



科里奥利质量流量计

Coriolis Mass Flow Meters

成都安迪生测量有限公司
Chengdu Andisoon Measure Co.,Ltd.

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COMPANY OVERVIEW

企业简介



- 成都安迪生测量有限公司成立于2008年3月，注册资金5000万。公司致力于流量测控相关领域自动化仪表和控制技术的开发、生产、销售及服务，具有雄厚的技术力量和生产能力。拥有大批从事流体测量产品设计和生产的专业技术人才及一批先进的研发、生产测试设备。公司是加拿大Truflow公司授权的生产基地，产品被广泛应用于石油化工、化学、制药、造纸、食品、冶金、环保等多个领域。研发生产的流量计产品远销英国、马来西亚、新加坡、尼日利亚、俄罗斯、泰国、巴基斯坦、乌兹别克斯坦等国。
- 公司已获得ISO9001、ISO14001、ISO45001三体系认证和CE、SIL2、PESO认证，是国家高新技术企业、四川省建设创新型新型企业、成都市企业技术中心、中国测试技术研究院联合实验室、西南石油大学实训基地。公司产品已通过四川省科技成果鉴定，获得“四川市场产品质量稳定合格企业”荣誉证书。

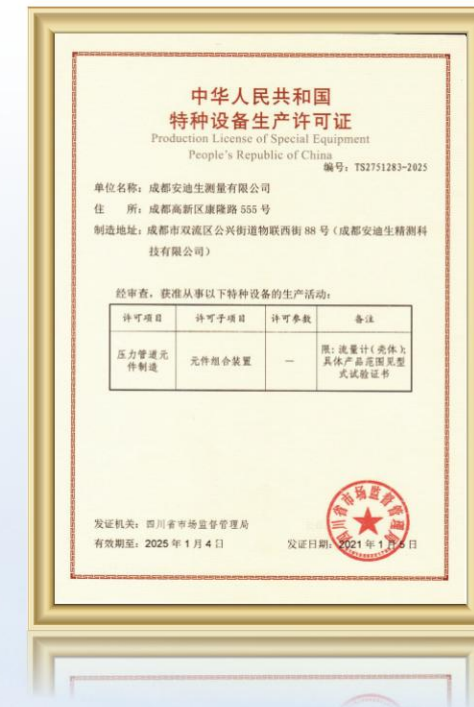
Chengdu Andisoon Measurement Co., Ltd. was founded in March 2008 with a registered capital of 50 million yuan. The company is committed to the development, production, sales and service of automation instruments and control technology in the field of flow measurement and control. It has strong technical force and production capacity. It has a large number of professional technical personnel engaged in the design and production of fluid measurement products and a number of advanced R&D and production testing equipment. The company is the authorized production base of Truflow Canada inc. Its products are widely used in petroleum, chemical, pharmaceutical, paper making, food, metallurgy, environmental protection and many other fields. The flowmeters developed and produced by the company are exported to the United Kingdom, Malaysia, Singapore, Nigeria, Russia, Thailand, Pakistan, Uzbekistan and other countries.

The company has obtained the ISO9001, ISO14001, ISO45001, CE, SIL2, and PESO certifications. It is recognized as a National High-tech Enterprise, Sichuan Province Construction of Innovative Enterprise, Chengdu City Enterprise Technology Center, China NIMTT Joint Laboratory, and Southwest Petroleum University Internship Base. The company's products have been approved by the Sichuan Science and Technology Bureau as a technological achievement and have obtained the "Sichuan Market Product Quality Stable Qualified Enterprise" honorary certificate.

产品资质

PRODUCT QUALIFICATION

■ 中华人民共和国特种设备生产许可证 (流量计壳体)



■ 中华人民共和国计量器具型式批准证书



■ 国家认定防爆电气产品质量监督检验机构出具的防爆合格证



■ 三体系统证书



■ 质量管控

通过产品信息溯源系统 (APIS) 对研发过程、工艺管控、生产过程、测试过程、质量检验等产品各个环节的数据快速溯源、精准定位

技术能力

TECHNICAL SKILLS

■ 参与多项国家级流量计量技术相关标准及校准规范

■ 参与国家标准《智能流量仪表 通用技术条件》编纂，该标准于2017年7月正式发布



■ 参与国家标准《封闭管道中流体流量的测量 科里奥利流量计的选型、安装和使用指南》编纂，该标准于2021年8月正式发布



■ 参与国家计量技术规范《标准表法科里奥利质量流量计在线校准规范》编纂，该技术规范于2018年6月正式发布



■ 参与国家规范《充装用科里奥利气体质量流量计校准规范》编纂



- 另外还正在参与编纂《充装用科里奥利气体质量流量计校准规范》、《液化天然气加气机检定校准规范》、《差压式湿气两相流量计校准规范》、《流量测量装置校准和使用中不确定度的评估第2部分：非线性校准关系》等流量计量技术标准与规范
- 公司参与多项国家、行业、地方标准编制，其中参与国家级的标准、规程、规范起草共计15项



■ **静态质量法水流量标准装置**
Static mass method water flowmeter calibration device
使用水作为介质对流量计进行精度测试



■ **高温液体流量标准装置**
High temperature liquid flowmeter calibration device
使用高温油作为介质对高温流量计进行精度测试和稳定性测试



■ **低温液体流量标准检定装置**
Cryogenic liquid flow calibration device
使用零下196℃液氮低温介质对低温流量计进行精度测试和稳定性测试



■ **两相流流量标准装置**
Two-phase flowmeter Calibration Device
使用高压氮气和水作为介质，利用气液混合器将气液混合均匀，对两相流量计进行精度测试和稳定性测试。



■ **高压标定平台**
High pressure Calibration Platform
使用高压气体（氮气、氢气）作为介质，对高压流量计、加氢机检定装置、CNG检定装置进行精度测试和稳定性测试。

科里奥利质量流量计

CORIOLIS MASS FLOWMETER



产品介绍 Product Introduction

科里奥利质量流量计是一种利用流体在振动管中流动，从而产生与质量流量成正比的科氏力原理制作的用来测量管道内液体、浆液和气体等介质的质量流量、密度以及温度的多变量计量仪表。

A Coriolis mass flow meter is a multi-variable measuring instrument that uses the Coriolis force principle generated by the fluid flowing in a vibrating tube to measure the mass flow rate, density, and temperature of liquid, slurry, and gas media in a pipeline.

