



**2016
Numbers!**

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The World Market for Coriolis Flowmeters, 5th Edition

Overview

500 pages



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The World Market for Coriolis Flowmeters, 5th Edition

Flow Research has published a new market study on the worldwide Coriolis flowmeter market. The study was conducted by Flow Research. Our primary goal was to determine the size of the Coriolis flowmeter market in 2015, and to forecast market size through 2020. The study is called *The World Market for Coriolis Flowmeters, 5th Edition*.

This study contains the following vital information:

- The 2015 market size in US dollars and unit volume for Coriolis flowmeters worldwide
- Market shares of the leading suppliers of Coriolis flowmeters worldwide
- A detailed forecast of the market for Coriolis flowmeters in dollars and unit volumes through 2020
- Segmented data both on a worldwide basis and for each of eight global regions
- A technology and product analysis for Coriolis flowmeters
- Market and product strategies for suppliers of Coriolis flowmeters worldwide
- Company profiles of the significant suppliers of Coriolis flowmeters worldwide



Rationale for Study

Flow Research published the fourth edition of our worldwide Coriolis flowmeter study in January 2013. We resumed following the Coriolis flowmeter market regularly since then, and have been providing technical, corporate, and marketing updates in our quarterly publication *Market Barometer* (www.worldflow.com). Our end-user interviews indicate that the interest in Coriolis flowmeters remains at a very high level, and that end-user needs have become more complex and demanding. We have determined that significant growth in this market is due to growth in the oil & gas and other energy markets, and have also determined growth rates of other industries since the 2008/2009 recession. The last two years have been an optimal time to quantify all of this growth, and so we have taken another in-depth look at a rapidly expanding market.

Background of Study

The French mathematician Gustave Coriolis formulated the principle that underlies Coriolis flowmeters. In 1835, Gustave Coriolis showed that an inertial force needs to be taken into account when the motion of bodies in a rotating frame of reference is described. The Earth is often used as an example of the Coriolis force. A hypothetical object thrown from the North Pole to the Equator appears to vary from its intended path, due to the Earth's rotation.

Operating Principle. Coriolis flowmeters contain one or more vibrating tubes. These tubes are usually bent, although straight-tube meters are also now available. The fluid to be measured passes through the vibrating tubes. It accelerates as it flows toward the maximum vibration point, and slows down as it leaves that point. This causes the tubes to twist. The amount of twisting is directly proportional to mass flow. Position sensors detect tube positions.



Coriolis flowmeters are a relatively recent entrant into the market. In 1977, Micro Motion introduced a commercially viable Coriolis flowmeter for industrial applications. Since that time, a number of other suppliers have entered the market, including Endress+Hauser and KROHNE. Coriolis suppliers have introduced a wide variety of models and types of Coriolis flowmeters in the past 35 years. Endress+Hauser, KROHNE, and Micro Motion have all introduced large four-tube Coriolis meter for oil, gas, and other fluids in the last several years. The use of Coriolis flowmeters in multiphase flow measurement is another recently developed application.

Coriolis suppliers differentiate themselves in a number of ways. One is by the proprietary design of the bent tubes in their Coriolis flowmeters. Another is by the different types of straight tube Coriolis flowmeters that they offer. Suppliers also compete by bringing out Coriolis flowmeters for particular industries and applications, such as water, food & beverage, and pharmaceutical. Accuracy and other performance specifications are other areas of supplier differentiation.

While Coriolis flowmeters are preferred by many end-users, price is often an issue. Coriolis flowmeters are the most expensive meters made. The average selling price of a Coriolis flowmeter remains higher than most other flowmeter types, although some suppliers have introduced low-cost Coriolis flowmeters in the \$3,000 range or even less. Performance specifications for the lower-cost flowmeters are not at the same level as those of the higher-priced meters. However, these lower-cost meters help satisfy the most essential needs of users who want the benefits of Coriolis technology, but also seek to avoid the higher price premiums.

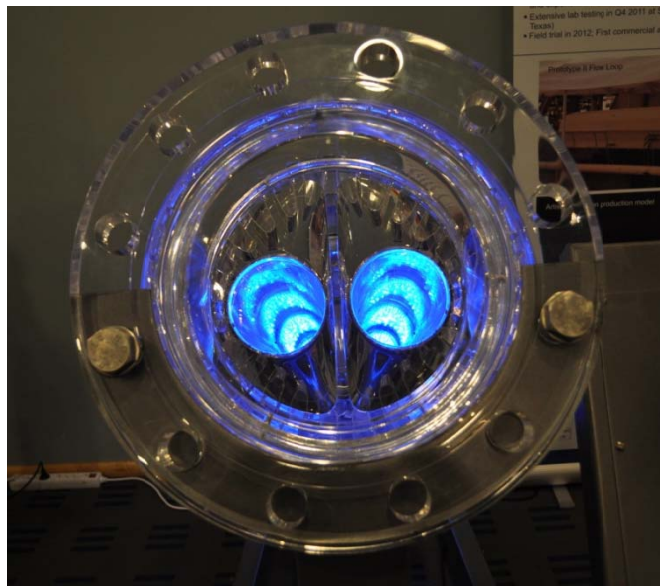


Photo by Flow Research

Key Issues Addressed

This study addresses the key issues in the Coriolis flowmeter market, including:

- Growth in the use of smart Coriolis flowmeters
- Growth in the popularity and availability of low-cost Coriolis flowmeters
- The relative merits of straight tube vs bent tube meters
- The growing use of Coriolis flowmeters to measure gas flow
- The emerging market for Coriolis in steam flow measurement
- Growth in the market for large line size Coriolis meters
- The use of Coriolis flowmeters for multiphase flow measurement

This study addresses the following growth factors in the Coriolis flowmeter market:

- Coriolis meters are benefiting from the market for custody transfer of natural gas
- Low cost Coriolis meters reduce sticker shock
- Suppliers continue to make technological improvements in Coriolis flowmeters
- Coriolis meters offer low maintenance
- Straight tube meters reduce fluid build-up and pressure drop
- Suppliers break the line size barriers for Coriolis meters

Technical Analyses

- Reviews of Coriolis products worldwide by manufacturer

Segmentation

The segmentation for this study is as follows:

Geographic Segmentation

- North America (United States and Canada)
- Western Europe
- Eastern Europe/Former Soviet Union (FSU)
- Mideast/Africa
- Japan
- China
- Rest of Asia
- Latin America (Mexico, Central and South America)

What's in this for my company?

- See the emerging applications and where the growth is.
- Understand world and regional markets.
- Get to know your real competition.
- Learn what other suppliers manufacture, where, and for whom.
- The best information creates the best decisions.

This study analyzes - in depth – overall market size and market growth forecasts from 2015 to 2020 on both a worldwide and a regional basis.

Total Shipments of Coriolis Flowmeters Worldwide and by Region by Technology

- Single Bent Tube
- Dual Bent Tube
- Single Straight Tube
- Dual Straight Tube

This study provides Average Selling Prices for Coriolis Flowmeters by Technology

- Worldwide
- By Region

Coriolis Flowmeters Worldwide and by Region by Fluid Type

Coriolis flowmeters are segmented in this study according to fluid type:

- Petroleum Liquids
- Non-petroleum Liquids
- Gas
- Steam

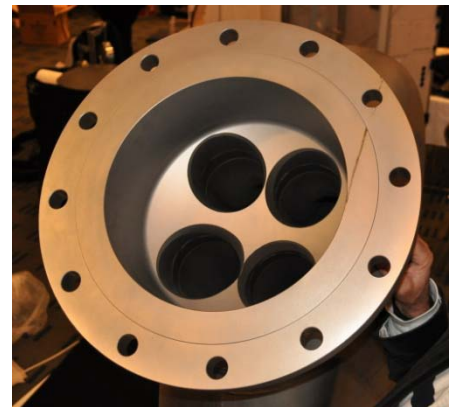
Coriolis Flowmeters Worldwide and by Region by Mounting Type

Coriolis flowmeters are segmented in this study according to mounting type:

- Integral (compact)
- Remote

Shipments of Coriolis Flowmeters Worldwide by Sensor Tube Material

- Stainless Steel
- Hastelloy C[®]
- Titanium
- Zirconium
- Tantalum



Shipments of Coriolis Flowmeters Worldwide and by Region by the Following Temperature Ranges

- High Temperature: >200° C
- Low Temperature: <-50° C(Cryogenic)
- All Others: -50⁰ to 200°C

Shipments of Coriolis flowmeters by Sanitary/Hygienic Applications

- Sanitary/Hygienic
- Other Applications/Not Offered

Shipments of Coriolis flowmeters by Environment

- Hazardous Locations
- General Areas

Shipments of Coriolis Flowmeters for Gas Worldwide and by Region by Gas Applications

- Custody Transfer of Natural Gas
- Allocation Metering
- Process Measurement
- Industrial Gases
- CNG (Compressed Natural Gas)
- Utility Metering
- Other

Shipments of Coriolis Flowmeters for Petroleum Liquids Worldwide and by Region by the Following Applications

- Custody Transfer: Upstream/Mid-stream
- Custody Transfer: Downstream
- Allocation Metering
- Leak Detection (Upstream/Midstream)
- Leak Detection (Downstream)
- LNG (Liquefied Natural Gas)
- Batch Filling
- In-Plant Process Measurement
- Other

