	Function	Description
1	Parameter setting	Select this function to enter the parameter setting screen
2	Total Clear	This function allows you to clear the total amount of the meter
3	Coefficient Change	Log Select this function to view the flow coefficient modification record

8. 2. 2参数设置

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。

8.2.2Parameter settings

Press "OK" key to confirm the "parameter setting" function, enter the function selection screen "parameter setting", and then press the Enter key to enter the input password status, "00000" state, enter the password to enter the "Confirm key" to enter the parameter setting screen.

8. 2. 3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。

8.2.3Total Clear

Press the "key" to "clear", enter the total clear password, press the "complex key + confirm button", press the "key" When the total clear password automatically becomes "00000", the instrument clear function is completed, the total amount of 0 inside the instrument.

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8. 2. 4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”（详见附录3）

8.2.4Coefficient change records

Press the "key + confirm key" to display the "parameter settings" function, and then press the "up key" page to "coefficient to modify the record" (see Appendix 3)

参数设置菜单

共有54个参数，使用仪表时，用户应根据具体情况设置各参数。参数一览表如下：

参 数	参数文字	设置方	参数范围	密 码
1	语言	选择	中文、英文	2
2	仪表通讯地址	置数	0~99	2
3	仪表通讯速度	选择	300~38400	2
4	测量管道口径	选择	3~3000	2
5	流量单位	选择	L/h、L/m、L/s、m3/h、m3/m、m3/s	2
6	仪表量程设置	置数	0~99999	2
7	测量阻尼时间	选择	1~64	2
8	流量方向择项	选择	正向、反向	2
9	流量零点修正	置数	0~±9999	2
10	小信号切除点	置数	0~599.99%	2
11	允许切除显示	选择	允许/禁止	2
12	流量积算单位	选择	0.001m3~1m3、0.001L~1L	2
13	反向输出允许	选择	允许、禁止	2
14	电流输出类型	选择	4~20mA	2
15	脉冲输出方式	选择	频率 / 脉冲	2
16	脉冲单位当量	选择	0.001m3~1m3、0.001L~1L	2
17	频率输出范围	选择	1~5999 Hz	2
18	空管报警允许	选择	允许/禁止	2
19	空管报警阈值	置数	59999 %	2
20	上限报警允许	选择	允许/禁止	2
21	上限报警数值	置数	000.0~599.99 %	2
22	下限报警允许	选择	允许/禁止	2
23	下限报警数值	置数	000.0~599.99 %	2
24	励磁报警允许	选择	允许/禁止	2
24	总量清零密码	置数	0~99999	3
26	传感器编码1	用户设	出厂年、月 (0~99999)	4
27	传感器编码2	用户设	产品编号 (0~99999)	4
28	励磁方式选择	选择	方式1、2、3	4
29	传感器系数值	置数	0.0000~5.9999	4
30	流量修正允许	选择	允许/禁止	2

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参 数	参数文字	设置方	参数范围	密 码
31	流量修正点1	用户设	按流速设置	5
32	流量修正数1	用户设	0.0000~1.9999	5
33	流量修正点2	用户设	按流速设置	5
34	流量修正数2	用户设	0.0000~1.9999	5
35	流量修正点3	用户设	按流速设置	5
36	流量修正数3	用户设	0.0000~1.9999	5
37	流量修正点4	用户设	按流速设置	5
38	流量修正数4	用户设	0.0000~1.9999	5
39	正向总量低位	可以修	00000~99999	5
40	正向总量高位	可以修	0000~9999	5
41	反向总量低位	可以修	00000~99999	5
42	反向总量高位	可以修	0000~9999	5
43	尖峰抑制允许	选择	允许/禁止	5
44	尖峰抑制系数	选择	0.010~0.800m/s	3
45	尖峰抑制时间	选择	400~2500ms	3
46	保密码1	用户可	00000~99999	3
47	保密码2	用户可	00000~99999	5
48	保密码3	用户可	00000~99999	5
49	保密码4	用户可	00000~99999	5
50	电流零点修正	置数	0.0000~1.9999	5
51	电流满度修正	置数	0.0000~3.9999	5
52	出厂标定系数	置数	0.0000~5.9999	5
53	仪表编码1	厂家设	出厂年、月 (0-99999)	6
54	仪表编码2	厂家设	产品编号 (0-99999)	6

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Parameter setting menu

A total of 54 parameters, the use of instrumentation, the user shall set the parameters according to the specific circumstances. The parameter list is as follows:

Param	Parameter text	Set by	Parameter range	Pass
1	Language	Select	Chinese English	2
2	Instrument	Set	0~99	2
3	Instrument	Select	300~38400	2
4	Measure the	Select	3~3000	2
5	Flow unit	Select	L/h、L/m、L/s、m3/h、m3/m、m3/s	2
6	Instrument	Set	0~99999	2
7	Measure the	Select	1~64	2
8	Flow direction	Select	Positive, reverse	2
9	Flow zero	Set	0~±9999	2
10	Small signal	Set	0~599.99%	2
11	Allow to	Select	Able/disable	2
12	Flow total unit	Select	0.001m3~1m3 、0.001L~1L	2
13	Reverse output	Select	Able/disable	2
14	Current output	Select	4~20mA	2
15	Pulse output	Select	Frequency/pulse	2
16	Pulse unit	Select	0.001m3~1m3 、0.001L~1L	2
17	Frequency	Select	1~ 5999 Hz	2
18	Air flow	Select	Able/disable	2
19	Upper limit	Set	59999 %	2
20	Upper limit	Select	Able/disable	2
21	Lower limit	Set	000.0~ 599.99 %	2
22	Lower limit	Select	Able/disable	2
23	Excitation	Set	000.0~599.99 %	2
24	Clear the total	Select	Able/disable	2
24	Sensor code 1	Set	0-99999	3
26	Sensor code 2	User	Factory year, month (0-99999)	4
27	Excitation	User	Product Number (0-99999)	4
28	Sensor	Select	Way 1, 2, 3	4
29	Flow	Set	0.0000~5.9999	4
30	Flow	Select	Able/disable	2
31	Flow	User	Set by flow rate	5
32	Flow	User	0.0000~1.9999	5
33	Flow	User	Set by flow rate	5
34	Flow	User	0.0000~1.9999	5
35	Flow	User	Set by flow rate	5
36	Flow	User	0.0000~1.9999	5

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Param	Parameter text	Set by	Parameter range	Pass
37	Flow	User	Set by flow rate	5
38	Flow	User	0.0000~1.9999	5
39	Positive total	Can be	00000~99999	5
40	Positive total	Can be	0000~9999	5
41	Reverse total	Can be	00000~99999	5
42	Reverse total	Can be	0000~9999	5
43	Spike	Select	Able/disable	5
44	Spike	Select	0.010~0.800m/s	3
45	Spike	Select	400~2500ms	3
46	Security code	User	00000~99999	3
47	Security code	User	00000~99999	5
48	Security code	User	00000~99999	5
49	Security code	User	00000~99999	5
50	Current zero	Set	0.0000~1.9999	5
51	Current full	Set	0.0000~3.9999	5
52	Factory	Set	0.0000~5.9999	5
53	Instrument	Manufact	Factory year, month (0-99999)	6
54	Instrument	Manufact	Product Number (0-99999)	6

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。

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。

Instrument parameters determine the instrument running status, calculation methods, output methods and status. Proper selection and setting of instrument parameters allows the instrument to run at its best and get high measurement accuracy and measurement output accuracy.

