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Haimo Technologies Group Corp.

COMPANY PROFILE

Haimo Technologies Group Corp. is a multinational enterprise dedicated to providing high-end equipment and services for oil and gas field stimulation, production optimization, reservoir management, and digital transformation. Founded in 1994, the company was transformed into a joint-stock company in 2000 and listed on the Growth Enterprise Market of the Shenzhen Stock Exchange in May 2010 (Stock Abbreviation: Haimo Technologies, Stock Code: 300084).

Haimo is recognized as one of the three major mainstream suppliers of oilfield multiphase metering products and services internationally, a competitive domestic manufacturer of fracturing pump fluid ends, and a technology leader in China's oil and gas field digitalization sector.

The company operates over ten subsidiaries and branches globally, with its business network covering key regions including the Middle East, North Africa, Central Asia, South Asia, Southeast Asia, North America, and South America.

Haimo has established overseas branches and professional service teams in core markets such as Saudi Arabia, Oman, the UAE, and the Americas, providing local clients with comprehensive services encompassing mobile testing, installation and commissioning, technical training, after-sales maintenance, and digital transformation.

Since its inception, the company has steadfastly adhered to the path of "Independent R&D, Made in China." With its research institute serving as the innovation hub, Haimo focuses on breakthroughs in multiphase metering technology and the application of digital-intelligent platforms. It has accumulated over 160 patents and more than 20 software copyrights, building a solid moat of independent intellectual property rights.

Looking ahead, the company will forever retain the sharpness of pioneers and the persistence of doers. On one hand, it will continue to invigorate its core traditional businesses—high-end oil and gas field equipment and services—through deeper cultivation of key markets, increased R&D investment, and upgraded service capabilities. On the other hand, in collaboration with professional investment institutions, it will actively position itself in new quality productivity sectors such as semiconductors and artificial intelligence, striving to build a new development pattern characterized by the synergistic growth of its "core oil and gas business and emerging industries," thereby broadening its development horizons through diversified.

CORE VALUES

CUSTOMER CARE

GROWING PEOPLE

INTERNATIONAL TEAMWORK

INNOVATION

PROFIT

PRODUCTS

- Multiphase Flow Meter
  - Full Range
  - Spool Piece
  - Subsea
  - Bulk Flow
- Wet Gas Meter
- Water Cut Meter - 3 Phase
- Low Production Tester (LPT)
- High Performance Tester (HPT)

SERVICES

- Mobile Well Testing Service
- Annual Maintenance Contract
- Performance Guaranteed Services

APPLICATIONS

- Well/ Field/ Platform Production Testing
- Exploration Well Testing
- Appraisal Well Testing
- Well Cleanup Testing
- Production Monitoring
- Allocation Metering
- Reservoir Management

STANDARDS

Haimo Multiphase Flow Meter is designed, manufactured and tested as per international standards such as API / ANSI / ASME / NACE etc, custom made designs are available upon request.

Spool Piece MPFM

MULTIPHASE FLOW METER - FULL RANGE

(MFM 2000 Series)

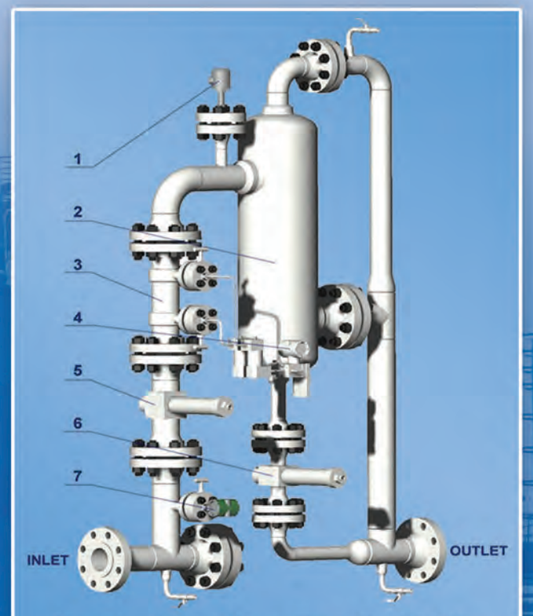
WORKING PRINCIPLE

Haimo's skid mounted flow meter is a combination of gas / liquid two phase flow meter and three phase water cut meter.