技术参数 Technical Parameters

准确度等级 Accuracy	0.1%、0.15%、0.2%、0.5%
重复性 Repeatability	0.05%、0.075%、0.1%、0.25%
密度 Density	±0.001g/cm ³
温度 Temp.	±1℃±0.5%×读数(℃) ±1℃±0.5%×Reading(℃)
测量管材料 Measuring Tube Material	316L (默认)、蒙乃尔合金400、哈氏合金C22等
测量介质 Measuring medium	气体、液体 Gas, Liquid
通信接口 Communication interface	脉冲/频率、RS-485/Modbus、4-20mA/Hart pulse/frequency, RS-485/Modbus, 4-20mA/Hart

产品特点 Product Features

- 通过ATEX、IECEX、SIL2、以及CCS等认证
Certified by ATEX, IECEX, SIL2, CCS, etc
- 准确度高(最高到0.1级)、重复性好
High accuracy(up to 0.1),good repeatability
- 基于测量管振动频率的自适应压力补偿功能
Adaptive pressure compensation function based on the vibration frequency of the measuring tube.
- 基于气液两相流体模型的流量修正技术，适应复杂多变的两相工况
Based on the gas-liquid two-phase fluid model flow correction technology, to adapt to the complex and variable two-phase working conditions.
- 完整提供质量流量、体积流量、密度、温度测量和推算参数
Provide mass flow rate, volume flow rate, density, temperature measurement and parameter estimation
- 出厂通过高压、深冷、高温等介质标定
Pass high pressure \cryogenic\ high temperature media calibration.
- 二次腔体压力超过0.5MPa，通过爆破片泄压
Secondary chamber pressure exceeds 0.5MPa, pressure relief by rupture disc.
- 拥有仪表状态、通用功能等自诊断能力
With self-diagnostic capabilities such as instrument status and general functions.



产品特点

Product Features

- A. 准确度高，重复性好

B. 零点稳定性好，长期工作稳定

C. 专注高压和低温应用，最低零下253℃

A. Measurement precision , good repeatability

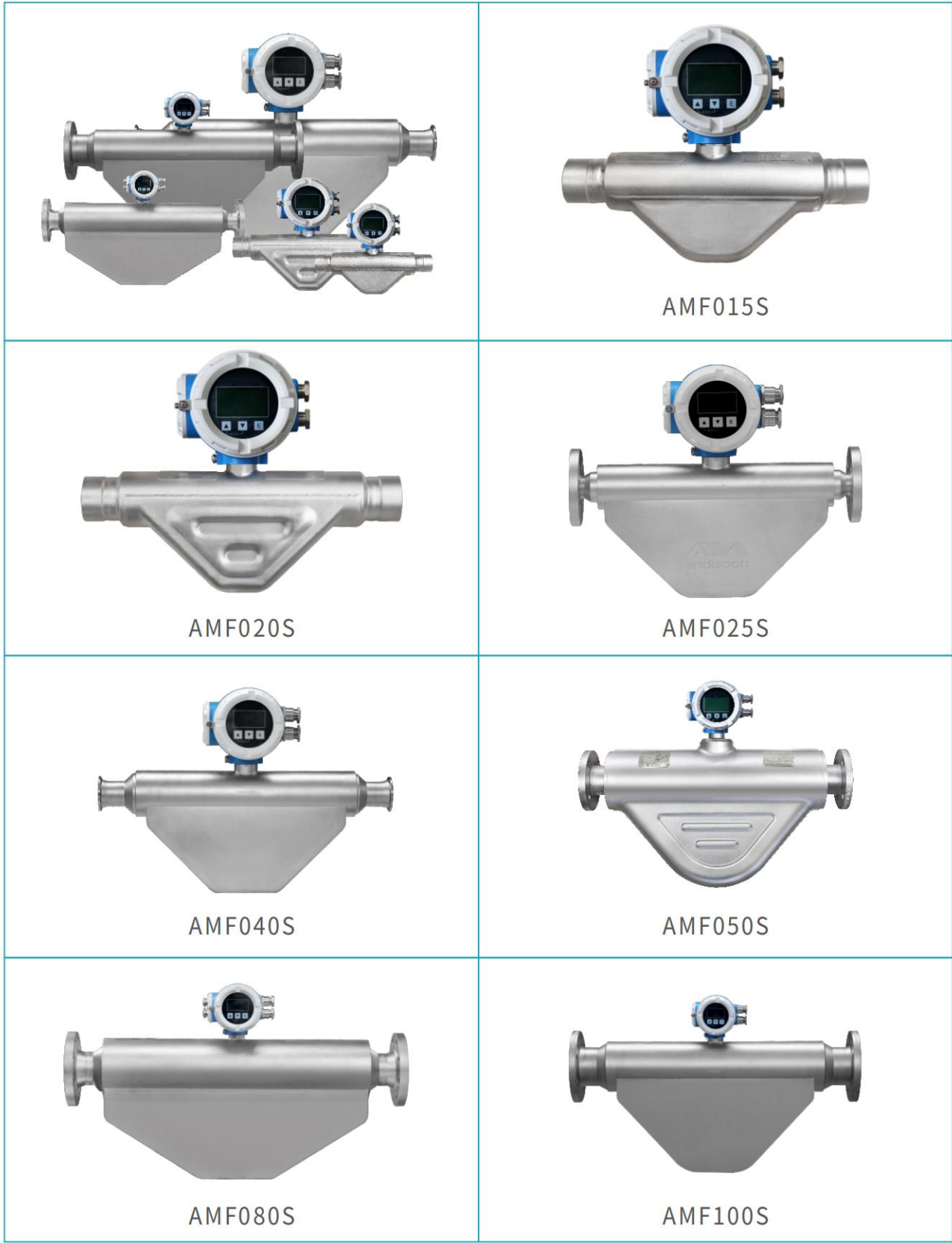
B. Zero point stability is good, long-term work is stable

