

The World Market for Thermal Flowmeters

Proposal



Publication Date: July 2009

www.flowthermal.com



Flow Research, Inc.
 27 Water Street
 Wakefield, MA 01880
 United States
 [1] 781-245-3200
 [1] 781-224-7552 (fax)
www.flowresearch.com

The World Market for Thermal Flowmeters

Flow Research is conducting a new market study on the worldwide thermal flowmeter market. The study is called **The World Market for Thermal Flowmeters**. The primary goal is to determine the size of the thermal flowmeter market in 2008. Forecasts through 2013 will also be included.

The study has multiple objectives:

- To determine worldwide market size and market shares for thermal flowmeters in 2008
- To forecast market growth for all types of thermal flowmeters through 2013
- To identify the industries and applications where thermal flowmeters are used, and to identify market growth sectors
- To provide a product analysis for the main companies selling into the thermal flowmeter market
- To provide strategies to manufacturers for selling into the thermal flowmeter market
- To provide company profiles of the main suppliers of thermal flowmeters.



Rationale for Study

Flow Research has been following the thermal flowmeter market for the past nine years. We included data on overall market size worldwide and by geographic region in both editions of our worldwide market study, **Volume X: The World Market for Flowmeters**. Since 2002, we have been following the thermal flowmeter market regularly, providing quarterly updates in our **Market Barometer** (www.worldflow.com). Some of the growth in this market is due to growth in the need for environmental monitoring, such as rising requirements to measure greenhouse gas emissions.

We believe that this is an optimal time to quantify the size of this market, and to take an in-depth look at the factors supporting what appears to be an expanding market with great potential for future growth.

Background of Study

One of the most interesting development areas today among new-technology flowmeters is in thermal flowmeters. This is due in part to the fact that this technology is still very young. Thermal meters grew out of hot wire anemometers, whose roots go back to the early 1900s. It was not until the 1960s that thermal flowmeters were developed out of hot wire anemometers. While this technology has been around as long as ultrasonic (1963), and longer than Coriolis (1977), it has yet to be developed to the same level as ultrasonic or Coriolis technologies.

Both thermal and Coriolis flowmeters measure mass flow. However, thermal meters measure mass flow quite differently from Coriolis meters. Instead of using fluid momentum, as do Coriolis meters, thermal flowmeters make use of the thermal or heat conducting properties of fluids to determine mass flow. While most thermal flowmeters are used to measure gas flow, a small percentage also measure liquid flow.

Hot wire anemometers consist of a heated, thin wire element, and are very small and fragile. Hot wire anemometers were used in velocity profile and turbulence research. Because they are susceptible to breakage and to dirt, they are not suited to industrial environments. Industrial thermal flowmeters use a similar concept of measuring the speed of heat dissipation to determine mass flow, but use more rugged sensors that are better adapted to industrial environments.

Key Issues Addressed

This study will address the key issues in the thermal flowmeter market, including:

- The use of thermal flowmeters for continuous emissions monitoring (CEM)
- The growing use of thermal flowmeters for environmental monitoring applications
- The use of insertion thermal flowmeters for flare gas measurement
- The role of thermal flowmeters in measuring greenhouse gas emissions
- The increased number of suppliers to this market
- New product and technology developments
- Growth strategies for thermal flowmeter suppliers

Operating Principle. Thermal flowmeters are used almost entirely for gas flow applications. As the name “thermal” implies, thermal flowmeters use heat to measure flow. Thermal flowmeters introduce heat into flowstream and measure how quickly this heat dissipates, using one or more temperature sensors. This method works best with gas flow measurement because gases are more sensitive to the presence of heat than liquids.

While all thermal flowmeters use heat to make their flow measurements, there are two different methods for measuring how quickly the heat dissipates. One method is called the “constant temperature differential” method. Thermal flowmeters using this method have two temperature sensors: a heated sensor, and another sensor that measures the temperature of the gas. Mass flowrate is computed based on the amount of electrical power required to maintain a constant difference in temperature between the two temperature sensors.