Measurement of the gas and liquid flow rates are carried out in the gas / liquid two phase meter that consist of a venturi and single energy gamma meter. The Water Liquid Ratio (WLR) is measured in the dual energy gamma meter which is located downstream of inline liquid sampler.

The phase fractions are derived from these two independent measurements and net oil flow rate is finally calculated using the gross liquid flow rate and water cut measurement.

Generally the Water Liquid Ratio (WLR) measurement accuracy suffers with slugging as well as high Gas Volume Fraction (GVF), therefore in order to measure WLR accurately we have introduced an inline liquid sampler upstream of the dual energy gamma water cut meter to condition the multiphase flow by mitigating slugs and reducing the GVF level. This helps achieve the water cut measurement error within ±2% absolute for the full range of stated GVF in the meter's operating envelope.



1 Temperature Transmitter 2 Flow conditioner 3 Venturi Flow Meter
4 Differential Pressure Transmitter 5 Single Gamma Meter
6 Dual Gamma Meter 7 Pressure Transmitter

BENEFITS

- Best in class for water cut measurement - a key factor in resulting net oil accuracy
- Flow regime independant
- Wide operating range with low pressure drop
- Non-intrusive and in-line measurement techniques
- Field oriented design, small footprint and cost effective mobilization
- Compact, robust and easy to install meter - ideal for remote locations
- High frequency data acquisition, provides real time well data at line and standard conditions

PERFORMANCE SPECIFICATIONS

Gas Volume Fraction	Measurements	Uncertainty
0~95%	Liquid Flow Rate	±5% rel.
	Gas Flow Rate	±5% rel.
	Water Cut Rate	±2% abs.
95~100%	Liquid Flow Rate	±5~10% rel.
	Gas Flow Rate	±2% rel.
	Water Cut Rate	±2% abs.

OPERATING RANGE

Water Cut Ratio	0~100 %
Gas Volume Fraction	0~100 %
Turndown Ratio	15:1 (Extendable to 30:1)

CUSTOM BUILT CONFIGURATIONS–THE 2 IN 1 METER CONCEPT

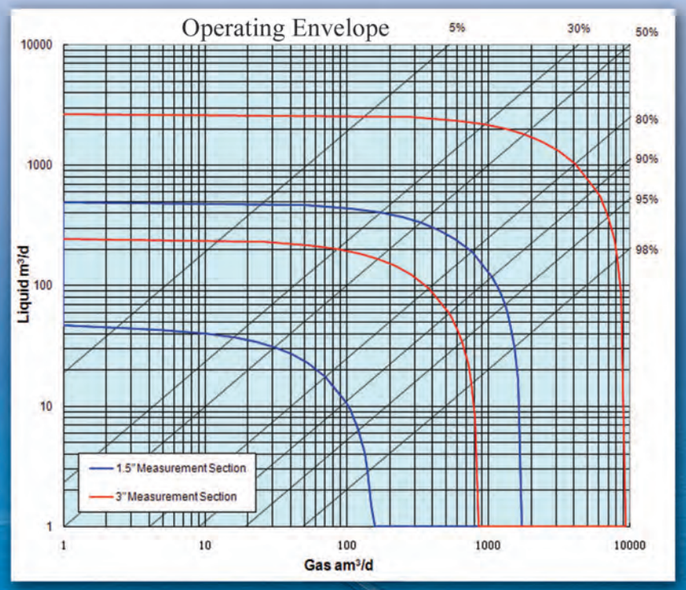
Customers frequently require solutions that would need a wide turndown ratio in measurement. Most meters deploy venturi for total flow rate measurements. The venturi sizing will dictate the turndown achievable for the system. It is often the case that the customer ends up buying two meters of different sizes to cater to their minimum and maximum flow rate requirements. Haimo offers innovative, yet cost effective solutions for these demanding applications.