C. Focus on high pressure& low temperature application, the lowest is-253℃

技术参数

Technical Parameters

型号 Model	AMF003A	AMF006A	AMF006AH	AMF008A	AMF025A	AMF050A	AMF080A	AMF150A	AMF200A
测量介质 Measuring medium	液体、气体 Liquid、Gas								
介质温度范围 Medium temp. range	-253℃~+300℃								
口径 Nominal diameter	DN3	DN6		DN8	DN25	DN50	DN80	DN150	DN200
最大流量 Max. Flow-rate	2kg/min	20kg/min	7.2kg/min	25 kg/min	80 kg/min	50 t/h	108 t/h	800t/h	1200t/h
工作压力范围 (可定制) Working Pressure range(Customizable)	≤10MPa	≤6.3MPa	≤43.8MPa /≤100MPa	≤4 MPa					
连接方式 (可定制) Connection Mode (Customizable)	G1/4 内螺纹 Internal Thread	Rc 1/2 内螺纹 Internal Thread	UNF 13/16-16 , 内螺纹 Internal thread						
安全与防护 Safety and Protection	Ex db ib IIC T1... T6 Gb IP67	Ex ib IIC T1... T6 Gb (传感器) [Ex ib Gb] IIC (CN2000 变送器)	Ex db ib IIC T1... T6 Gb IP67	Ex db ib IIC T1...T6 Gb IP67 CCS					



产品特点

Product Features

- A. 结构紧凑，安装方便
B. 压力损失小，适应工况广
C. 高安全性，自动泄压设计

A. Compact structure, easy installation
B. Low pressure loss and wide adaptability to working conditions
C. Very security, automatic pressure relief design

技术参数

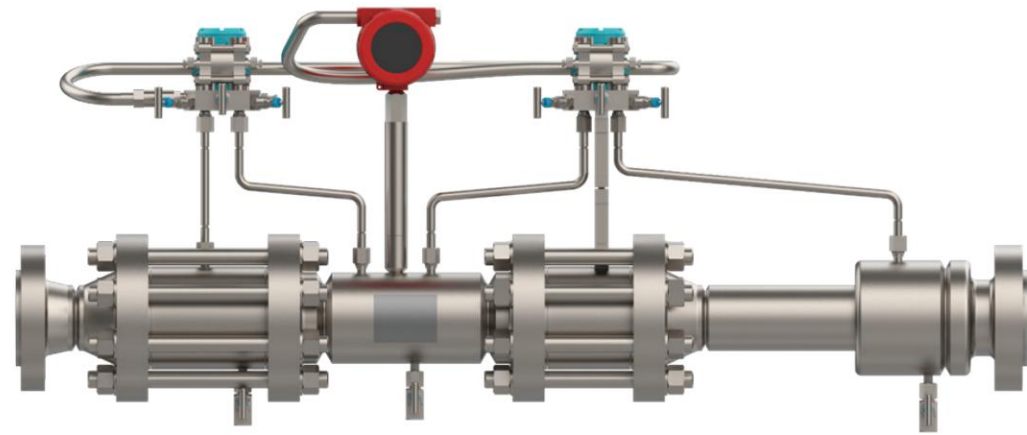
Technical Parameters

型号 Model	AMF015S	AMF020S	AMF025S	AMF040S	AMF050S	AMF080S	AMF100S
测量介质 Measuring medium	液体、气体 Liquid、Gas						
介质温度范围 Medium temp.range	-253℃~+300℃						
口径 Nominal diameter	DN15	DN20	DN25	DN40	DN50	DN80	DN100
最大流量 Max.Flow-rate	30kg/min	70kg/min	300kg/min	30 t/h	50 t/h	108 t/h	250t/h
工作压力范围 (可定制) Working Pressure range (Customizanle)	≤25MPa	≤25MPa	≤10MPa				
连接方式 (可定制) Connection Mode (Customizanle)	G 3/4 (内螺纹 Internal thread)	G1(内螺纹 Internal thread)	HG/T20592 法兰 Flange DN25 PN40 (RF)	HG/T20592 法兰 Flange DN40 PN40 (RF)	HG/T20592 法兰 Flange DN40 PN40 (RF)	HG/T20592 法兰 Flange DN40 PN40 (RF)	HG/T20592 法兰 Flange DN100 PN40 (RF)
安全与防护 Safety and Protection	Ex db ib IIC T1…T6 Gb IP67						

两相流流量计

长喉颈文丘里气液两相流量计
LONG-THROAT VENTURI GAS-LIQUID TWO-PHASE FLOWMETER

TWO-PHASE FLOW FLOWMETER



产品介绍 Product Introduction

长喉颈文丘里气液两相流最计基于理论分析和计算流体力学CFD数值模拟技术，优化设计了长喉颈文丘里管作为节流元件。采用独创的双差压比值法含率测量技术，适用于中低含液率天然气井口气液两相流测量。

Long-Throat Venturi Gas-Liquid Two-Phase Flowmeter combines the basic theory of gas-liquid two-phase flow, computer numerical simulation technology and real flow test, optimized a long throat venturi as the throttling device. By using our self-developed double differential pressure measurement algorithm, the flowmeter is suitable for natural gas well measurement of low liquid fraction.

技术参数 Technical Parameters

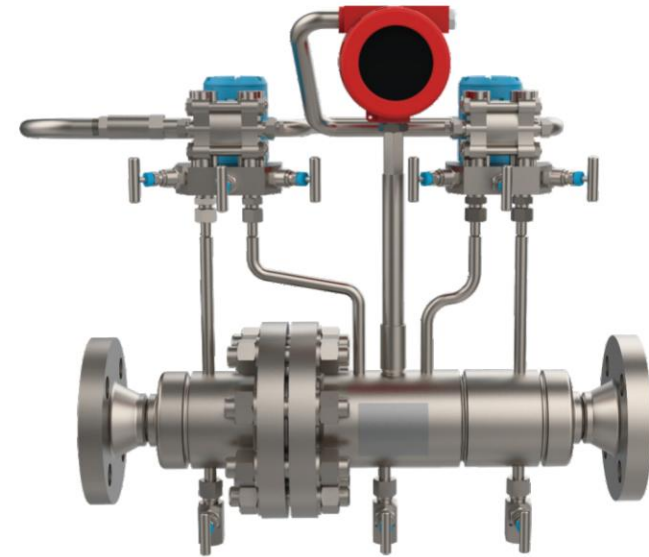
型号 Model	HHTPF-LV
气相测量精度 Gas phase measurement accuracy	±5%
液相测量精度 Accuracy of liquid phase measurement	±10%
含液率流量范围 Liquid rate flow range	(0~10)%
口径 Nominal diameter	DN50、DN80
设计压力 Design pressure	6.3MPa、10MPa、16MPa
材质 Material	304、316L、硬质合金、镍基合金、304、316L、YG8、Inconel 625