The instrument parameter setting function has a 6-level password. Among them, 1 to 5 for the user password, the sixth level for the factory password. The user can use the Level 5 password to reset the first to fourth level passwords.

Regardless of the password used, the user can view the instrument parameters. But users want to change the instrument parameters; you have to use different levels of password.

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

Level 2 password (factory value 03210): the user can change 1-24 instrument parameters;

Level 3 password (factory value 06108): the user can change 1-25 instrument parameters;

Level 4 password (factory value 07206): the user can change 1-29 instrument parameters;

Level 5 Password (fixed value): The user can change the instrument parameters from 1 to 52.

Recommended by the user a higher level of personnel to master, level 5 password; Level 4 password, mainly used to set the total; 1st to 3rd level password, by the user to decide what level of staff to master.

8.1.2 电磁热能表转换器参数及操作

按键功能

a) 自动测量状态下键功能

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。

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:

8.1.2 Electromagnetic heat meter converter parameters and operation

Key function

A) Automatically measure the status of the key function

On the key: instantaneous heat (cold) and instantaneous flow conversion; heat display: H, cold display: R.

Down key: Select the screen to display the contents of the cycle;

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

Contrast adjustment: Top key + Lower key (long press) Contrast darker; Up key + Shift key (long press) Contrast is bright;

B) Key function in parameter setting state

The next key: the cursor at the number minus 1, before the page;

On the key: the cursor at the number plus 1, after the page;

Press the Shift key to move the cursor under the up key and press the key to enter the submenu.

Press the Shift key to move the cursor under the down key and press the key to return to the previous menu.

Parameter setting functions and function key operation

To set or modify the instrument parameters, the instrument must be entered from the measurement state into the parameter setting state. In the measurement state, press the "shift key", the instrument into the function selection screen "instrument parameter settings", and then press the shift button to move the cursor under the "key" below, press the "key" to enter the input password "00000" state, enter the password and press the shift meta key to move the cursor to the "key" below, press the "key" to enter the selection operation main menu, as shown below:



图3.2 Figure 3.2

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 the "up key" can, if you want to enter the main menu to rewrite sub-menu parameters, please move the cursor to the "key" below, press the "key" instrument into the current main menu submenu, As shown:



图3.3 Figure 3.3

如若进入此子菜单，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，两级密码分别用于不同保密级别的操作者。

If you enter this submenu, move the cursor to "under" and press the key to overwrite the parameter.

According to the confidentiality level, the factory provides the corresponding password changes. Press "Shift key" to enter the desired function selection screen.

Instrument design has a 2-level password, where a user can set their own password value, 2 passwords for the fixed password value; two levels of password were used for different levels of security operators.

功能选择画面

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：

参数编	功能内容	说 明
1	仪表参数设	选择此功能，可进入参数设置画面
2	记录总量清	选择此功能，可进行仪表总量清零
3	月积总量显	选择此功能，可查看32个月的月积
4	掉电计时显	选择此功能，可查看32次掉电记录
5	系数修改记	预留

Function selection screen

Press the "shift key" to enter the function selection screen, and then press the "enter key" to select, in this picture a total of five functions to choose;

Parameter No	Functional content	Description
1	Instrument parameter settings	Select this function to access the parameter setting screen
2	Total amount of records is cleared	Select this function to clear the total amount of the instrument
3	Monthly total display	Select this function to view the total volume of 32 months
4	Power down time display	Select this function to view 32 power-down records
5	Coefficient change record	Reversed

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。

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。

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）；

Instrument parameter settings

Press the "Shift key" to display the "parameter setting" function, enter the instrument password, press the "shift key" to move the cursor to the "enter key" below, press the "enter key" to enter the parameter setting state.

The total amount of records is cleared

Press the "Shift key" to display "instrument parameter settings", and then press the "up key" page to "record the total clear", enter the total clear password, press the "shift key" to move the cursor to "Enter the key" below, press the "enter key", when the total clear password automatically become "00000", the instrument clear function is completed, the total amount of 0 inside the instrument.

Monthly total display

Instrument internal design with no power clock (internal battery-powered), can work for more than 5 years. If you want to use the total volume and power-down time function, you must ensure that the internal power-down clock is working properly;

Adjust the clock year, month, day, hour, minute, second value;

To ensure that the internal battery power sufficient (5 years for a battery);

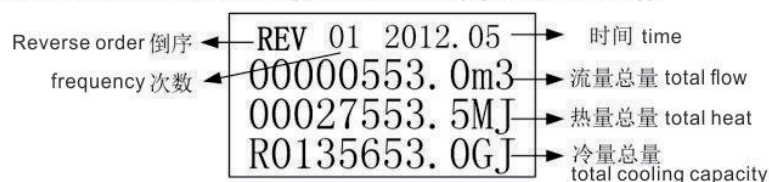


图3. 4月积总量
Figure 3.4 Months total volume

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！

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

The total amount of monthly data can record up to 32 times the data, when more than 32 times, the new record automatically in turn overwrite the original data!

Power down time display

Use the total amount of the same month. Can record up to 32 power-down records, can record 9999 times power-down

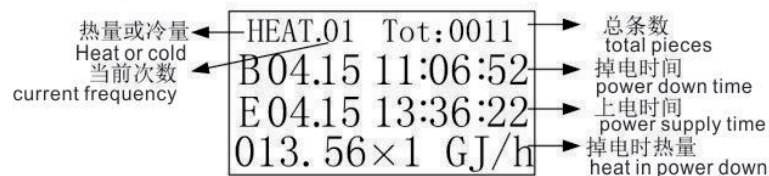


图3. 5掉电计时
Figure 3.5 Power-down timing

8. 2仪表详细参数说明

语言

电磁转换具有中、英文两种语言，用户可自行选择操作。

仪表通讯地址

指多机通讯时，本表的通讯地址，可选范围：01 ~ 99号地址，0号地址保留。

仪表通讯速度

仪表通讯波特率选择范围：300、600、1200、2400、4800、9600、19200、38400。

流量单位

在参数中选择流量显示单位，仪表流量显示单位有：L/s、L/m、L/h、m3/s、m3/m、

m3/h用户可根据工艺要求和使用习惯选定一个合适的流量显示单位。

仪表量程设置

仪表量程设置是指确定上限流量值，仪表的下限流量值自动设置为“0”。

因此，仪表量程设置确定了仪表量程范围，也就确定了仪表百分比显示、仪表频率输出、仪表电流输出与流量的对应关系：

仪表百分比显示值=(流量值测量值 / 仪表量程范围) * 100 %;