Built on measurement modules, which carry out the phase flow rate measurements independent of the phase fraction measurements, Haimo offers unique 2 in 1 measurement concepts which incorporate 2 different size venturi in the same meter.

With the help of an automated off / on valve, which is controlled by the flow computer, the flow is routed either through the small or the large venturi depending on the actual flow rates in the pipe section. This diversion of the flow between the venturi is fully automated and does not require any human intervention.

The below given 2 phase map with operating envelope is a typical example of a 2 in 1 meter, which clearly shows the wide turndown that can be achieved from a single meter.

The water cut measurement section is common to both venturi.



MULTIPHASE FLOW METER – SPOOL PIECE

(MFM 3000 Series)

SP (Spool Piece) MPFM is a state-of-the-art technology for inline measurement of multiphase flow. The meter consist of dual energy gamma sensor and Venturi meter that makes it very compact and suitable for direct well head installation. SP meter allows accurate measurement of water , oil and gas flow rate. Depending upon requirement, the meters can either be a spool piece or a skid mounted design.

WORKING PRINCIPLE

- Total Flow Rate (TFR) is measured by Venturi flow meter.
- Multi-Variable Transmitter (MVT) are mounted for measuring the DP (differential pressure) , temperature and pressure of the testing well.
- The Dual Energy Gamma Sensor is used to measure GVF and WLR of multiphase fluids.
- Flow computer / Data Acquisition Unit (DAU) is installed with proprietary software and inline PVT model to deliver reliable data at standard condition.

PERFORMANCE SPECIFICATIONS

Gas Volume Fraction	Measurements	Uncertainty
0~95% *	Liquid Flow Rate	±5% rel.
	Gas Flow Rate	±5% rel.
	Water Cut	±2% abs.

*For uncertainty >95% GVF, please consult factory.

BENEFITS

- Helps lowering field development cost
- Efficient well testing
- Real–time, reliable and accurate measurements
- Exceptional dynamic response to flow rate change
- Custom built and Highly Cost Effective
- Compact size and simple installation

MULTIPHASE FLOW METER-SUBSEA

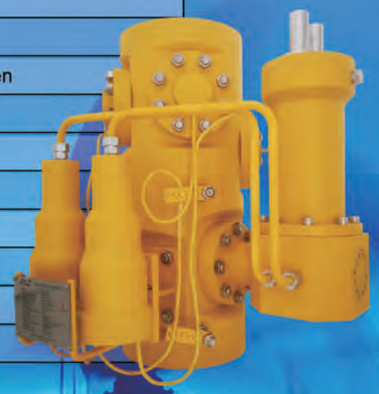
(SMPFM 5000 Series)

Haimo Subsea Multiphase Flow Meter (SMPFM) is a latest technology developed in a very compact design for monitoring and testing oil and gas wells up to 100% Gas Volume Fraction (GVF). The meter allows accurate measurement of individual liquid and gas flow rates along with the Water Cut (WC).

Haimo SMPFM utilizes the combination of two technologies: Venturi and dual energy γ-ray absorption. Subsea multiphase meters are based on the topside version of MPFM 3000 series, utilizing the same well-proven technology.