产品特点 Product Features

- **专利技术:**独创的双差压比值法含率测量技术
Self-developed double differential pressure measurement algorithm
- **无放射性:**无伽马射线源, 安全环保
No radioactive sources
- **非分离计量:**天然气井口气液两相混输流量测量, 无需分离器
No separation required
- **应用范围广:**适用于常规气田、页岩气田、致密砂岩气田、煤层气田等
Applicable to the conventional natural gas field, the shale gas field, the tight sandstone gas field, coalbed methane gas field and so on.

新月孔板气液两相流量计
CRESCENT-ORIFICE GAS-LIQUID TWO-PHASE FLOWMETER

HHTPF-CP



产品介绍 Product Introduction

新月孔板气液两相流量计针对工况条件下处于分层流的气液两相流动状态，创造性地采用非轴对称的新月孔板节流元件，结合独创的双差压比值法含率测量技术，适用于中高含液率天然气井口气液两相流测量。

To measure the natural gas in the condition of gas-liquid stratified flow, the Crescent-Orifice Gas-Liquid Two-Phase Flowmeter creatively optimize a crescent orifice as the throttling device. By using our self-developed double differential pressure measurement algorithm, the flowmeter is suitable for natural gas well measurement of high liquid fraction.

技术参数 Technical Parameters

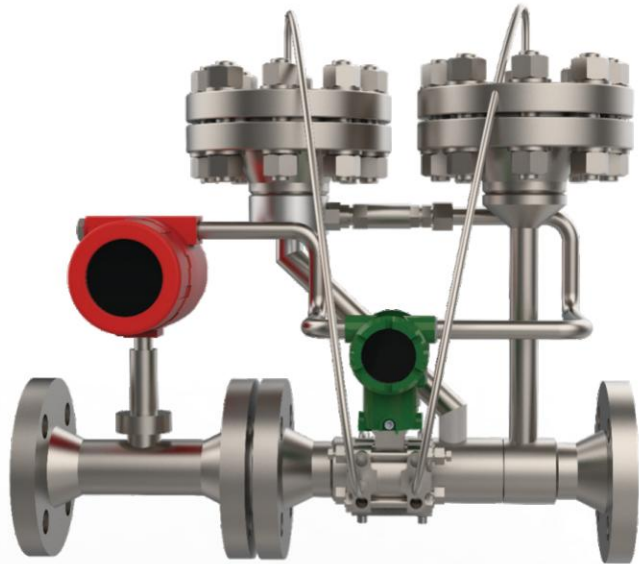
型号 Model	HHTPF-CP
气相测量精度 Gas phase measurement accuracy	±5%
液相测量精度 Accuracy of liquid phase measurement	±10%
含液率流量范围 Liquid rate flow range	(0~10)%
口径 Nominal diameter	DN50、DN80
设计压力 Design pressure	6.3MPa、10MPa、16MPa
材质 Material	304、316L、镍基合金、304、316L、Inconel 625

产品特点 Product Features

- **专利技术:**国际首创非轴对称节流原件测量气液两相流
Firstly use non-axisymmetric throttling element for measuring gas-liquid two-phase flow
- **无放射性:**无伽马射线源, 安全环保
No radioactive sources
- **非分离计量:**天然气井口气液两相混输流量测量, 无需分离器
No separation required
- **流型适应性强:**非轴对称节流原件设计, 特别适应于分层流、波状流、段塞流等多种中高含液率流动形态
Especially applicable to the stratified flow, wavy flow, slug flow, and other flow regime of high liquid fraction.

微波喷嘴气液两相流量计
MICROWAVE NOZZLE GAS-LIQUID TWO-PHASE FLOWMETER

HHTPF-NZ



产品介绍 Product Introduction

微波喷嘴气液两相流量计将微波技术与喷嘴节流装置有机结合，利用喷嘴节流装置测量气液两相总流量，微波技术测量液相含率，适用于含液率范围0-100%的天然井口气液两相流测量。具有自主知识产权，核心部件国产化，质量稳定，可靠性好。

Microwave Nozzle Gas-Liquid Two-Phase Flowmeter combines microwave measurement and nozzle measurement technology, using nozzle to measure the total flow rate of gas-liquid two-phase, and microwave to measure the liquid fraction. The flowmeter is suitable for natural gas well measurement of (0~100)% liquid fraction, and has self-dependence intellectual property, which can provide high performance and high quality.

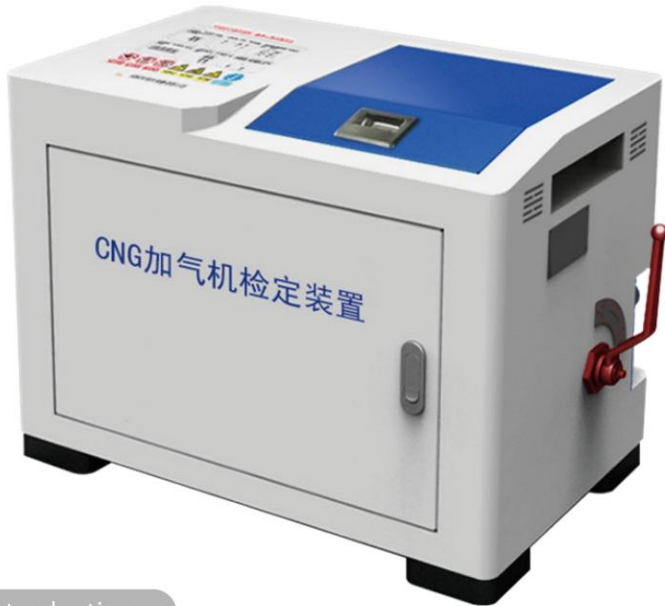
技术参数 Technical Parameters

型号 Model	HHTPF-NZ
气相测量精度 Gas phase measurement accuracy	±5%~±10%
液相测量精度 Accuracy of liquid phase measurement	±5%~±10%
含液率流量范围 Liquid rate flow range	(0~100)%
口径 Nominal diameter	DN50、DN80
设计压力 Design pressure	6.3MPa、10MPa、16MPa
材质 Material	304、316L、硬质合金、镍基合金、304、316L、YG8、Inconel 625