仪表频率输出值=(流量值测量值 / 仪表量程范围) * 频率满程值;

仪表电流输出值=(流量值测量值 / 仪表量程范围) * 电流满程值 + 基点;

仪表脉冲输出值不受仪表量程设置的影响;

测量阻尼时间

长的测量滤波时间能提高仪表流量显示稳定性及输出信号的稳定性，适于总量累计的脉动流量测量。短的测量滤波时间表现为快地测量响应速度，适于生产过程控制中。测量滤波时间的设置采用选择方式。

流量方向择项

如果用户认为调试时的流体方向与设计不一致，用户不必改变励磁线或信号线接法，而用流量方向设定参数改动即可。

流量零点修正

零点修正时应确保传感器管内充满流体，且流体处于静止状态。流量零点是用流速表示的，单位为 m/s。

8.2 Detailed description of the instrument

Language

Electromagnetic converter with Chinese and English languages, the user can choose their own operation.

Instrument communication address

It refers to the multi-machine communication, the communication address of this table, optional range: 01-99 address, 0 address reservations.

Instrument communication speed

Instrumentation communication baud rate selection range: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

Flow unit

In the parameter selection flow display unit, instrument flow display units are: L/s, L/m, L/h, m3/s, m3/m, m3/h Users can choose according to process requirements and habits of a suitable Flow display unit.

Instrument range setting

Meter range setting is to determine the upper limit flow value; the lower limit of the instrument flow rate is automatically set to "0".

Therefore, the instrument range setting to determine the instrument range, also determines the percentage of the instrument display, the instrument frequency output, the instrument current output and the flow of the corresponding relationship:

Meter percentage display value=(flow value measured value/instrument range) * 100%;

Meter frequency output value=(flow value measured value/instrument range) * frequency full value;

Meter current output value=(flow value measured value/instrument range) * current full value + base point;

The instrument pulse output value is not affected by the instrument range setting;

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Measure the damping time
Long measurement of the filter time can improve the instrument flow display stability and stability of the output signal, suitable for the cumulative amount of pulsating flow measurement. The short measurement filter time performance is fast to measure the response speed and is suitable for production process control. The measurement filter time setting is selected.

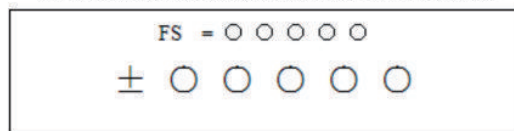
Flow direction option

If the user thinks that the direction of the fluid is not consistent with the design, the user does not have to change the excitation line or signal line connection, and the flow direction can be set to change the parameters.

Flow zero correction

Zero correction shall ensure that the sensor tube is filled with fluid and the fluid is at rest. The flow zero is expressed in flow rate, in mm/s.

转换器流量零点修正显示如下:
The converter flow zero correction is shown below:



上行小字显示: FS代表仪表零点测量值;

下行大字显示: 流速零点修正值;

当FS显示不为“0”时,应调修正值使FS = 0。注意:若改变下行修正值,FS值增加,需要改变下行数值的正、负号,使FS能够修正为零。

流量零点的修正值是传感器的配套常数,应记入传感器的记录单和传感器标牌。记入时传感器零点值是以mm/s为单位的流速值,其符号与修正值的符号相反。

小信号切除点

小信号切除点设置是用量程的百分比流量表示的。小信号切除时,用户可以选择同时切除流量、流速及百分比的显示与信号输出;也可选择仅切除电流输出信号和频率(脉冲)输出信号,保持流量、流速及百分比的显示。

流量积算单位

转换器显示器为9位计数器,最大允许计数值为999999999。

使用积算单位为L、m³(升、立方米)。

流量积算当量为:0.001L、0.010L、0.100L、1.000L
0.001m³、0.010m³、0.100m³、1.000m³;

反向输出允许功能

当反向输出允许参数设在“允许”状态时,只要流体流动,转换器就按流量值输出脉冲和电流。当反向输出允许参数设在“禁止”时,若流体反向流动,转换器输出脉冲为“0”,电流输出为信号“0”(4mA或0mA)。

电流输出类型

用户可在电流输出类型中选择0~10mA或4~20mA电流输出。

脉冲输出方式

脉冲输出方式有频率输出和脉冲输出两种供选择:

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频率输出方式: 频率输出为连续方波, 频率值与流量百分比相对应。

频率输出值 = (流量值测量值 / 仪表量程范围) * 频率满程值;

脉冲输出方式: 脉冲输出为矩形波脉冲串, 每个脉冲表示管道流过一个流量当量, 脉冲当量由下面的“脉冲当量单位”参数选择。脉冲输出方式多用于总量累计, 一般同积算仪表相连接。

频率输出和脉冲输出一般为0C门形式。因此, 应外接直流电源和负载。具体见第4.5节。

脉冲当量单位

脉冲单位当量指一个脉冲所代表的流量值, 仪表脉冲当量选择范围为:

Upstream small print display: FS on behalf of the instrument zero measurement;

Downstream characters show: flow rates zero correction value;

When the FS display is not "0", adjust the correction value to FS=0. Note: If you change the downlink correction value, FS value increases; you need to change the downlink value of the positive and negative, so that FS can be amended to zero.

The correction value of the zero point of the flow is the value of the supporting constant of the sensor and shall be recorded in the sensor's record sheet and sensor plate. The zero value of the sensor is the velocity value in mm/s, and the sign is the opposite of the sign of the correction value.

Small signal cut off point

The small signal cutoff point setting is expressed as a percentage of the range flow. When the small signal is removed, the user can choose to cut out the flow, flow rate and percentage display and signal output at the same time. You can also choose to cut off only the current output signal and the frequency (pulse) output signal to keep the flow, flow rate and percentage display.

Flow total unit

The converter display is a 9-bit counter with a maximum allowable count of 999999999.

Use the total unit of L, m³ (liters, cubic meters).

The cumulative flow equivalent is 0.001L, 0.010L, 0.100L, 1.000L

0.001m³, 0.010m³, 0.100m³, 1.000m³;

Reverse output allows function

When the reverse output enable parameter is set to the "allow" state, the converter outputs pulses and currents by flow rate as long as the fluid flows. When the reverse output enable parameter is set to "disabled", the current output is signal "0" (4mA or 0mA), if the fluid flows backwards and the converter output pulse is "0".

Current output type

The user can select 0-10mA or 4-20mA current output in the current output type.