SPECIFICATIONS

Items	Specifications
Model	SMPFM-5000
Design pressure	10000psi
Design temperature	-29~121°C (-46~121°C optional)
Water depth	3000m
Design life	30 years
Material grade	HH
Communication protocol	Modbus RTU, Modbus Ethernet or CANopen
Product specification level	PSL 3G
Design code	API 6A, API 17D, API 17F, API 17S etc.
Power consumption	≤ 15W
Power supply	18~36 VDC
Dimension	900(L) x 800(W) x 900(H) mm (Typical)
WLR range	0~100%
GVF range	0~100%



FEATURES

- Both multiphase and wet gas flow measurement
- Redundancy design for key parts
- Dual-seal and high reliability
- Verified by DNV GL
- Inline flow meter, non intrusive
- Reliable, real-time and accurate data
- Remote operation and data acquisition
- No moving parts
- Outstanding dynamic response
- Low pressure loss
- Low power consumption

MULTIPHASE FLOW METER-BULK FLOW

Bulk meters are large size Multiphase flow meters with sizes ranging up to 24 Inch with measurement capability of up to 500,000 BPD. Haimo Bulk Meters are in operation successfully since year 2003, and our 16 Inch bulk meters are the largest size on-shore and offshore installation in the world.

WORKING PRINCIPLE

- Gross Flow Rate is measured using venturi technology and gamma ray attenuation technology is used for phase fraction measurements.
- Flow computer/Data Acquisition Unit(DAU) is installed with proprietary software and inline PVT model to deliver reliable data at standard condition.

PERFORMANCE SPECIFICATIONS

Gas Volume Fraction	Measurements	Uncertainty
0~95% *	Liquid Flow Rate	±5% rel.
	Gas Flow Rate	±5% rel.
	Water Cut Rate	* Consult factory for size specific GVF

BENEFITS

- High Flow Rate measurement
- Production Allocation measurement
- Inter Field Transfer measurement

WET GAS METER

(MFM 5000 Series)

The Wet Gas Metering technology is an extension of Haimo standard Multiphase meter. In the wet-gas meter, we accurately measure flowrates along with phase-fraction. Depending upon the client requirement, the meters can either be a spool piece or skid mounted design.

WORKING PRINCIPLE

- The Total Flow Rate (TFR) is measured using the venturi technology and the phase fraction measurement with gamma ray attenuation technology.
- Flow computer / Data Acquisition Unit (DAU) is installed with proprietary software and inline PVT model to deliver reliable data at standard condition.

PERFORMANCE SPECIFICATIONS

Gas Volume Fraction	Measurements	Uncertainty
90~100%	Total Mass Flow Rate	±3% rel.
	Gas Mass Flow Rate	±2% rel.
	Water Volume Fraction	±0.5% abs.

BENEFITS

- Compact Size and Cost Effective
- Custom built
- Enhanced reservoir management
- Real time data
- Production optimization

WATER CUT METER - 3 PHASE

Haimo water cut meter (WCM) uses extremely low gamma energy source, which is exempted by IAEA and determines the Water Cut (WC) in three phase (oil+water+gas) flow up to 90% GVF. The meter is independent of oil/water emulsion effect.

WORKING PRINCIPLE

WCM is based on the principle that different matter have different absorption ability to gamma ray. The exempted gamma source is able to emit multiple energy levels gamma ray, and WCM uses two of them, namely high energy and low energy level gamma ray. Based on the absorption of the two gamma rays, two equations could be established and phase fractions could be solved. WCM is a non-intrusive type meter.

WCM could be used for Water Cut measurement in oil/water two phase flow or for both WC and GVF measurement in oil/water/gas three phase flow.

FEATURES

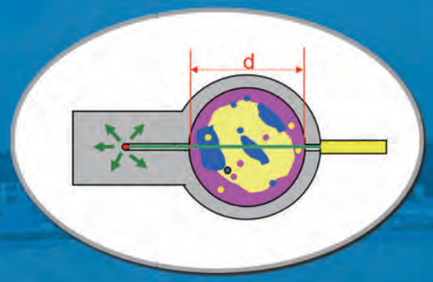
- Accurately measures Water Cut in three phase flow up to 90% GVF.
- Independent of oil / water emulsion effect
- Inline meter, non intrusive
- No moving parts – low maintenance
- Small foot print & weight - Simple Installation
- Low power consumption
- Exempted category source, free of regulatory maintenance requirement - safe operation
- Managementor for both WC and GVF measurement in oil/water/gas three phase flow