A second method is called a “constant current” method. Thermal flowmeters using this method also have a heated sensor and another one that senses the temperature of the flowstream. The power to the heated sensor is kept constant. Mass flow is measured as a function of the difference between the temperature of the heated sensor and the temperature of the flowstream. Both methods rely on the idea that greater cooling results from higher velocity flows. Both measure mass flow based on the measured effects of cooling in the flowstream.

Proposed Segmentation

The proposed segmentation for this study is as follows:

Geographic Segmentation

The research will include seven geographic regions:

- North America
- Europe, including Central Europe and FSU
- Middle East/Africa
- China
- Japan
- Asia without Japan/China
- Latin America

Thermal Flowmeters by Type

There are two kinds of thermal flowmeters:

- Inline
- Insertion

Insertion Flowmeters by Type

- Single Point Insertion
- Multipoint Insertion

Thermal Flowmeters by Technology

- Constant Power
- Constant Temperature

Thermal Flowmeters by Fluid Type

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

- Gas
- Air
- Liquid



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

Thermal Flowmeters by Mounting Type

Inline thermal flowmeters are distinguished by mounting type as follows:

- Integral
- Remote

Thermal Flowmeters by Line Size

This study distinguishes line sizes for thermal flowmeters as follows:

- <2 inches
- 2 - 4 inches
- > 4 - 8 inches
- > 8 - 20 inches
- > 20 inches

Thermal Flowmeters by Intelligence Level

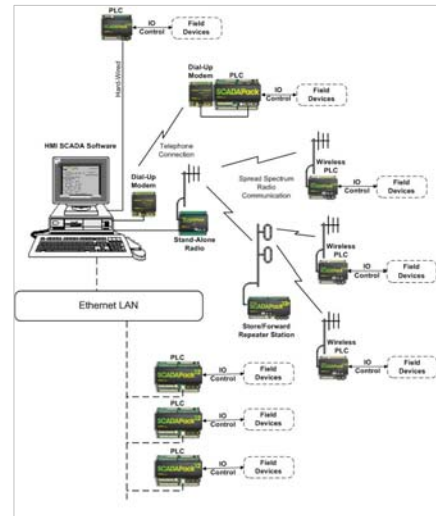
Thermal flowmeters are distinguished by intelligence level as follows:

- Smart
- Conventional

Thermal Flowmeters by Communication Protocol

Smart thermal flowmeters are segmented by the following protocols:

- HART
- Foundation Fieldbus
- Profibus DP
- Profibus PA
- Modbus
- Serial
- Other



Thermal flowmeters by Industry

Thermal flowmeters are used mainly in the process industries. We are including the following industries in this study:

- Oil and Gas Production, Transportation, and Distribution
- Refining
- Chemical
- Food & Beverage
- Pharmaceutical
- Pulp & Paper
- Metals & Mining
- Power
- Water & Wastewater
- Other



Thermal Flowmeters by Application

- Continuous Emissions Monitoring (CEM)
- Flare Gas/Flue Gas Monitoring
- Landfill Gas Recovery
- Biogas Recovery
- Biomass Fermentation and Recovery
- Coal Mine Methane Recovery
- Ethanol Production and Refining
- Boiler Inlet
- Other



Thermal flowmeters by Sales Channels

The thermal flowmeter market will be segmented according to the following sales channels:

- Direct Sales
- Independent Representatives
- Distributors
- E-Business

Thermal flowmeters by Customer Type

The thermal flowmeter market will be segmented according to the following customer types:

- End-Users
- OEMs
- Systems Integrators
- Engineers/Consultants

Market Shares of the Leading Suppliers

This study provides company market share data in multiple categories. Included in these categories will be data for the global market and the following seven geographic regions:

- Worldwide
- North America (United States, Canada)
- Europe
- Middle East/Africa
- Japan
- China
- Asia w/o Japan/China
- Latin America

Strategies for Success

- Discussion of market forces at work
- Strategic action perspectives
- Forming alliances to enhance product offerings