产品特点 Product Features

- **专利技术:**国际首创非轴对称节流原件测量气液两相流
Use microwave and nozzle technology to measure gas-liquid two-phase flow
- **无放射性:**无伽马射线源，安全环保
No radioactive sources
- **非分离计量:**天然气井口气液两相混输流量测量，无需分离器
No separation required
- **流行适应性强:**适用于含液率范围(0~100)%的工况条件
Applicable to measure (0~100)% liquid fraction

检定装置 CNG类
CALIBRATION DEVICE



产品介绍 Product Introduction

本装置由高精度质量流量计、高精度压力变送器、7寸触摸屏和智能控制器等构成，可实现触摸屏离线操作或上位机在线进行CNG加气机计量准确度和重复性检测，依照检定数据打印出检定记录和计量合格证书。

This device is composed of high-precision mass flowmeter, high-precision pressure transmitter, 7" touch screen, and intelligent controller, etc. It can realize touch screen off-line operation or upper computer online CNG dispenser metering precision and repeatability check, and print verification record and metering certificate according to the verification data.

技术参数 Technical Parameters

计量精度(准确度) Accuracy	0.2 级	额定工作压力 Rated operating pressure	20 MPa
重复性 Repeatability	0.1 %	最大工作压力 Maximum operating pressure	25MPa
测量量程比 Measuring range ratio	1:40	输入电压 Input voltage	12V DC~24V DC
环境温度 Environment temp.	-25℃~+55℃	防爆标志 Explosion proof mark	Ex d e ic IIB T4 Gc
尺寸规格 Overall dimension	长×宽×高: 600mm×335mm×430mm Length×Width×Height: 600mm×335mm×430mm		

产品特点 Product Features

- **整机全防爆**
Complete explosion-proof machine, safe and reliable
- **触屏交互式操作与显示**
Touch screen interactive operation and display
- **结构紧凑，体积小，方便运输和使用**
- **内部集成控制器，无需外接电脑，即可实现现场检定操作**
Internal integrated controller, without external computer, can achieve on-site verification operation
- **当前压力实时显示(电脑软件和触摸屏)**
Real-time display of current pressure (computer software and touch screen)

LNG类



产品介绍 Product Introduction

由高精度的质量流量计、管路系统、安全阀、截止阀、压力表和机壳等组成；通过与加气机设备串联的方式来检测加气机的准确度和重复性，依照检定数据打印出检定记录。

It is composed of high-precision mass flowmeter, pipeline system, safety valve, globe valve, pressure gage, and enclosure, etc. Degree of accuracy and repeatability of gas dispenser is through cascading with gas dispenser. Verification record is to be printed according to verification data.

技术参数 Technical Parameters

最大允许误差 Maximum permissible error	±0.3 %
最大工作压力 Maximum operating pressure	1.6MPa
环境温度 Environment temp	-20℃~+55℃
输入电压 Input voltage	12V DC/24V DC
防爆标志 Explosion proof mark	Ex d e ib IIB T4 Gc
尺寸规格 Overall dimension	长×宽×高: 794mm×584mm×650mm Length×Width×Height: 794mm×584mm×650mm

产品特点 Product Features

电气部分采用了防爆结构, 安全可靠
The electric part adopts explosion proof structure which is safe and reliable.

采用图像自动识别技术捕捉LNG加气机数据
It adopts image automatic identification technique to seize LNG gas dispenser data.

- 采用高精度质量流量计和专用检定软件实现对LNG加气机检定
It adopts high-precision mass flowmeter and special verification software to realize verification for LNG gas dispenser.

H₂类



产品介绍 Product Introduction

本装置由高精度质量流量计、高精度压力变送器和智能控制器等构成, 可实现远程操作或上位机在线进行压缩氢气加气机计量准确度和重复性检测, 依照检定数据打印出检定记录和计量合格证书。

This device is composed of high-precision mass flowmeter, high-precision pressure transmitter and intelligent controller, etc. It can remote operation or upper computer online compressed hydrogen dispenser metering precision and repeatability check, and print verification record and metering certificate according to the verification data.

技术参数 Technical Parameters

流量范围 Flow-rate range	0.36~7.2kg/min	工作温度 Working temp.	-25℃~+55℃
最大允许误差 Maximum permissible error	±0.5 %	输入电压 Input voltage	12V DC~24V DC
重复性 Repeatability	0.25%	防爆标志 Explosion proof mark	Ex d e mb ib IIC T4 Gb
额定工作压力 Rated operating pressure	35/70MPa	整机重量 Total weight	约60kg
最大工作压力 Maximum operating pressure	43.8/87.5MPa	尺寸规格 Overall dimension	长×宽×高: 650mm×640mm×580mm Length×Width×Height: 650mm×640mm×580mm

产品特点 Product Features

- 整机防爆, 安全可靠
The whole machine explosion-proof, safe and reliable

- 智慧计量, 检测数据汇总于云平台, 便于后台数据管理
Intelligent metering, detection data summary in the cloud platform, easy to manage background data

- 检定数据无线传输, 远程操作, 方便可靠
Verification data wireless transmission, remote operation, convenient and reliable