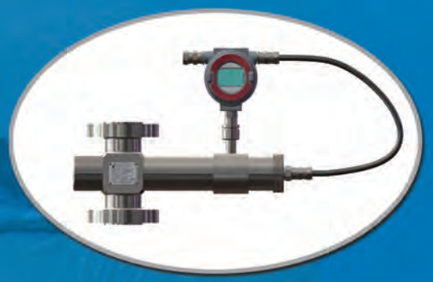
APPLICATIONS

- Individual well monitoring
- Water break though detection
- Separators

PERFORMANCE SPECIFICATIONS

GVF	Measurements	Uncertainty
0~50%	Water Cut abs.	1~2%
50~90%	Water Cut abs.	3~5%





LOW PRODUCTION TESTER（LPT）

Accurate measurement of low flowing and slugging wells are always a challenge in the oil industry. Haimo's Low Production Tester- LPT is developed primarily to address this challenge. LPT is a compact skid mounted meter, which can be used as fixed or mobile unit, to accurately measure low flow wells.

WORKING PRINCIPLE

- The multiphase flow is separated into Gas and liquid in a vertical separator.
- Total liquid flow rate is measured by Coriolis flow meter and water cut can be calculated by mixed fluid density from Coriolis meter or measured by water cut meter, B&SW will be analyzed by samples from auto grab sampler based on the flow proportional or manual sampling system for verification.
- The level in the vertical separator is controlled by a combination of level transmitters in the vessel and the liquid control valve installed downstream the vertical separator.
- Data acquisition and computation, liquid level controls etc are done by Haimo's proprietary Data Acquisition Unit (DAU) / flow computer.

PERFORMANCE SPECIFICATIONS

Measurements	Uncertainty
Liquid Flow Rate	±5% rel.
Gas Flow Rate	±5~10% rel.
Water Cut	±2% abs.

OPERATING RANGE

Water Liquid Flow Rate	0~100%
Gas Volume Fraction	0~100%
Liquid Range	$0m^3/d$ to $50m^3/d$
Gas Range	$0m^3/d$ to $7,880m^3/d$

BENEFITS

- Accurately measures (oil / water / gas) low flowing wells
- Accurate and repeatable data
- Compact and skid mounted for easy deployment
- Fully automated with unique control strategy
- Real time electronic data acquisition

HIGH PERFORMANCE TESTER（HPT）

Haimo's High Performance Tester (HPT) is an excellent tool for field verification of meters including MPFM. HPT gives client the benefit of in-situ verfication of installed meters at actual conditions. The distinctive design with the combination of vertical and horizontal separation along with fully automated controls and electronic data acquisition system / flow computer marks the difference between a standard test separator and HPT.

WORKING PRINCIPLE

- Multi-Phase flow is separated into Gas phase and liquid phase for measurement.
- Enhanced separation efficiency is achieved with a cyclone separator & a horizontal separator incorporated in the same skid.
- Gas is measured by Vortex meter.
- Total liquid flow rate is measured by Coriolis flow meter and water cut can be calculated by mixed fluid density from Coriolis meter or measured by water cut meter, B&SW will be analyzed by samples from auto grab sampler based on the flow proportional or manual sampling system for verification.
- Data acquisition and computation, liquid level controls etc are done by Haimo's proprietary Data Acquisition Unit (DAU) / flow computer.

PERFORMANCE SPECIFICATIONS

Measurements	Uncertainty
Liquid Flow Rate	±5% rel.
Gas Flow Rate	±5~10% rel.
Water Cut	±2% abs.