Pulse output mode

Pulse output mode with frequency output and pulse output two options:

Frequency output mode: frequency output for the continuous square wave, the frequency value and the flow corresponds to the percentage.

Frequency output value=(flow rate measurement value/instrument range range) * frequency full value;

Pulse output mode: pulse output for the rectangular wave train, each pulse indicates that the pipeline flows through a flow equivalent, the pulse equivalent by the following "pulse equivalent unit" parameter selection. Pulse output mode is used for total accumulation, generally connected with the total instrument.

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The frequency output and the pulse output are generally in the form of an OC gate. Therefore, an external DC power supply and load shall be installed. See Section 4.5 for details.

Pulse equivalent units

Pulse unit equivalent refers to a pulse represents the flow value, the instrument pulse equivalent selection range:

脉冲当量 Pulse equivalent	流量值 Flow value	脉冲当量 Pulse equivalent	流量值 Flow value
1	0.001L/cp	5	0.001m3/cp
2	0.01L/cp	6	0.01m3/cp
3	0.1L/cp	7	0.1m3/cp
4	1.0L/cp	8	1.0m3/cp

在同样的流量下，脉冲当量小，则输出脉冲的频率高，累计流量误差小。

频率输出范围

仪表频率输出范围对应于流量测量上限，即百分比流量的100%。频率输出上限值可在1~5000Hz范围内任意设置。

空管报警允许

具有空管检测功能，且无需附加电极。若用户选择允许空管报警，则当管道中流体低于测量电极时，仪表能检测出一个空管状态。在检出空管状态后，仪表模拟输出、数字输出置为信号零，同时仪表流量显示为零。

空管报警阈值

在流体满管的情况下（有无流速均可），对空管报警设置进行了修改，用户使用更加方便，空管报警阈值参数的上行显示实测电导率，下行设置空管报警阈值，在进行空管报警阈值设定时，可根据实测电导率进行设定，设为实测电导率的3~5倍即可。

上限报警允许

用户选择允许或禁止。

上限报警数值

上限报警值以量程百分比计算，该参数采用数值设置方式，用户在0%~199.9%之间设置一个数值。仪表运行中满足报警条件，仪表将输出报警信号。

下限报警

同上限报警

励磁报警

选择允许，带励磁报警功能，选择禁止，取消励磁报警功能。

总量清零密码

用户使用第三级别以上密码可以设置该密码，然后在总量清零内设置该密码。

励磁方式选择

提供三种励磁频率选择：即1/16工频（方式1）、1/20工频（方式2）、1/25工频（方式3）。小口径的传感器励磁系统电感量小，应选择1/16工频。大口径的传感器励磁系统电感量大，用户只能选择1/20工频或1/25工频。使用中，先选励磁方式1，若仪表流速零点过高，再依次选方式2或方式3。注意：在何种励磁方式下标定，就必须在何种励磁方式下工作。

正向总量高位、低位

总量高位低位设置能改变正向累计总量、反向累计总量的数值，主要用于仪表维护和仪表更换。

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用户使用5级密码进入，可修改正向累积量（ $\Sigma+$ ），一般设的累积量不能超过计数器所计的最大数值（999999999）。

反向总量高位、低位

用户使用5级密码进入，可修改反向累积量（ $\Sigma-$ ），一般设的累积量不能超过计数器所计的最大数值（999999999）。

尖峰抑制允许

对于纸浆、泥浆等浆液类流量测量，流体中的固体颗粒摩擦或冲击测量电极，会形成“尖状干扰”，为克服此类干扰，采用了变化率抑制算法，转换器设计有三个参数，对变化率抑制特性进行选择。

设该参数为“允许”，启动变化率抑制算法。设该参数为“禁止”，关闭变化率抑制算法。

尖峰抑制系数

该系数选定欲抑制尖状干扰的变化率，按流速的百分比计算，分为0.010m/s、0.020m/s、0.030m/s、0.050m/s、0.080m/s、0.100m/s、0.200m/s、0.300m/s、0.500m/s、0.800m/s十个等级，等级百分比越小，尖状干扰抑制灵敏度越高。注意，在应用中，并不见得灵敏度选得越高越好，而是应根据实际情况，试验着选择。

尖峰抑制时间

该参数选定欲抑制尖状干扰的时间宽度，以毫秒为单位。持续时间小于选定时间的流量变化，转换器认为是尖状干扰。持续时间大于选定时间的流量变化，转换器认为是正常的流量变化。也应根据实际情况，试验着选择该参数。

用户密码1~4

用户使用5级密码进入，可修改此密码；

电流零点修正

转换器出厂的电流输出零点调节，使电流输出准确为0mA或4mA。

电流满度修正

转换器出厂的电流输出满度调节，使电流输出准确为10mA或20mA。

出厂标定系数

该系数为转换器制造厂专用系数，转换器制造厂用该系数将电磁转换器测量电路系统归一化，以保证所有电磁转换器间互换性达到0.1%。

仪表编码1和2

转换器编码记载转换器出厂时间和编号。

At the same flow rate, the pulse equivalent is small, the output pulse frequency is high, the cumulative flow error is small.

Frequency output range

The instrument frequency output range corresponds to the upper limit of the flow measurement, i.e., 100% of the percentage flow. The frequency output upper limit can be set arbitrarily in the range of 1-5000Hz.

Air flow control alarm allowed

If the user chooses to allow the air flow control alarm, the instrument can detect an empty tube condition when the fluid in the pipeline is lower than the measuring electrode. In the detection of empty tube state, the instrument analog output, the digital output is set to zero signals, while the instrument flow is displayed as zero.

Empty tube alarm threshold

In the case of full capacity of the fluid (with or without the flow rate can be), the air flow control alarm settings were modified, the user is more convenient, empty tube alarm threshold

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parameters of the uplink display measured conductivity, downlink set empty tube alarm threshold, Air flow alarm threshold set, according to the measured conductivity to set, set the measured conductivity of 3 to 5 times.

Upper limit alarm allowed

The user chooses to allow or disable.

Upper limit alarm value

The upper limit alarm value is calculated as a percentage of the range. The parameter is set in numerical mode. The user sets a value between 0% and 199.9%. The instrument running to meet the alarm conditions, the instrument will output the alarm signal.

Lower limit alarm

With the upper limit alarm

Excitation alarm

Choose to allow, with excitation alarm function, select the ban, cancel the excitation alarm function.

Clear the total password

The user can use the third level above the password to set the password, and then set the password in the total clear.

Excitation mode selection

Provide three kinds of excitation frequency selection: that is, 1/16 power frequency (mode 1), 1/20 power frequency (mode 2), 1/25 power frequency (mode 3). Small diameter sensor excitation system inductance is small, shall choose 1/16 power frequency. Large diameter sensor excitation system inductance large, the user can only choose 1/20 frequency or 1/25 power frequency. In use, the first election excitation mode 1, if the instrument flow rate zero is too high, and then choose the way 2 or 3. Note: In which excitation mode calibration, it must be in which excitation mode to work.