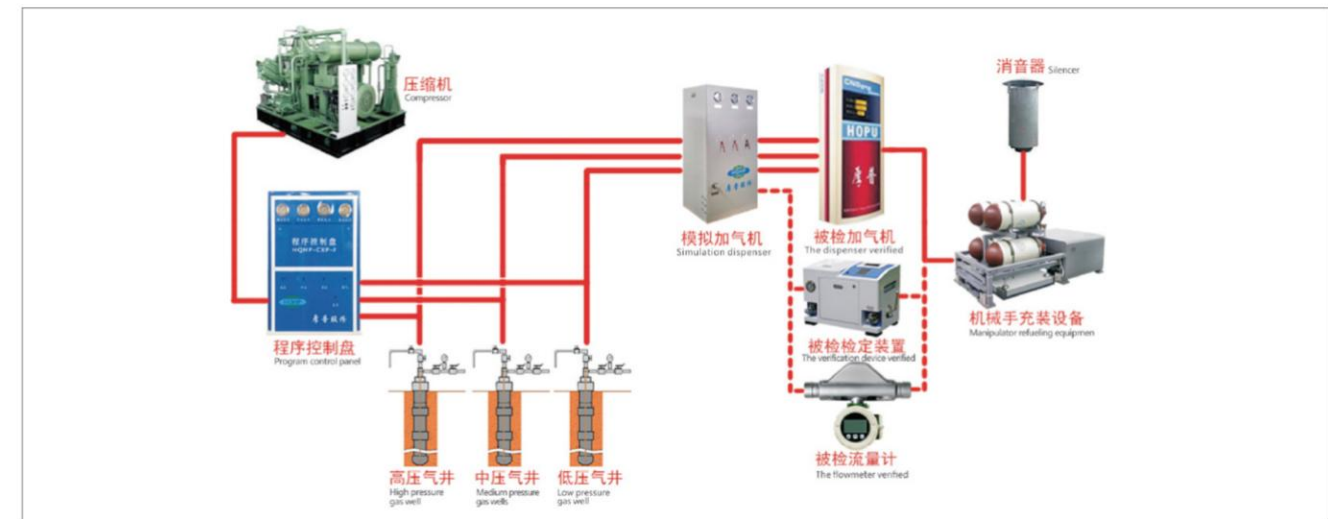
- 结构紧凑, 体积小, 方便运输和使用
Compact structure, small volume, convenient transport and using

溯源系统

质量法气体流量标定系统

TRACEABILITY SYSTEM

GAS MASS FLOW CALIBRATION SYSTEM



产品介绍

Product Introduction

系统通过高压空气压缩机将产生的高压气体经过程序控制盘分配，分别打入高、中、低压储气井中，并使用储气井里的压缩空气作为检定介质，给配置了标准表的模拟加气机供气。被检设备通过高压软管与模拟加气机和机械手充装设备连接，由上位机操作软件控制模拟加气机对机械手充装设备中的气瓶组进行加气充装，充装完后可使用高精度电子称称得加气量，进行质量法的检定，也可以依据模拟加气机中的标准流量计对被检设备进行标准表法的检定。检定完成后，气瓶组内高压气体通过排空管道进入消音器对外排空。

The high pressure gas produced by the high pressure air compressor is distributed by program control panels into low, medium and high gas compressing and storing wells and the compressed gas in the wells is used as calibrating media to supply gas for simulation dispensers mounted with standard scales. The detected equipment is connected to the simulation dispenser and the manipulator filling equipment via the high pressure hose and the upper computer operating software is applied to control the simulation dispenser to add and fill gas into the cylinder group of the manipulator filling and loading equipment. After that, a high precision electronic scale is used to weigh and verify the gas added with the quality law; also, the detected equipment can be verified with the standard flowmeter in the simulation dispenser according to the standard scale method. After calibration, the high pressure gas in the cylinder group is discharged from the emptying pipe to the silencer, calibrating results.

技术参数

Technical Parameters

参数名称 Parameter Name	小流量标定系统 Low flow manipulator automatic filling equipment	中流量标定系统 Medium flow manipulator automatic filling equipment
气瓶组容积 Cylinder group volume	100L	300L
电子称量程 Electronic scale range	300kg	600kg
电子称检定分度值 Electronic scale calibrating division value	10g	20g
系统扩展不确定度 System expansion uncertainty	$\leq 0.05\%$	

产品特点

Product Features

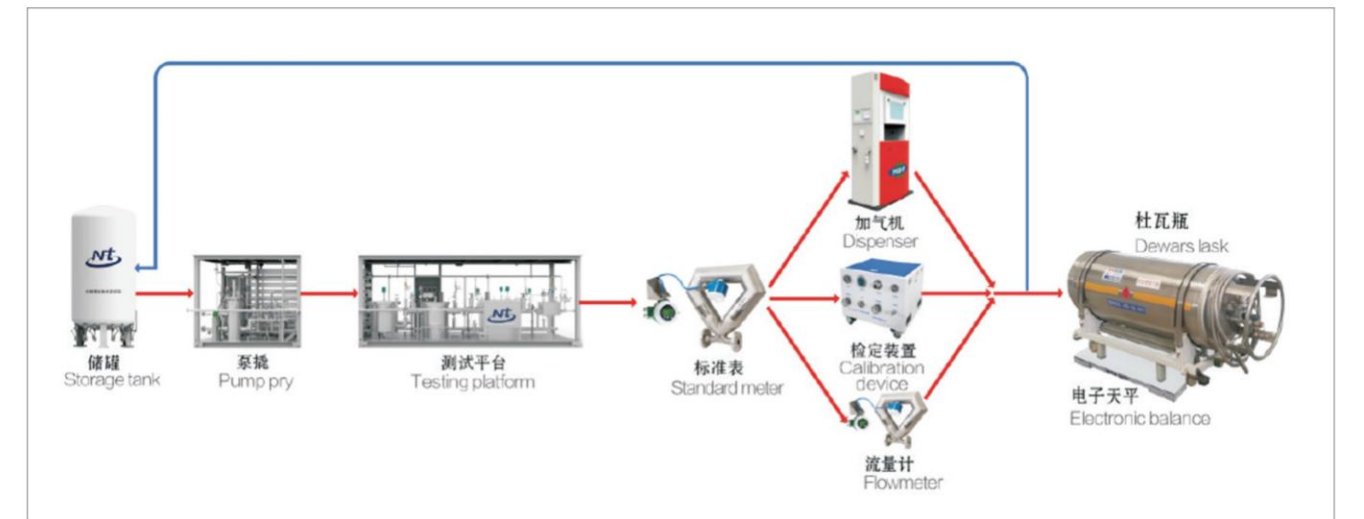
充装、称重及排气过程都通过上位机操作机械手充装设备完成，人员无需进入高压设备区进行检定工作，保障人员安全、减少人员工作量

Filling, weighing and discharging processes are completed with the manipulator filling equipment of upper computer. There is no need for any person to enter the high pressure equipment zone for calibration, thus guaranteeing personnel safety and reducing workload.