Company Profiles

We provide complete company profiles on the leading thermal flowmeter suppliers. The following is a partial list of the companies to be profiled in the study:

- ABB
- Bronkhorst
- Eldridge Products
- Endress+Hauser
- Fluid Components International (FCI)
- Fox Thermal Instruments
- Intek
- Kurz Instruments
- Magnetrol International
- Sage Metering
- Sierra Instruments
- Thermal Instrument Company
- Tokyo Keiso

Thermal Flowmeters by Application

- Continuous Emissions Monitoring (CEM)
- Flare Gas/Flue Gas Monitoring
- Landfill Gas Recovery
- Biogas Recovery
- Biomass Fermentation and Recovery
- Coal Mine Methane Recovery
- Ethanol Production and Refining
- Boiler Inlet
- Other

Thermal flowmeters by Sales Channels

The thermal flowmeter market will be segmented according to the following sales channels:

- Direct Sales
- Independent Representatives
- Distributors
- E-Business

Thermal flowmeters by Customer Type

The thermal flowmeter market will be segmented according to the following customer types:

- End-Users
- OEMs
- Systems Integrators
- Engineers/Consultants

What makes a Flow Research study so special?

- Our only focus is flowmeters and process instrumentation.
- We research the big three: manufacturing, distribution, and application.
- Our end-user surveys and perspectives are unique to the industry.
- Our Worldflow Monitoring Service keeps you up-to-date between studies.
- We only succeed when you do.

How will the *Founding Sponsor Program* help me?

- You can have your specific data requirements included in the study
- You help determine the scope and final objectives
- You receive periodic updates as the research progresses
- You are among the first to receive final study results
- You receive favorable pricing and other purchase terms

See the enclosure for more information

The Coming Age of Thermal Flowmeters

In the past, thermal flowmeters have been significantly helped by environmental regulations. In the early 1990s, new environmental regulations began requiring companies to detect and reduce the emission of sulfur dioxide (SO₂) and nitrous oxide (NOX) into the air. SO₂ and NOX are two principal causes of acid rain.

The Environmental Protection Agency (EPA) initiated a program to reduce pollution in the atmosphere. It is possible to determine how much of these substances are released into the atmosphere by combining a measurement of the flowrate with a measurement of the concentration of SO₂ and NOX. EPA regulations have resulted in the development of an entire industry around the monitoring of continuous emission systems. Specifically, the CEM industry.

In response to CEM requirements, thermal flowmeter companies developed multipoint thermal flowmeters. In many cases, continuous emissions monitoring occurs in large stacks that emit industrial pollution. Single point thermal flowmeters measure flow at a point, making it difficult to accurately compute flow in a large pipe or smokestack. Multipoint thermal flowmeters measure gas flow at multiple points, and use these values to compute flow for the entire pipe, duct, or stack. Some multipoint flowmeters have as many as 16 measuring points.

While the need for CEM is ongoing, the 21st century has brought new environmental awareness and requirements. Scientific thinking has evolved substantially in the past ten years. While global warming and the need to reduce carbon emissions were once viewed as scientific theory, they are now widely accepted as scientific fact. And in the United States, the Obama administration has made a commitment reducing greenhouse gas emission 80 percent by 2050. The new administration is also pledging to make the United States a leader in climate change.

It is not just the United States that is working to reduce greenhouse gas emissions. The Kyoto Accord, an international treaty designed to reduce greenhouse gas emissions internationally, has resulted in the creation of several mechanisms that require measurement of greenhouse gases. These include Certified Emission Reductions (CER), which allow noncompliant firms to purchase carbon emission credits from companies within compliance. Another program is the Clean Development Mechanism (CDM), which allows countries to invest in sustainable development projects that reduce emissions in developing countries.

The new age of environmental awareness, together with the Kyoto Accord and other greenhouse gas initiatives, has resulted in a rewriting of the rules on measuring greenhouse gas emissions. There is suddenly a need and demand to measure greenhouse gases in applications that formerly may have gone unnoticed. Many of these applications present opportunities for thermal flowmeters, including the following:

- Measurement and recovery of landfill gas
- Ethanol distillation and refining
- Measuring emissions from steam generators, boilers, and process heaters
- Biomass gasification
- Recovery of methane from coal mines
- Monitoring of flue gas
- Measurement and monitoring of flare gas flow

Publication Date

The target date for publication of this study is July 2009.