OPERATING RANGE

Water Liquid Flow Rate	0~100%
Gas Volume Fraction	0~100%
Liquid Range	$0m^3/d$ to $2,000m^3/d$
Gas Range	$0m^3/d$ to $65,700m^3/d$

BENEFITS

HPT acts similar to that of a conventional test separator system, but differs in the focus it lays on accuracy required for qualifying as a verification system. It eliminates the possibility of gas and liquid carry over, which are common factors for loss of accuracies in conventional systems.

MOBILE WELL TESTING SERVICES

WELL TESTING SERVICES USING CUSTOM BUILT TEST UNITS

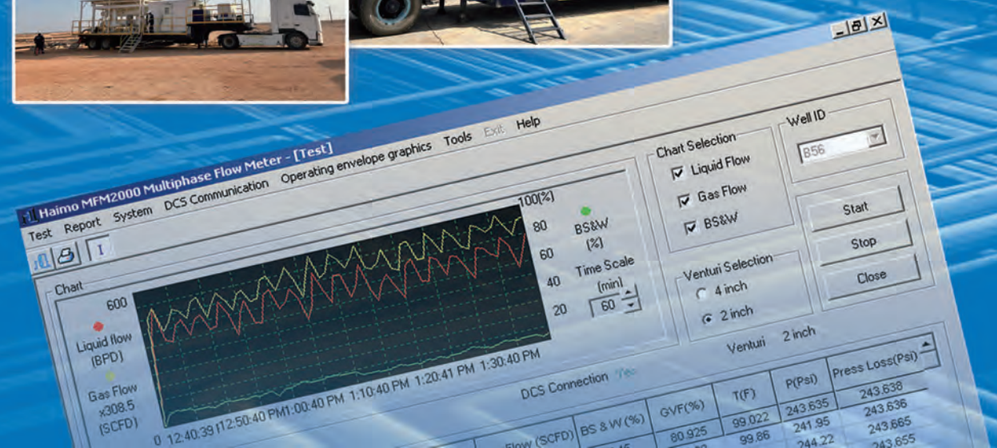
- Compact mobile MPFM for regular well testing
- Low Production Tester (LPT) for testing wells in marginal fields
- High Production Tester (HPT) for the edge in Well Test Services as a master meter / prover system
- Compact mobile wet gas meter for testing gas wells

APPLICATIONS

- Production testing and trending
- Well cleanup and optimization
- Back allocation
- Exploration and Appraisal testing
- Gas lift optimization
- Flow line diagnosis

BENEFITS

- Professional, dedicated and highly experienced personnel
- Low risk for OPEX, pay for highly accurate data and not for equipment
- Compact and highly mobile for rapid deployment
- Minimal installation requirements
- Repeatable and reliable minute data of well characteristics
- Improved well diagnostics



CERTIFICATION

CUSTOMER

ADNOC Abu Dhabi National Oil Company	Agiba Petroleum Company	Anadarko Petroleum Corporation	Andes Petroleum Ecuador LTD
Baker Hughes	Cairn Energy PLC	Caltex Petroleum Corporation	Chevron Corporation
China National Logging Corporation	China National Offshore Oil Corporation	China National Petroleum Corporation	Conoco Phillips Corporation
China Petroleum & Chemical Corporation	Daleel Petroleum L.L.C	Dove Energy Group	Dubai Petroleum Establishment
Halliburton	Kuwait Oil Company	Mansarovar Energy Colombia Ltd.	Masila Petroleum Exploration and Production Company
Murphy Oil Corporation	Oil and Natural Gas Corporation Limited	OMV Group	OQ Exploration and Production LLC
Occidental Petroleum Corporation	Petroleum Development Oman	Petroliam Nasional Berhad	Roc Oil Company Limited
Royal Dutch / Shell Group of Companies	Sonatrach	Saudi Aramco	TOTAL

ENTERPRISE VISION

Committed To Energy Production, Equipment Supply, Environmental Protection, Data Management And Production Optimization.

BRANCH
BUSINESS