Shipments of Coriolis Flowmeters Worldwide for Non-petroleum Liquids Worldwide and by Region by the Following Applications

- Custody Transfer of Non-petroleum Liquids
- Non-custody Transfer of Non-petroleum Liquids
- Process Measurement
- Batch/Filling
- Other

Coriolis Flowmeters Worldwide and by Region by Intelligence Level

- Smart
- Conventional

Smart Coriolis Flowmeters by Communication Protocol Worldwide and by Region

- HART
- Ethernet IP
- Foundation Fieldbus™
- Modbus
- Profibus® DP
- Profibus® PA
- Proprietary digital
- Other



Coriolis Flowmeters by Line Size

Coriolis flowmeters are segmented in this study according to line size:

- < ½ inch
- ½ inch – 1 inch
- >1 inch – 2 inches
- >2 – 4 inches
- >4 – 6 inches
- >6 – 10 inches
- >10 – 16 inches

Photo by Flow Research

Shipments of Flowmeters Worldwide and by Region by Industry

- Upstream Oil & Gas (exploration & production)
- Midstream Oil & Gas (from upstream to refining/processing facility)
- Refining
- Downstream Oil & Gas (refined product transportation and distribution)
- Chemical
- Food & Beverage
- Pharmaceutical
- Pulp & Paper
- Metals & Mining
- Power
- Water/Wastewater
- Other



Coriolis Flowmeters by Distribution Channel

- Direct sales
- Independent representatives
- Distributors
- E-Business

Coriolis flowmeters by Customer Type

The Coriolis flowmeter market is segmented according to the following customer types:

- End-users
- Original equipment manufacturers (OEMs)
- Systems integrators
- Engineering companies



Market Shares of Coriolis Flowmeter Manufacturers

- Worldwide
- For each geographic region

Strategies for Success

- Competitive points of product emphasis
- Strategies for being competitive in the Coriolis flowmeter market
- Pursuing new applications
- Customer education and other market strategies and tactics

Company Profiles

- Business profiles of the main suppliers of Coriolis flowmeters
- Histories, current organization, overall product line summaries
- Coriolis flowmeter product line descriptions
- Company strategies

The following is a partial list of the Coriolis suppliers profiled in this study:

- | | |
|------------------------------------------------------------|--------------------------------------------------------|
| • ABB | • Rheonik |
| • Bronkhorst High-Tech B.V. | • Schneider Electric – Foxboro |
| • Brooks Instrument | • Shanghai Yinuo Instrument Co., Ltd |
| • Emerson Process Management –
Micro Motion | • Siemens AG |
| • Endress+Hauser | • TASI Group – KEM Kueppers |
| • KOBOLD Instruments, Inc. -
Heinrichs Messtechnik GmbH | • Xi'an Dongfeng Machinery and
Electronics Co., LTD |
| • KROHNE, Inc. | • Yokogawa |
| • OVAL Corporation | |

Publication Date

This study was published in December 2016.

Flow Research, Inc.

Flow Research is the only market research company whose primary mission is to research flowmeter and instrumentation markets.

Flow Research specializes in instrumentation, and conducts **market research studies** in a wide variety of instrumentation areas that can be purchased by anyone interested in the topics. We create these studies through interviews with suppliers, distributors, and end-users. Topics include all of the flowmeter technologies - both new and traditional - as well as temperature sensors, temperature transmitters, level products, pressure transmitters, liquid analytical instruments, and selected API-certified valves.

Research Team Background

Dr. Jesse Yoder is President of Flow Research Inc., a company he founded in 1998. Dr. Yoder has 28 years of experience as a writer and as an analyst in process control and instrumentation. He is the lead analyst for this study. Since 1990, he has written more than 180 market research studies, most of them regarding flow and instrumentation. Dr. Yoder has also written more than 250 articles on flow and instrumentation for trade journals. Links to many of these can be found at www.flowarticles.com.

Norm Weeks, Senior Market Analyst, joined Flow Research in 2004 after a 24-year stint with Verizon. Norm's previous experiences include serving as Director of the Urban Fellows Institute in New York, and being a Customer Services manager at Automatic Data Processing. At Verizon, Norm specialized in creating innovative solutions for national and international enterprises, introducing new products and lifecycle management, and product marketing. At Flow Research, his contributions in development, research and writing have been significant to studies, custom projects, White Papers, and Worldflow's *Energy Monitor* and *Market Barometer*.

Leslie Buchanan, Research Associate, joined Flow Research in March 2010. She assists with research and writing for Flow Research studies and publications, develops and implements standards for publication formats, serves as a customer liaison, and manages the contacts database.

Vicki Tuck, Administrative Assistant, joined Flow Research in June, 2012. She has experience in both the fast-paced law firms of Boston, and in various nonprofit organizations. In addition to administrative support, she also collects news for Flow Research publications.