- 系统采用SCADA控制系统，具有实时性、高可靠性及可扩展性优点
A highly reliable and expandable real-time SCADA control system is adopted.
- 操作方便，提高工作效率
It makes operation convenient and improves working efficiency.
- 模拟加气机可模拟实际充装工况，实现低、中、高压自动切换充装，使检定结果真实可靠
The simulation dispenser can imitate the actual filling condition to shift automatically the filling under low, medium and high pressure and bring about authentic and reliable calibrating results.

低温液体流量标定系统

CRYOGENIC LIQUID FLOW CALIBRATION SYSTEM



产品介绍

Product Introduction

对LNG加气机实施强制检定，LNG加气机检定装置正是对LNG加气机进行现场检定的装置，而LNG加气机检定装置在计量检定上自身也需要溯源。LNG加气机检定装置液氮标定系统对LNG检定装置进行检定及校准，以检定LNG加气机检定装置计量是否准确，从而确保计量法在LNG加气机领域的贯彻实施。

The LNG dispensers are calibrated under coercion. The calibrating apparatus is also the device to verify the LNG dispenser where it is, while the device itself needs to be traced in respect to metrological verification. The liquid nitrogen calibrating system of the LNG dispenser calibration device is used to verify and adjust the LNG calibration device so as to check if the metering of the device is correct and ensure the implementation of the metering law in the field of LNG dispensers.

技术参数

Technical Parameters

电子称量程 Electronic scale range	800kg
电子称检定分度值 Electronic scale calibrating division value	20g
单次换向时间 Single commutation time	$\leq 15\text{ms}$
连续两次换向时间差 Time difference between two consecutive commutations	$\leq 5\text{ms}$
系统扩展不确定度 System expansion uncertainty	$\leq 0.1\%$

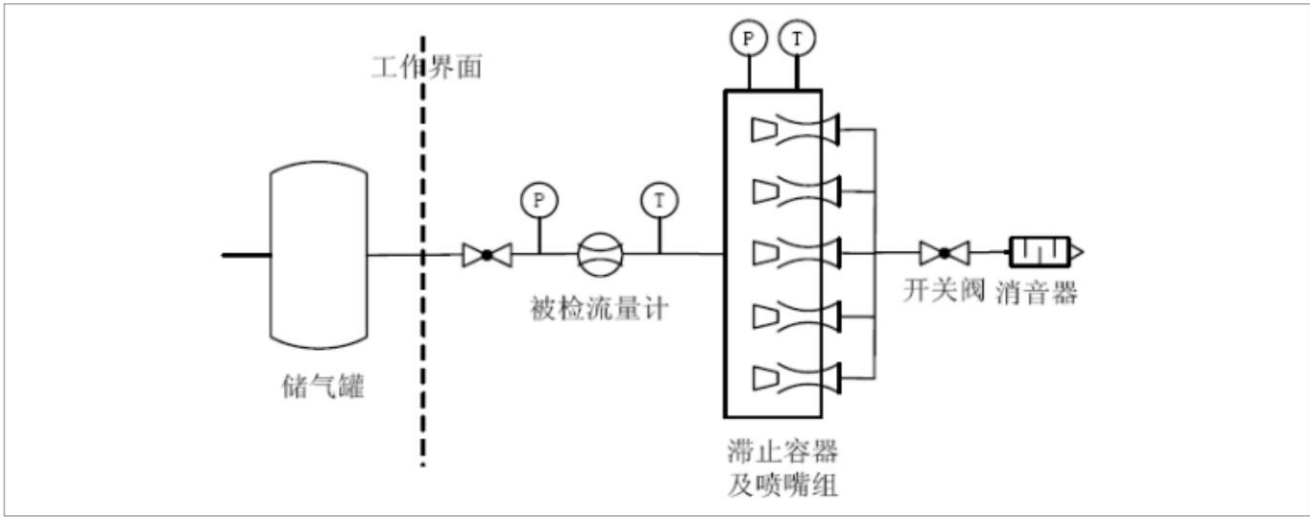
产品特点

Product Features

- 称重机构与空气隔绝，减少结霜现象对称量误差的影响
The weighing mechanism is isolated from the air to reduce the influence of frost on the weighing error
- 低温介质中快速换向，无泄漏，确保实验数据真实有效
Rapid reversing in low temperature medium, no leakage, to ensure the real and effective experimental data
- 远程操作，安全可靠
Remote operation, safe and reliable

音速喷嘴式气体流量标准装置

Sonic Nozzle Gas Flow Standard Device



工作原理 Working Principle

根据气体动力学原理,当气体通过临界流喷嘴时,当喷嘴上游、下游压力比达到某一特定条件后,在喷嘴喉部形成临界流状态,气流达到最大速度(音速)。流过喷嘴的气体质量流量也达到最大值 Q_m 。此时 Q_m 只与喷嘴入口处的滞止压力和温度有关,而不受其下游状态变化的影响。本装置正是基于上述原理,以音速喷嘴为标准表与被检流量计比对得出示值误差。

Based on the principle of gas dynamics, when gas flows through a critical flow nozzle, when the pressure ratio between the upstream and downstream of the nozzle reaches a certain specific condition, a critical flow state is formed at the throat of the nozzle, and the gas flow reaches the maximum velocity (sonic velocity). The mass flow rate of the gas flowing through the nozzle also reaches the maximum value Q_m . At this time, Q_m is only related to the stagnation pressure and temperature at the inlet of the nozzle, and is not affected by the change of its downstream state. This device is based on the above principle, using the sonic nozzle as the standard meter to compare with the tested flowmeter to obtain the indication error.

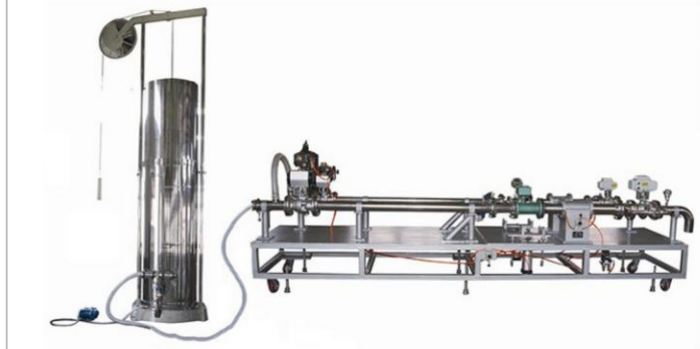
技术指标 Technical Parameters

- 1、装置流量范围: (1~5000) m³/h。
- 2、工作压力: 0.5MPa。
- 3、检表种类: 涡街流量计、质量流量计、阿牛巴流量计、孔板流量计、转子流量计等气体流量计。
- 4、检定介质: 压缩空气。
- 5、喷嘴不确定度: 0.2% (k=2)。
- 6、装置综合扩展不确定度: 优于0.5% (k=2)。
- 7、检表台位六个: DN50 (40/32/25)、DN80 (65)、DN100、DN150 (125)、DN200、DN250
- 8、装置材质: 所有计量管路为不锈钢, 其余为碳钢。

- 1、Flow range of the device: (1~5000)m³/h.
- 2、Working pressure: 0.5MPa.
- 3、Types of tested meters: Vortex flowmeter, mass flowmeter, Annubar flowmeter, orifice plate flowmeter, rotor flowmeter and other gas flowmeters.
- 4、Calibration medium: Compressed air.
- 5、Nozzle uncertainty: 0.2% (k=2).
- 6、Comprehensive expanded uncertainty of the device: Better than 0.5% (k=2).
- 7、Six calibration benches: DN50 (40/32/25), DN80 (65), DN100, DN150 (125), DN200, DN250
- 8、Material of the device: All measuring pipes are made of stainless steel, and the rest are made of carbon steel.

钟罩式气体流量标准装置

Standard Bell Porvers of Gas Flow



技术指标 Technical Parameters

- 工作压力: 1-5.0KPa
流量范围: 0.6-120m³/h
系统不确定度: 0.2-0.5级
压力波动: 20-50pa
- Working pressure: 1~5.0KPa
Flow range: 0.6~120m³/h
System uncertainty: 0.2~0.5 grade
Pressure fluctuation: 20~50pa

工作原理 Working Principle

可动的钟罩和固定的液槽形成一个容积可变的密封空腔。钟罩下降过程中通过压力补偿机构,使其内部气体压力保持一定值,不随钟罩浸入密封液体中的深度而变化。以钟罩内有效容积为标准,当钟罩下降时,钟罩内气体经实验管道排至被检仪表,以钟罩排出气体容积与被检仪表输出值进行比较,从而获得仪表的测量精度。

The movable bell jar and the fixed liquid tank form a sealed cavity with variable volume. During the lowering of the bell jar, the gas pressure inside is kept constant through a pressure compensation mechanism, and does not change with the depth of the bell jar immersing into the sealing liquid. With the effective volume inside the bell jar as the standard, when the bell jar descends, the gas inside the bell jar is discharged through the test pipeline to the meter under test. By comparing the discharged gas volume of the bell jar with the output value of the meter under test, the measurement accuracy of the meter can be obtained.

水流量标准装置

Water Flow Standard Device

工作原理 Working Principle

将被检流量计夹装到对应的试验管路上,启动相应的液体循环系统,调整泵的频率、调节阀开度,介质流速及管线内压力,调节到检定流量并保持稳定,使液体流经被检流量计和流量工作标准(工作量器或标准表),同步操作被检流量计和流量工作标准,比较两者的输出流量值,从而确定被检流量计的计量准确度和重复性。

The tested flowmeter is installed on the corresponding test pipeline, the corresponding liquid circulation system is started, the pump frequency and the regulating valve opening are adjusted, the medium flow rate and the pressure in the pipeline are adjusted to the calibration flow and kept stable, so that the liquid flows through the tested flowmeter and the flow working standard (working volume meter or standard meter), the tested flowmeter and the flow working standard are operated synchronously, and the outflow values of the two are compared to determine the measurement accuracy and repeatability of the tested flowmeter.



技术指标 Technical Parameters

- 1、检定方法: 静态容积法、静态质量法、标准表法
- 2、装置不确定度: 静态质量法 $\pm 0.05\%$, 静态容积法 $\pm 0.1\%$, 标准表法 $\pm 0.2\%$ 。
- 3、流量稳定度: $\pm 0.2\%$
- 4、标准量器准确度: 0.05%, 电子秤准确度: 0.015%, 标准表准确度: 0.2%
- 5、工作压力: (0.3~0.4)MPa
- 6、检表口径: DN 15~DN300以上
- 7、检表种类: 速度式流量计、容积式流量计、质量流量计等
- 8、测试方式: 自动或手动
- 9、流体介质: 水

- 1、Calibration Method: Static Volumetric Method、Static Mass Method、Standard Meter Method
- 2、Device Uncertainty: Static Mass Method: $\pm 0.05\%$ 、Static Volumetric Method: $\pm 0.1\%$ 、Standard Meter Method: $\pm 0.2\%$
- 3、Flow Stability: $\pm 0.2\%$
- 4、Accuracy of Standard Measuring Instruments: Standard Volume Meter: 0.05%、Electronic Balance: 0.015%、Standard Meter: 0.2%
- 5、Working Pressure: (0.3~0.4)MPa
- 6、Calibration Meter Caliber: DN 15~DN300 and above
- 7、Types of Tested Meters: Velocity Flowmeter
- 8、Volumetric Flowmeter/Mass Flowmeter
- 9、Test Method: Automatic or Manual
- 10、Fluid Medium: Water

应用案例

APPLICATION CASE



■ 油库槽车充装计量



■ 低温槽车卸车计量



■ 冷媒充装计量



■ 油田石油开采计量



■ 液化工厂槽车充装计量



■ 加氢检定装置



■ 高压气体加注



■ 某部队低温溯源装置



■ 重庆计量院低温溯源系统