Positive total high, low

The total amount of high and low bits can be set to change the total amount of positive cumulative total, the total value of the cumulative total, mainly for instrument maintenance and instrument replacement.

The user can use the Level 5 password to enter the positive cumulative amount ($\Sigma +$). The cumulative amount can not exceed the maximum value counted by the counter (999999999).

Reverse total high, low

The user can use the 5-level password to enter, can modify the inverse cumulative amount ($\Sigma -$), the general set of the cumulative amount can not exceed the maximum value of the counter (999999999).

Spike suppression allowed

For pulp, mud and other slurry flow measurement, the solid particles in the fluid friction or impact measurement electrode, will form a "sharp interference", in order to overcome this interference, using the rate of change suppression algorithm, the converter design has three parameters, Change rate suppression characteristics.

Set the parameter to "allow", start the rate of change suppression algorithm. Set the parameter to "disable", turn off the rate of change suppression algorithm.

Spike suppression factor

The coefficient is chosen to be 0.010 m/s, 0.020 m/s, 0.030 m/s, 0.050 m/s, 0.080 m/s, 0.100 m/s, and the ratio of the flow rate, 0.200m/s, 0.300m/s, 0.500m/s, 0.800m/s ten grades, the smaller the percentage, the higher the sensitivity of the tip interference suppression. Note that in the application, and not necessarily choose the higher the better sensitivity, but shall be

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based on the actual situation, test the choice.

Spike suppression time

This parameter selects the time width, in milliseconds, to suppress sharp interference. The duration is less than the selected time of the flow change, the converter is considered sharp interference. The duration is greater than the selected time flow change, and the converter considers normal flow changes. Shall also be based on the actual situation, test the choice of the parameters.

User password 1-4

Users use 5 password to enter, you can modify this password;

Current zero correction

The converter output current output zero adjustment, so that the current output is accurate to 0mA or 4mA.

Current full scale correction

Converter current output full-scale adjustment, so that the current output is accurate to 10mA or 20mA.

Factory calibration factor

This factor is the coefficient for the converter manufacturer, and the converter manufacturer uses this factor to normalize the electromagnetic converter measurement circuit system to ensure that the interchangeability of all electromagnetic converters is 0.1%.

Instrument code 1 and 2

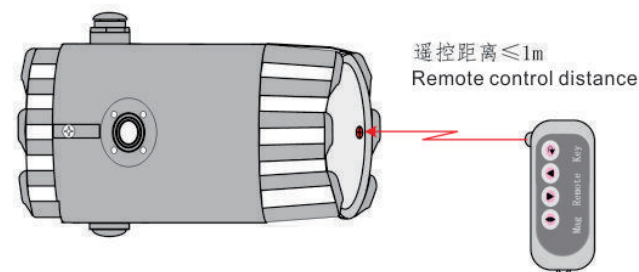
The converter code records the converter factory time and number.

8. 4红外手持遥控键盘

仪表的红外手持遥控操作键盘操作, 同仪表的键盘操作相同, 操作时请将红外手持遥控操作键盘的红外发射口与仪表的红外接收口平行放置, 距离L约为1m, 具体操作, 见下图:

8.4 Infrared remote control keyboard

The instrument's infrared hand-held remote operation keyboard operation, with the instrument keyboard operation the same operation, please operate the infrared remote control keyboard infrared transmission port and the instrument infrared receiver parallel to the distance L is about 1m, the specific operation, see below:



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8.5报警信息
电磁流量转换器的印刷电路板采用表面焊接技术，对用户而言，是不可维修的。因此，用户不能打开转换器壳体。

智能化转换器具有自诊断功能。除了电源和硬件电路故障外，一般应用中出现的故障均能正确给出报警信息。这些信息在显示器左方提示出“”。在测量状态下，仪表自动显示出故障内容如下：

FQH ---- 流量上限报警； FQL ---- 流量下限报警；
FGP ---- 流体空管报警； SYS ---- 系统励磁报警；
UPPER ALARM ---- 流量上限报警； LOWER ALARM ---- 流量下限报警；
LIQUID ALARM ---- 流体空管报警； SYSTEM ALARM ---- 系统励磁报警

8.5 alarm information

Electromagnetic flow converter printed circuit board using surface welding technology, the user is not repairable. Therefore, the user can not open the converter housing.

The intelligent converter has a self-diagnostic function. In addition to power and hardware circuit failure, the general application of the failure can correctly give the alarm information. This information is displayed on the left side of the display . In the measurement state, the instrument automatically shows the following contents:

FQH ---- flow limit alarm; FQL ---- flow lower limit alarm;
FGP ---- fluid air flow control alarm; SYS ---- system excitation alarm;
UPPER ALARM ---- flow limit alarm; LOWER ALARM ---- flow lower limit alarm;
LIQUID ALARM ---- fluid air flow control alarm;
SYSTEM ALARM ---- system excitation alarm

8.6电磁流量计MODBUS寄存器地址定义

TK1000电磁流量计的Modbus 通讯地址表（如下表 所示），包括瞬时流量、累计流量等数据的寄存器地址，其中所提供的地址为寄存器地址，即有些PLC、组态王等寄存器地址需要加1。

8.6 Electromagnetic flow meter MODBUS register address definition

TK1000 electromagnetic flow meter Modbus communication address table (as shown in the table below), including the instantaneous flow, cumulative flow and other data register address, which provides the address for the register address, that is, some PLC, configuration king and other register address need to add 1 The

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电磁流量计Modbus通讯地址表
Electromagnetic flow meter Modbus communication address table

Protocol Addresses (Decimal)	Protocol Addresses (HEX)	数据格式 Data forma	寄存器定义 Register definition
4112	0x1010	Float Inverse	瞬时流量浮点表示 Instantaneous flow floating point representation
4114	0x1012	Float Inverse	瞬时流速浮点表示 Instantaneous flow rate floating point representation
4116	0x1014	Float Inverse	流量百分比浮点表示 (电池供电表保留) Percentage of flow Floating point representation (battery powered table reserved)
4118	0x1016	Float Inverse	流体电导比浮点表示 The fluid conductance is expressed as a floating point
4120	0x1018	Long Inverse	正向累积数值整数部分 Positive cumulative value integer part
4122	0x101A	Float Inverse	正向累积数值小数部分 Positive cumulative fractional part
4124	0x101C	Long Inverse	反向累积数值整数部分 Reverse accumulate the value of the integer part
4126	0x101E	Float Inverse	反向累积数值小数部分 Reverse accumulate the fractional part of the value
4128	0x1020	Unsigned short	瞬时流量单位（表 3） Instantaneous flow units (Table 3)
4129	0x1021	Unsigned short	累积总量单位（表 4/表 5） Accumulated units of total (Table 4/Table 5)
4130	0x1022	Unsigned short	上限报警 Upper limit alarm
4131	0x1023	Unsigned short	下限报警 Lower limit alarm
4132	0x1024	Unsigned short	空管报警 Air flow control alarm
4133	0x1025	Unsigned short	系统报警 System alarm