Christina Glaser, a Research Analyst, is a seasoned software programmer, systems architect, and developer with significant website experience. In addition to her technical talent, she brings significant customer savvy, with clients that have ranged from Staples to Microsoft.

Flow Research studies contribute to an ongoing view of the flowmeter market

Listed below is a summary of Flow Research studies in process as well as studies completed during the last few years in the area of process control instrumentation. Conducting these studies has contributed to a more thorough understanding of the flowmeter technologies included in *The World Market for Coriolis Flowmeters, 5th Edition*. The studies below are further described at www.flowstudies.com.

Recent and Currently Scheduled Flow Research Studies

Websites

New-Technology Flowmeter Studies

The World Market for Coriolis Flowmeters, 5 th Edition	www.flowCoriolis.com
The World Market for Magnetic Flowmeters, 6 th Edition	www.flowMags.com
The World Market for Ultrasonic Flowmeters, 5 th Edition	www.flowUltrasonic.com
The World Market for Vortex Flowmeters, 5 th Edition	www.flowVortex.com
The World Market for Thermal Flowmeters	www.flowThermal.com

Traditional Technology Flowmeter Studies

The World Market for Pressure Transmitters, 4 th Edition	www.worldPressure.com
The World Market for Positive Displacement Flowmeters, 2 nd Edition	www.flowPD.com
The World Market for Turbine Flowmeters, 2 nd Edition	www.flowturbine.com

Emerging Technology

The World Market for Multiphase Flowmeters, 2 nd Edition	www.flowMultiphase.com
Multiphase: Module A: The World Market for Watercut Meters	www.flowMultiphase.com

Mass Flow Controllers

The World Market for Mass Flow Controllers, 2 nd Edition	www.flowMFC.com
The World Market Update for Mass Flow Controllers	www.flowMFC.com

Cross-Technology Flowmeter Studies

Volume X: The World Market for Flowmeters, 6 th Edition	www.flowVolumeX.com
Volume X: Module A: Strategies, Industries, and Applications	www.flowVolumeX.com
The World Market for Natural Gas and Gas Flow Measurement, 3 rd Edition	www.gasflows.com
The World Market for Liquefied Natural Gas (LNG)	www.flowLNG.com
The World Market for Oil and Oil Flow Measurement	www.oilflows.com

Calibration

Core Study: Worldwide Gas Flow Calibration Facilities and Markets	www.flowCalibration.org
Module A: Worldwide Liquid Flow Calibration Facilities and Markets	www.flowCalibration.org

The above flow studies and others are described at www.flowstudies.com

Besides writing and publishing studies of this type, Flow Research specializes in user surveys that include a detailed analysis of customer perceptions. In addition, Flow Research provides quarterly updates on the flow and energy industries in the **Market Barometer** and the **Energy Monitor**. The **Energy Monitor** analyzes the current state of the oil & gas, refining, power, and renewables industries, and the implications for instrumentation suppliers. Both publications are part of the Worldflow Monitoring Service. More details are available at www.worldflow.com.

For more information on Flow Research, please visit our website at www.flowresearch.com.



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The Flow Research *Founding Sponsor Program*

To produce studies that most closely match our clients' needs, Flow Research instituted the Founding Sponsor Program. This program enables companies who wish to participate at a high level in a study's research to influence its scope and segmentation. In addition, Founding Sponsors receive regular updates from Flow Research on study progress, and receive a significant discount on the standard retail price of the study.

Procedure: Early in the planning phase of a study, Founding Sponsors receive a proposal that includes the proposed segmentation. Founding Sponsors can propose additional segmentation, and can also suggest changes to the proposed segmentation. While the decision to adopt particular segmentation ultimately lies with Flow Research, and is based on input from all contributors, we will do our best to accommodate the specific needs of each of our clients.

During the research phase of a study, Flow Research will issue regular reports that provide updates on the progress of the research. These reports will be sent to Founding Sponsors, who are then invited to provide any additional input or comments into the study.

Being a Founding Sponsor requires making an early commitment to purchase the study. However, in return, Founding Sponsors receive a significant discount off the regular price of the study. Payment can be made either in one amount at the beginning of the study, or split into two, with the second payment due upon delivery of the study.

For additional details, or to find out how the Founding Sponsor program applies to any particular study, please contact Flow Research. We look forward to working with you!

If you have any questions about the Founding Sponsor program, please contact Norm Weeks at +1 781 245-3200, or norm@flowresearch.com.

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Why Flow Research?

- We specialize in flowmeter markets and technologies.
- We have researched all flowmeter types.
- We study suppliers, distributors, *and* end-users.
- Our worldwide network of contacts provides a unique perspective.
- Our mission is to supply the data to help your business succeed.