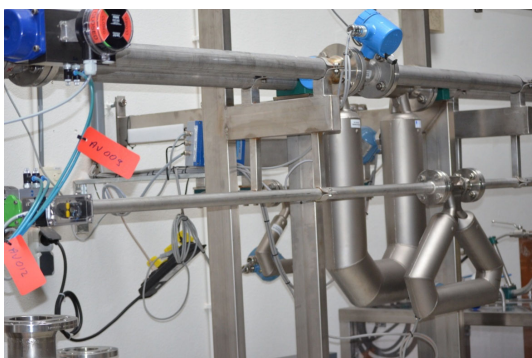


MASS FLOWMETER SERIES

The World Market for Mass Flow Measurement

The World Market for Coriolis Flowmeters, 7th Edition
The World Market for Thermal Flowmeters, 3rd Edition
The World Market for Mass Flow Controllers, 4th Edition

— PROPOSAL —



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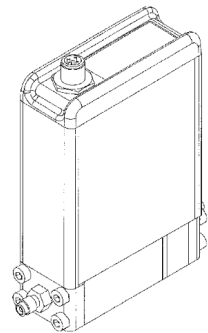
The World Market for Mass Flow Measurement

Flow Research is proposing a first-ever *Mass Flowmeter Series* with a core overview study, *The World Market for Mass Flow Measurement* and in-depth studies on three types of flowmeters that measure mass directly: *The World Market for Coriolis Flowmeters, 7th Edition*; *The World Market for Thermal Flowmeters, 3rd Edition*; and *The World Market for Mass Flow Controllers, 4th Edition*. Each of these separate studies in the series is interesting in its own right, but the core study will compile high-level results from each of the studies to give a comprehensive picture of the entire mass flow market. We also plan to include data on multivariable mass flowmeters in this core study. Correct us if we're wrong, but we don't think anyone has ever done this before. Are you interested?

Rationale for Study

Mass flow measurement, which measures the weight of a fluid independent of pressure or temperature, is more reliable and offers a higher accuracy and repeatability than volumetric flow, which measures the volume of a gas or liquid occupying a pipe. This difference is particularly important for gases, which shrink or expand in volume with changes in pressure or temperature, but whose mass – the number of molecules – stays constant.

Fortunately, a mass flowmeter can easily provide flows in volume by adding the volume (the pipe diameter) to the calculation. Conversely, some volumetric flowmeters e.g., multivariable vortex and differential pressure flowmeters – can indirectly provide mass flow by also measuring temperature and pressure and computing the mass flow.



Mass flow controller

Flowmeters determine mass flow through mounted temperature, pressure, and flow sensors and this equation: $\text{mass flow} = (\text{mass density} \times \text{volume flow})$. They determine density by measuring the pressure and temperature of the flow. They determine velocity by a rotating turbine or vortex sensor.

Study Goals

This executive-level study will determine the size of the entire mass flow market in 2022 and forecast market growth through 2027. Segmentation will include total worldwide market size broken down by eight geographic regions and the basic mass flow technology types: Coriolis, thermal, MFC, and multivariable flowmeters.

The study has multiple objectives:

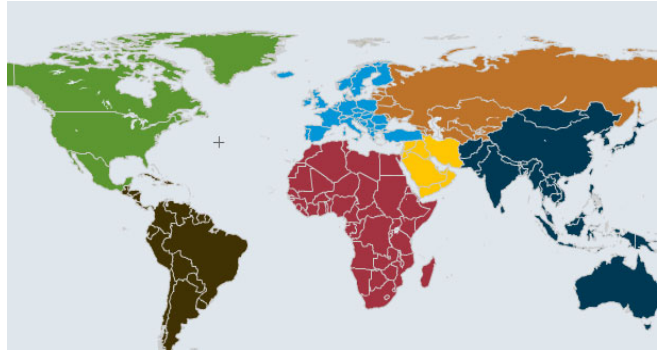
- Show worldwide market size and shares for the mass flow market in 2022 for Coriolis, thermal, MFC, and multivariable flowmeters
- Forecast mass flow market growth through 2027
- Share top-level data about each of the types

- Segment data both on a worldwide basis and for each of eight global regions
- Discuss market forces and suggest strategies for selling into the mass flow controller market

Study Segmentation

Geographic Regions

- North America
- Western Europe
- Eastern Europe/FSU
- Middle East Africa
- China
- Japan
- Asia/Pacific (without Japan and China)
- Latin America



Shipments of Mass Flowmeters by Technology Worldwide and by Region

- Coriolis
- Thermal
- Mass Flow Controllers
- Multivariable flowmeters: Differential pressure, vortex, other

Shipments of Coriolis Flowmeters by Technology Worldwide and by Region

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

Shipments of Mass Flow Controllers by Technology Worldwide and by Region

- Thermal
- Differential Pressure (DP)
- Coriolis
- Ultrasonic

Shipments of Mass Flow Controllers by Industry Type Worldwide and by Region

- Semiconductor
- Industrial (including industrial process control, research & development)

Thermal Flowmeters by Mounting Type

- Inline
- Single Point Insertion
- Multipoint Insertion

Flow Research, Inc.