Founding Sponsorship

We are offering the opportunity for companies to become Founding Sponsors for this study. Benefits of being a Founding Sponsor include being able to participate in determining study scope and direction, being sent regular updates on study progress, and receiving a favorable discount pricing package. The Founding Sponsor program is explained for your consideration later in this document. In the meantime, please review the segmentation and let us know if there is any additional segmentation you would like to see, or if you would like to propose changes to the existing segmentation.

Thank you in advance for your input, and we hope to hear from you!

Background

Dr. Jesse Yoder is President of Flow Research Inc., a company he founded in 1998. Dr. Yoder has 22 years' experience as a writer and analyst in process control and instrumentation. Since 1990, he has written more than 100 market research studies, most of them in flow and instrumentation. Some of the recent and currently planned Flow Research studies are as follows:

- I. The World Market for Coriolis Flowmeters, 3rd Edition (9/08) - **New edition!**
- II. The World Market for Magnetic Flowmeters, 4th Edition (3/09)
- III. The World Market for Ultrasonic Flowmeters, 3rd Edition (1/08)
- IV. The World Market for Vortex Flowmeters, 4th Edition (8/09)
- V. The World Market for Differential Pressure (DP) Flowmeters and Primary Elements (1/07)
- VI. Worldwide Survey of Flowmeter Users, 2nd Edition (1/06)
- VII. The World Market for Positive Displacement Flowmeters (2002)
- VIII. The World Market for Turbine Flowmeters (2002)
- IX. The World Market for Pressure Transmitters, 2nd Edition (10/07)
- X. The World Market for Flowmeters, 2nd Edition (4/08)
- XI. The World Market for Gas Flow Measurement (9/04)
- XII. The World Market for Steam Flow Measurement (3/08)
- XIII. The World Market for Mass Flow Controllers (7/08)
- XIV. The World Market for Thermal Flowmeters (7/09)
- XV. Liquid Flow Measurement in the Water & Wastewater Industry (10/09)
- XVI. The World Market for Liquid Analytical Instruments (12/09)

The above studies are fully described at <http://www.flowresearch.com/flow.htm>. Dr. Yoder has also written more than 90 articles on flow and instrumentation for trade journals. Links to many of these can be found at <http://www.flowresearch.com/articles.htm>.

Norm Weeks, Market Analyst, joined Flow Research in November 2004 after a 24-year stint with Verizon. At Verizon, Norm specialized in creating innovative customer solutions, product management, and product marketing. He is now a fulltime market analyst for Flow Research, has completed several studies, and regularly contributes articles and editorial assistance to our *Market Barometer* and *Energy Monitor* publications.

Belinda Burum, Vice President and Editor, has worked in high tech for 16 years as a technical writer and marketing communications manager. She joined the company in 2002, and has since then worked on many projects. In addition to her work on market studies, Belinda is serving as associate editor of *Market Barometer* and *Energy Monitor*.

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 *Market Barometer* and *Energy Monitor*. *Energy Monitor* analyzes the current state of the oil & gas, refining, power, and renewables industries, and the implications for instrumentation supplier. Both reports 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.

See our article on thermal flowmeters in the March 2009 issue of Flow Control:



The World Market for Thermal Flowmeters
Flow Research, Inc.



Flow Research, Inc.

27 Water Street
 Wakefield, MA 01880
 United States
 [1] 781 245-3200
 [1] 781 224-7552 (fax)
www.flowresearch.com



Robert Boyle

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 regular 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 (781) 245-3200, or norm@flowresearch.com.

The World Market for Thermal Flowmeters



Flow Research, Inc.
27 Water Street
Wakefield, MA 01880
United States
[1] 781 245-3200
[1] 781 224-7552 (fax)
www.flowresearch.com

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