九、使用注意事项

Precautions for use

9.1 使用时:

- 使用中应使测量管充满液体, 以免影响计量的准确性。
- 定期清除测量管内的结垢。
- 除需接线外, 不准随意打开仪表盖。
- 用户需重新标定仪表时, 请与本公司联系。

9.2 接地:

由于电磁式能量计的感应信号十分微弱, 易受杂讯干扰。传感器与转换器的基准电位必须与测量液体一致, 有相同的地电平。

9.3 储存:

存储时需注意:

- 用原来的包装包装流量计, 存储时尽量维持原样。
- 存储环境需满足以下要求: 温度: $-20\sim 70^{\circ}\text{C}$ 湿度: $<85\%\text{RH}$ 避免存储在震动与冲击场合 避免被腐蚀性物质侵入。

9.1 When used:

- The use of the measuring tube shall be filled with liquid, so as not to affect the accuracy of measurement.
- Regularly remove fouling from the measuring tube.
- Do not open the instrument cover except for wiring.
- Please contact our company when you need to re-calibrate the instrument.

9.2 Ground:

As the electromagnetic energy meter sensor signal is very weak, susceptible to noise interference. The reference potential of the sensor and the converter must be consistent with the measurement liquid and have the same ground level.

9.3 Storage:

Note when storing:

- Pack the flow meter with the original packaging and keep it as much as possible.
- Storage environment shall meet the following requirements: Temperature: $-20-70^{\circ}\text{C}$ Humidity: $<85\%\text{RH}$ Avoid storage in shock and shock occasions to avoid corrosive substances intrusion

十、故障处理

Troubleshooting

仪表无显示

- * 检查电源是否接通;
- * 检查电源保险丝是否完好;
- * 检查供电电压是否符合要求;

励磁报警

- * 励磁接线EX1和EX2是否开路;
- * 传感器励磁线圈总电阻是否小于 150Ω ;
- * 如果a、b两项都正常, 则转换器有故障。

空管报警

- * 测量流体是否充满传感器测量管;
- * 用导线将转换器信号输入端子SIG1、SIG2和SIGGND三点短路, 此时如果“空管”提示撤消, 说明转换器正常, 有可能是被测流体电导率低或空管阈值及空管量程设置错误;

- * 检查信号连线是否正确;
- * 检查传感器电极是否正常;

使流量为零, 观察显示电导比应小于100%;

在有流量的情况下, 分别测量端子SIG1和SIG2对SIGGND的电阻应小于 $50\text{k}\Omega$ (对介质为水测量值。最好用指针万用表测量, 并可看到测量过程有充放电现象)。

- * 用万用表测量DS1和DS2之间的直流电压应小于1V, 否则说明传感器电极被污染, 应给予清洗。

测量的流量不准确

- * 测量流体是否充满传感器测量管;
- * 信号线连接是否正常;
- * 检查传感器系数、传感器零点是否按传感器标牌或出厂校验单设;

Instrument no display

- * Check if the power is on;
- * Check the power fuse is intact;
- * Check whether the supply voltage meets the requirements;

Excitation alarm

- * Excitation lines EX1 and EX2 are open;
- * Whether the total resistance of the sensor field coil is less than 150Ω ;
- * If a, b two are normal, the converter is faulty.

Air flow control alarm

- * Measure whether the fluid is filled with the sensor measuring tube;

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* The converter signal input terminals SIG1, SIG2 and SIGGND are short-circuited by wire. At this point, if the "empty tube" prompt is canceled, it means that the converter is normal; it may be that the measured fluid conductivity is low or the empty tube threshold and the empty tube range set the error;

- * Check that the signal connection is correct;
- * Check that the sensor electrode is working properly:

So that the flow is zero, observe the conductivity ratio shall be less than 100%;

In the case of flow, the resistance of the terminals SIG1 and SIG2 to the SIGGND shall be less than 50 k Ω (for the measurement of the water for the media, preferably by means of a pointer multimeter and see the charging and discharging of the measurement process).

* Measure the DC voltage between DS1 and DS2 by less than 1V with a multimeter. Otherwise, the sensor electrode is contaminated and shall be cleaned.

The measured flow is inaccurate

- * Measure whether the fluid is filled with the sensor measuring tube;
- * Whether the signal line connection is normal;
- * Check the sensor coefficient, the sensor zero is the sensor plate or factory calibration set alone;

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附录1 励磁频率选择 (参考)

电磁转换器提供三种励磁频率选择: 即1/16工频 (方式1)、1/20工频 (方式2)、1/25工频 (方式3)。小口径的传感器励磁系统电感量小, 应选择1/16工频。大口径的传感器励磁系统电感量大, 用户只能选择1/20工频或1/25工频。使用中, 先选励磁方式1, 若仪表流速零点过高, 再依次选方式2或方式3。

电磁转换器同用户传感器配套中, 经常出现用户传感器励磁线圈电阻不符合电磁转换器要求的情况, 此时, 根据具体情况, 可做如下处理:

(1) 励磁线圈电阻小

若励磁线圈电阻小于转换器要求的阻值, 可用在励磁线圈回路中串联电阻的方法解决, 使总阻值符合转换器要求。串联电阻的功率应大于实际产生功耗的一倍, 如在250毫安电流下串10 Ω 电阻, 其功率应选3W。

(2) 励磁线圈电阻大 (改变励磁电流)

若励磁线圈电阻大于转换器要求的阻值, 可以选择改变励磁电流的处理方法, 例如励磁线圈电阻为70 Ω , 对于250毫安励磁电流而言, 线圈电阻过大, 这时, 可将励磁电流由250毫安改为187毫安。

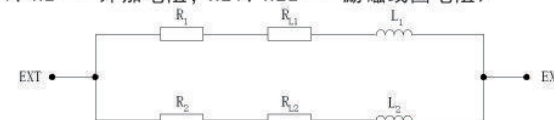
(3) 励磁线圈电阻大 (改变线圈接法)

若励磁线圈电阻大于转换器要求的阻值, 可以选择改变线圈接法的处理方式, 例如励磁线圈总电阻为200 Ω , 则每个励磁线圈电阻为100 Ω , 采用将上下两个励磁线圈并联的方式, 则可使线圈并联后阻值符合要求。若线圈并联后阻值过小, 可用串联电阻的方法解决。

根据上面分析, 改变传感器的励磁线圈接法, 从励磁线圈两端测量,

使 总电阻 = $(R_1 + R_{L1})$ 并联 $(R_2 + R_{L2}) \leq 120\Omega$;