Flow Research is the only market research company that publishes studies on all nine flowmeter types and whose primary mission is to research process control instrumentation markets. In addition to studies on both new and conventional flowmeter types, we have researched pressure transmitters; temperature sensors and transmitters, infrared thermometers and thermal imagers; level devices; analytical instrumentation; and selected API-certified valves. We also publish studies on oil & gas and other major flowmeter markets. In addition, Flow Research started a working group on flowmeter calibration (FRWG.org) and published two studies on flowmeter calibration facilities, one each for liquids and gas.



Dr. Jesse Yoder, president and founder of Flow Research

Partnerships and Alliances

Flow Research helps flowmeter companies form alliances and partnerships to provide specific solutions or broaden their customer base and distribution channels. These partnerships can include manufacturers of valves, hoses, transmitters, or other flow-related products, as well as other flowmeter manufacturers.

Distributorships

Are you thinking about expanding your presence in the U.S.? We can help you find distributors for your flowmeters and other instrumentation.

Custom Projects

Companies commission us for custom projects when they want more detailed information on a specific subject than is possible in an off-the-shelf report. They may be evaluating the future or expansion of a product line, determining whether to acquire or merge with another company, or seeking to better understand their customer needs.

Consulting

We also work with companies individually to formulate strategies that help them succeed in an increasingly complex world. Dr. Yoder and his team have studied hundreds of companies and have advised most of the top flowmeter suppliers on market and product strategies.

Research Team Background

Dr. Jesse Yoder, the lead analyst for this study, is President of Flow Research Inc., which he founded in 1998. He has worked as a writer and analyst in process control and instrumentation since 1987 and has created market research studies since 1990. Since then he has written over 280 market research studies, most of them on flow and instrumentation, and over 300 articles on flow and instrumentation for trade journals. (See www.flowarticles.com.)

Dr. Yoder received a PhD in philosophy from the University of Massachusetts Amherst in 1984 and spent 10 years as an adjunct philosophy professor at the University of Massachusetts Lowell and Lafayette College. Dr. Yoder also worked 10 years as a technical writer, including for the process control division of Siemens, and taught technical writing at Northeastern University and the UMass Lowell.

Dr. Yoder has received two U.S. patents for the flowtube meter, a new dual tube/dual sensor method of measuring flow, in 2015 and 2017. This meter's two prototypes have been tested at CEESI in Nunn, Colorado.

CRC Press published Dr. Yoder's two-book set, *Advances in Flowmeter Technology*, on the history, operating principles, growth factors, representative companies, and frontiers of research for all 10 types of flowmeters. The first volume, *New-Technology Flowmeters*, published September 6, 2022, was followed by *Conventional Flowmeters* on December 15.

In 2015, ISA published Dr. Yoder's book, *The Tao of Measurement*, with Richard E. Morley as co-contributor. Topics included temperature, pressure, flow, time, length, and area.



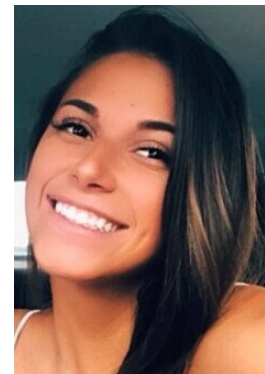
Belinda Burum

Belinda Burum, Vice President, joined Flow Research in 2002. Since then, she has served as senior strategic advisor and been involved with most of our projects and publications. She has also worked as a writer and editor in journalism, advertising, and high tech marketing communications and customer references for 40+ years in the U.S. and Switzerland and is a published author and book editor. She has travelled extensively and enjoyed teaching English in Massachusetts, California, and Ecuador.

Leslie Buchanan, Research and Publication Production Associate, joined Flow Research in 2010 with skills from work and life experiences here and abroad. She assists with research and writing, and handles many publication aspects of Flow Research studies.

Vicki Tuck, Administrative Assistant, joined Flow Research in 2012 with experience in both the fast-paced law firms of Boston and in various nonprofit organizations. She assists with administrative tasks, including database and collecting news for the Worldflow publications.

Kaleigh Flaherty, Director of Marketing, created social media posts for us starting in May 2021 before going back to school to finish her degree in marketing at Coastal Carolina University in Conway, South Carolina. She rejoined us in August 2022 to expand our social media presence and manage other outreach activities.



Kaleigh Flaherty

For more information on Flow Research, please visit our website at www.flowresearch.com. Please follow us on Facebook, LinkedIn, Twitter, and Instagram. We also invite you to join our Flow Research LinkedIn group.

Recent and Currently Scheduled Flow Research Studies

New-Technology Flowmeter Studies

Mass Flowmeter Series	www.massflows.com
The World Market for Mass Flow Measurement (Core Study)	
The World Market for Coriolis Flowmeters, 7 th Edition	www.flowcoriolis.com
The World Market for Thermal Flowmeters, 3 rd Edition	www.flowthermal.com
The World Market for Mass Flow Controllers, 4 th Edition	www.flowmfc.com
The World Market for Magnetic Flowmeters, 7 th Edition	www.flowmags.com
The World Market for Ultrasonic Flowmeters, 6 th Edition	www.flowultrasonic.com
The World Market for Vortex Flowmeters, 6 th Edition	www.flowvortex.com
The World Market Update for Mass Flow Controllers	www.flowmfc.com
The World Market for Multiphase Flowmeters, 2 nd Edition	www.flowmultiphase.com
Multiphase: Module A: The World Market for Watercut Meters	www.watercutmeters.com

Conventional Flowmeter Studies

The World Market for Pressure Transmitters, 5 th Edition	www.pressureresearch.com
The World Market for Primary Elements, 2 nd Edition	www.flowplate.com
The World Market for Positive Displacement Flowmeters, 3 rd Edition	www.flowpd.com
The World Market for Turbine Flowmeters, 3 rd Edition	www.flowturbine.com
The World Market for Variable Area Flowmeters	www.flowva.com

Cross-Technology Flowmeter Studies

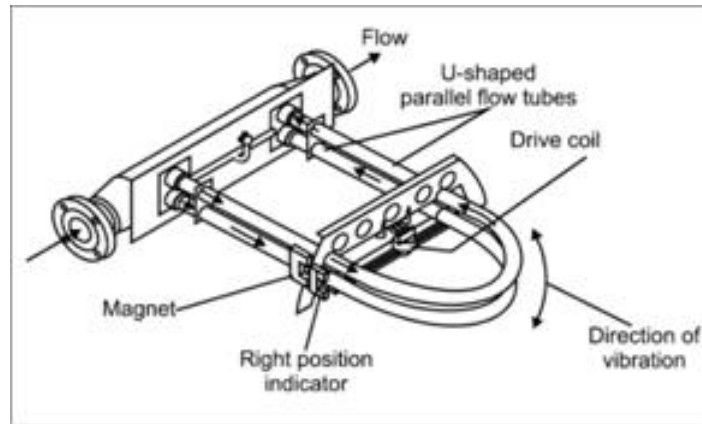
Volume X: The World Market for Flowmeters, 8 th Edition	www.flowvolumex.com
Volume X: Module A: Strategies, Industries, and Applications	www.flowvolumex.com
The World Market for Gas Flow Measurement, 4 th Edition	www.gasflows.com
Gas Module A: Applications and Strategies for Gas Flow Measurement	www.gasflows.com
Gas Module B: Natural Gas Production, Consumption, and Flow Measurement in the Oil & Gas Industry	www.gasflows.com
Flowmeters in the Oil & Gas Industry	www.oilflows.com

Flow Calibration Studies

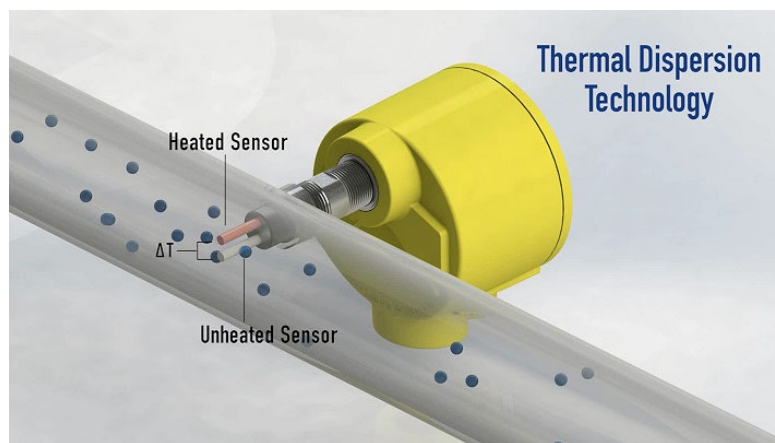
Core Study: Worldwide Gas Flow Calibration Facilities and Markets	www.flowcalibration.org
Module A: Worldwide Liquid Flow Calibration Facilities and Markets	www.flowcalibration.org

Temperature

Market for Temperature Sensors in the Americas, 3 rd Edition	www.tempresearch.com
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Coriolis flowmeter



*Thermal mass flowmeter technology
(Graphic courtesy of Fluid Components International)*

Flow Research Gold Partner Program: *Your input, please*

Make sure this study meets your needs by telling us what you think about our scope and segmentation. By becoming a Gold Partner, you can also enjoy a significant discount on the regular price of the study.

Being a Gold Partner requires making an early commitment to purchase the study, but you can make payments 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 more details, please contact Jesse Yoder at +1 781 245-3200, or jesse@flowresearch.com.

We look forward to working with you.

Publication Date: We plan to complete the core study and all of the related studies by November 2023.

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Why Flow Research? Because we . . .

- Are the only company whose sole focus is the flowmeter instrumentation market
- Research all new-technology and conventional flowmeters
- Contact every known supplier
- Offer our studies in both electronic and color-printed hardcopy versions
- Draw on flowmeter data dating back to 1992, when we began actively following the market