(如图: R_1 、 R_2 ——外加电阻; R_{L1} 、 R_{L2} ——励磁线圈电阻)



(4) 传感器励磁电流稳定时间过长 (电感量过大)

对于励磁电流稳定时间过长的问題, 首先选用改变励磁方式的办法解决, 选用1/16工频或1/25工频。

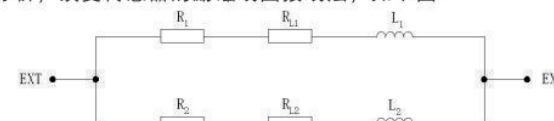
若改变励磁方式的办法不能满足使用要求, 则仍可采用改变线圈接法来处理。

励磁电流渡越时间 $\tau = L / R$

其中: L ——励磁线圈电感; R ——励磁线圈电阻。

因此, 减小 L 或增大 R 都会使 τ 减小。

根据上面分析, 改变传感器的励磁线圈接法, 如下图:



R_1 、 R_2 ——外加电阻; R_{L1} 、 R_{L2} ——励磁线圈电阻。

串联电阻 R_1 、 R_2 后, 使总电阻 $(R_1 + R_{L1})$ 并联 $(R_2 + R_{L2}) \leq 120\Omega$

Appendix 1 Excitation Frequency Selection (Reference)

The electromagnetic converter provides three kinds of excitation frequency options: 1/16 power frequency (mode 1), 1/20 power frequency (mode 2), 1/25 power frequency (mode 3). Small diameter sensor excitation system inductance is small, shall choose 1/16 power frequency. Large diameter sensor excitation system inductance large, the user can only choose 1/20 frequency or 1/25 power frequency. In use, the first election excitation mode 1, if the instrument flow rate zero is too high, and then choose the way 2 or 3.

Electromagnetic converter with the user sensor package, often the user sensor excitation coil resistance does not meet the requirements of the electromagnetic converter, this time, depending on the specific circumstances, do the following:

(1) Excitation coil resistance is small

If the resistance of the excitation coil is less than the resistance required by the converter, it can be used to solve the series resistance in the excitation coil loop, so that the total resistance value meets the converter requirements. Series resistance of the power shall be greater than twice the actual power consumption, such as the 250 mA current string 10Ω resistor, the power shall be selected 3W.

(2) Excitation coil resistance is large (change excitation current)

If the excitation coil resistance is greater than the resistance required by the converter, you can choose to change the excitation current processing methods, such as excitation coil resistance of 70Ω, for the 250 milliamperes excitation current, the coil resistance is too large, then the excitation current from 250 milliamperes changed to 187 milliamperes.

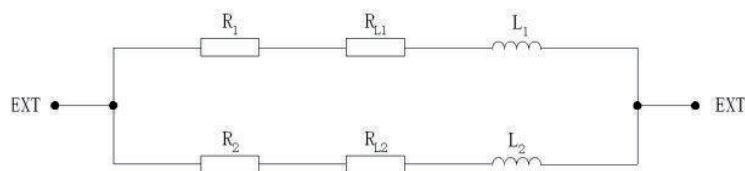
(3) Excitation coil resistance is large (change coil connection)

If the excitation coil resistance is greater than the resistance required by the converter, you can choose to change the coil connection method, such as the total resistance of the excitation coil is 200Ω, then each excitation coil resistance is 100Ω, the upper and lower excitation coil in parallel, The coil can be connected in parallel after the resistance to meet the requirements.

According to the above analysis, change the sensor excitation coil wiring method, measured from both ends of the excitation coil,

So that the total resistance=(R1 + RL1) in parallel (R2 + RL2) ≤ 120Ω;

(Figure: R1, R2 - plus resistance; RL1, RL2 - excitation coil resistance)



(4) Sensor excitation current stabilization time is too long (inductance is too large)

For the excitation current stabilization time is too long, the first choice to change the way to solve the excitation method, use 1/16 power frequency or 1/25 power frequency.

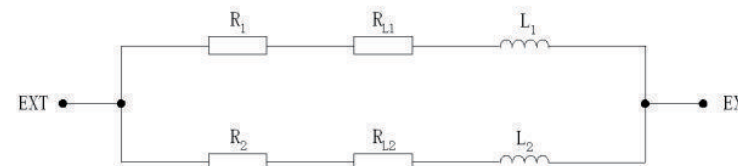
If the way to change the excitation method can not meet the requirements, you can still use the change coil connection to deal with.

Excitation current crossing time $\tau = L/R$

Among them: L - excitation coil inductance; R - excitation coil resistance.

Therefore, decreasing L or increasing R will reduce τ .

According to the above analysis, change the sensor excitation coil wiring method, as shown below:



R1, R2 - plus resistance; RL1, RL2 - excitation coil resistance;

After the series resistors R1 and R2, the total resistance (R1 + RL1) is connected in parallel (R2 + RL2) ≤ 120Ω

附录2 REMOTE功能说明

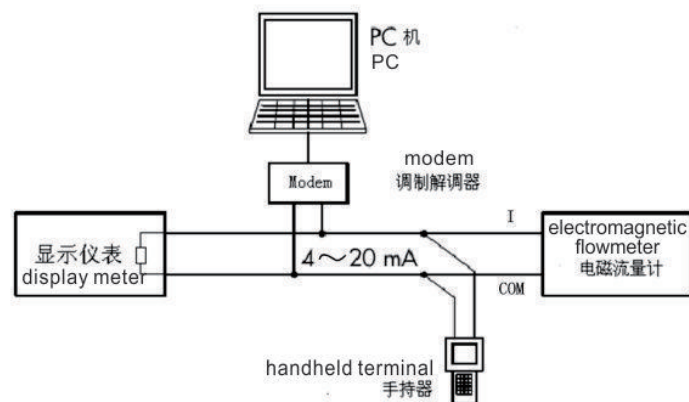
Appendix 2 REMOTE function description

1、REMOTE 总线现场网络图

REMOTE总线的特点是利用4-20mA信号线传输数据信号，所以既可以节省现场的数据通讯线，又能实现数据通讯，非常适合现场应用。由REMOTE总线组成的其现场网络如下图所示。

1、REMOTE bus site network map

REMOTE bus is characterized by the use of 4-20mA signal line to transmit data signals, so you can save the field of data communication lines, but also to achieve data communications, is ideal for field applications. The field network consisting of the REMOTE bus is shown below.



2、转换器设置说明

- (1) 如使用我公司手持器需将仪表通讯地址设为1，波特率设为4800；
- (2) 如使用375、275等其它手持器时需将仪表通讯地址设为2，波特率设为4800；（此功能以实物为准）
- (3) 若仪表通讯方式、地址及波特率设置不正确，手持器将不能设置参数。

2、converter settings instructions

- (1) If you use the company's controller to set the instrument communication address is set to 1, the baud rate is set to 4800;
- (2) If you use 375, 275 and other handheld devices need to set the communication address is set to 2, the baud rate is set to 4800; (this function to prevail in kind)
- (3) If the instrument communication mode, address and baud rate settings are not correct, the handheld will not be able to set parameters.

3、REMOTE使用功能仪表注意事项

- (1) 手持器并联在电磁流量计电流输出的负载两端没有极性；
- (2) 回路中的电阻应大于200Ω，小于500Ω；
- (3) 手持器不能串入电流回路；

3、REMOTE use function instrument precautions

- (1) The hand held in parallel to the electromagnetic flow meter current output at both ends of the load without polarity;
- (2) The resistance in the circuit shall be greater than 200Ω, less than 500Ω;
- (3) The handheld can not string into the current loop;

附录3 流量系数修改记录功能

Appendix 3 Flow coefficient modification record function

按《电磁流量计国家计量检定》新规程，电磁流量转换器记录一组（3个）流量特征参数，分别是转换器校正系数（出厂标定系数）、传感器标定系数（传感器系数值）、传感器零点（流量零点修正），同时自动记录流量特征参数修改次数（MR数）。修改流量特征参数组中的任何一个，修改次数记录加1，用户不能改变修正次数记录的数值。用户在检定书中，应记录传感器流量标定系数和修改次数记录（MR数）两个数值，而后的任何改动，将产生不同的修改次数记录，查看修改记录次数，即可知流量特征参数是否被修改过。

电磁流量转换器能保存32组修改流量特征参数的历史记录，以便用户查看，具体操作方法如下：

在测量状态下，进入到转换器功能选择画面“参数设置”，然后再按“上键”翻页到“系数更改记录”，进入到查看系数更改记录画面。

According to the new procedure of "National Metrological Verification of Electromagnetic Flow meter", the electromagnetic flow converter records a set of (3) flow characteristic parameters, namely, the converter correction coefficient (factory calibration coefficient), the sensor calibration coefficient (sensor coefficient value), the sensor zero point (Zero flow correction), and automatically record the flow characteristics of the number of parameters modified (MR number). Modify the flow characteristics of any one of the parameters, modify the number of records plus 1, the user can not change the number of correction records of the value. Users in the test book, the sensor shall be recorded in the flow calibration coefficient and the number of changes in the number of records (MR number) two values, and then any changes will produce a different number of changes in the record, see the number of changes in the record, you can see whether the flow characteristics of the parameters were modified Too.

The electromagnetic flow converter can save 32 groups to modify the flow characteristics of the parameters of the parameters for the user to view, the specific operation is as follows:

in the measurement state, enter the converter function selection screen "parameter settings", and then press the "up key" page to "coefficient change record", enter the view coefficient change record screen.

Number of changes 记录修改次数	MF	0.8776	←	calibration factor when delivery 出厂标定系数
	SF	0.5820	←	characteristic coefficient product 特征系数乘积
	SZ	+0.0003	←	flow zero amendment 流量零点修正
	MR=00058	SR=023	←	storage record No. 存储记录序号

※注意：进入此参数的第一项即显示最后一次所修正特征系数的序号，如果用户想查历史记录，可按“下键”进行追忆查询，最多可查从最后一次修改至前推32次的记录。最后用户将记录修改次数（MR）值记录备案。

※ Note: Enter the first item of this parameter that shows the serial number of the last modified feature coefficient. If the user wants to check the history record, press the "down key" to recall the query, up to the last change to the previous push to 32 times. The last user records the record number of changes (MR) records.

附录4 带非线性修正功能补充说明

Appendix 4 Supplementary explanation with non-linear correction function

非线性修正功能，原则上是用于小流量（0.3m/s）以下的线性调整，该功能设计有4段修正，分为4个流速点和4个修正系数。

非线性修正系数是在原传感器标定系数的基础上再进行修正，因此，应先关闭非线性修正功能，标出传感器系数，然后再把该功能打开进行非线性修正。根据传感器的非线性段，进行修正点及修正系数的设置，若设置的合适，不用重新标定。

设：经过传感器系数计算的流速为原流速，经非线性修正后的流速称修正流速，则修正后的流速有以下对应关系；

在修正点1>原流速≥修正点2区间；

修正流速 = 修正系数1×原流速；

在修正点2>原流速≥修正点3区间；

修正流速 = 修正系数2×原流速；

在修正点3>原流速≥修正点4区间；

修正流速 = 修正系数3×原流速；

在修正点4>原流速≥0区间；

修正流速 = 修正系数4×原流速；

注意：设置修正点时，应保持如下关系：

修正点1>修正点2>修正点3>修正点4

修正系数的中间值为1.0000，修正系数大于中间值为正修正（加大），修正系数小于中间值为负修正（减小）。

Non-linear correction function, in principle, is used for small flow (0.3m/s) below the linear adjustment; the function design has 4 corrections, divided into four flow points and four correction factor.

The non-linear correction factor is modified on the basis of the original sensor calibration factor. Therefore, the non-linear correction function shall be closed, the sensor coefficient shall be marked, and then the function shall be opened for non-linear correction. According to the non-linear section of the sensor, the correction point and the correction coefficient are set. If the setting is appropriate, it is not necessary to re-calibrate.

The flow rate calculated by the sensor coefficient is the original flow rate, and the flow rate is corrected by the non-linear velocity. The corrected flow rate has the following correspondence;

At the correction point 1> the original flow rate ≥ correction point 2 interval;

Corrected flow rate=correction factor 1 x original flow rate;

In the correction point 2> the original flow rate ≥ correction point 3 interval;

Corrected flow rate=correction factor 2 x original flow rate;

At the correction point 3> the original flow rate ≥ correction point 4 interval;

Corrected flow rate=correction factor 3 x original flow rate;

In the correction point 4> the original flow rate ≥ 0 interval;

Corrected flow rate=correction factor 4 x original flow rate;

Note: When setting the correction point, the following relationship shall be maintained:

Correction Point 1> Correction Point 2> Correction Point 3> Correction Point 4

The correction factor is 1.0000, the correction coefficient is greater than the middle value is positive correction (increase), the correction coefficient is less than the middle value is negative correction (decrease).

附录5 防雷功能说明

Appendix 5 Lightning protection function description

用户安装时务必一定要将转换器端子接地点与壳体连接后可靠接地，因为防雷气体放电器是通过壳体将雷击电流导入大地，若壳体没有可靠接地，一旦雷击时有人员操作转换器，可能造成人身事故。具体详见连接示意图：

The user must be installed when the converter terminal grounding point and the shell connected after the reliable grounding, because the mine gas discharge device is the shell through the lightning current into the earth, if the shell is not reliable grounding, once the lightning when the operation of the conversion Device, may cause personal accident, see the specific connection diagram:

