The World Market for Primary Elements, 3rd Edition

Overview

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The World Market for Primary Elements, 3rd Edition

Flow Research is announcing a new market study called ***The World Market for Primary Elements, 3rd Edition***. The study determines the size of the worldwide market in 2023 and 2024, the market shares of all major suppliers, and market forecasts through 2029.

Study objectives:

- Provide the 2023 and 2024 market size in US dollars and unit volume for primary elements worldwide
- Provide 2024 market shares of the leading suppliers of primary elements worldwide
- Forecast market growth for primary elements in dollars and unit volumes through 2029
- Segment data both worldwide and for each of eight geographic regions
- Analyze products from the significant suppliers of primary elements
- Identify market growth sectors and the industries and applications where primary elements are used
- Offer market and product strategies for suppliers of primary elements worldwide
- Profile the significant suppliers of primary elements worldwide

Rationale for Study

Flow Research published the 1st edition of our worldwide primary elements study in 2007 and the 2nd edition in January 2019. We also follow the primary elements market regularly through successive editions of **Volume X: The World Market for Flowmeters**. Since our last primary elements study, much has happened in economies and industries, and we received requests for a more detailed look at the primary elements market. As oil & gas exploration and production activity expands, we see a positive outlook for primary elements and related instrumentation. As a result, this is an optimal time to accurately quantify the size and growth of this technology, and to provide a comprehensive view of its market.

Background of Study

Primary elements have been used for flow measurement since the 18th and 19th centuries. One of the most common types of primary elements is the orifice plate. In 1896, Max Gehre, a German engineer, received a patent on an orifice meter. The first commercial orifice plate meter appeared in 1909 and was used to measure steam flow. Shortly thereafter, the oil and gas industry began using orifice plate meters because of their ease of standardization and low maintenance. The first patent for the use of a Pitot tube to measure velocity in pipes was given to Henry Fladd of St. Louis, Missouri, in 1889. The Venturi tube was invented by an Italian physicist named Giovanni Battista Venturi in 1797. In 1887, Clemens Herschel used Venturi's work to develop the first commercial flowmeter based on it. His version of the Venturi flowmeter became known as the

Herschel Standard Venturi. Herschel published his paper called "The Venturi Water Meter" in 1898. In 1970, a company called BIF introduced the Universal Venturi Tube™.

More than 125 suppliers worldwide now offer primary elements for use in flow measurement.

Key Issues Addressed in This Study

- The growth outlook for primary elements worldwide and by region
- The chief types of primary elements manufactured
- New product developments
- The integration of different types of primary elements into a single unit
- The encroachment of new-technology flowmeters into the primary elements market
- The large number of primary elements suppliers in the market
- Mergers and acquisitions of primary elements suppliers

Primary elements included in this study

- Orifice Measuring Points
- Pitot Tubes (single and multiport)
- Venturi Tubes
- Cone Elements
- Flow Nozzles
- Wedge Elements
- Other (e.g., Dall Tubes, Laminar Flow)

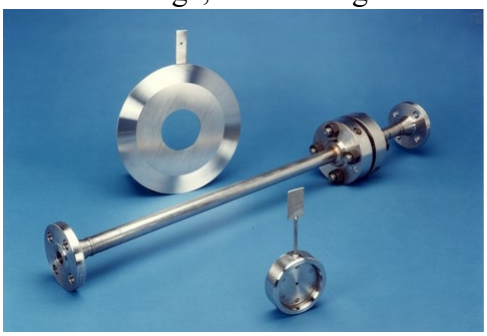
Descriptions of the main primary elements included in this study

Orifice Measuring Points

Orifice plates are the most common type of primary element. An orifice plate is a flat, usually round piece of metal, often steel, with an opening or "orifice" in it. The orifice plate needs to be positioned at a correct position in the flowstream for it to function as a primary element for the purpose of making a differential pressure flow measurement. For it to be so positioned, it must be held in place. This is typically done by an orifice assembly, an orifice flange, or a holding element.

This study defines an orifice measuring point as having the following three components:

- An orifice plate
- An orifice assembly, flange, or holding element
- A valve manifold



Pitot Tubes

Photo courtesy of Veris

Pitot tubes are of two types: Single port and Multiport averaging.

A **single port Pitot tube** includes an L-shaped tube inserted into the flowstream, with the opening facing directly into the flow measuring impact pressure. Another tube has an opening parallel to the direction of flow measuring static pressure. Flowrate is proportional to the difference between impact pressure and static pressure.

A **multiport averaging Pitot tube** has multiple ports to measure impact pressure and static pressure at different points. The DP transmitter computes flowrate by taking the average of the differences in pressure readings at different points.

Photo courtesy of ABB

Venturi Tube

A Venturi tube is a flow tube that has a tapered inlet and a diverging exit. A differential pressure transmitter measures pressure drop and uses this value to calculate flowrate.

Cone Elements

Cone elements consist of a specially tapered element positioned within the flowstream through the pipe. The cone element creates a difference in speed and pressure as the flow is forced around it, then allowed to resume unobstructed flow beyond the cone. DP transmitters get measurements via a port in the pipe upstream from the cone (the high side) and also downstream (the low side) via another port either in the pipe wall or in the blunt end of the cone.

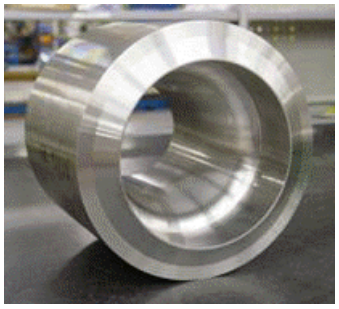


Photo courtesy of ABB

Flow Nozzles

A flow nozzle is a flow tube with a smooth entry and a sharp exit. Flow nozzles are mainly used for high-velocity, erosive, non-viscous flows. Flow nozzles are sometimes used as an alternative to orifice plates when erosion or cavitation would damage an orifice plate. They offer excellent long-term accuracy.

Wedge Elements

A wedge element is a flow tube that has a "V-"shaped flow restriction – the "wedge" – protruding into the flowstream from at least one side of the pipe. They are robust, easy to install and use and there are variations designed to handle air and gases, steam, and all sorts of liquids – clean, dirty, high-solids, slurries, viscous, corrosive or erosive.

Other Primary Elements

Other types of primary elements include combinations, Dall tubes, laminar flow elements, and low loss elements.

Study Segmentation

Geographic Regions

- North America (U.S. and Canada)
- Western Europe
- Eastern Europe (including Central Europe)/Former Soviet Union
- Mideast/Africa
- Japan
- China
- Asia/Pacific
- Latin America (including Mexico and Caribbean)

Primary Elements

- Orifice Measuring Points
- Pitot Tubes (single and multiport)
- Venturi Tubes
- Cone Elements
- Flow Nozzles
- Wedge Elements
- Other (e.g., Dall Tubes, Laminar Flow)

Fluid Types

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

Industries

- Oil & Gas
- Oil Refining
- Gas Processing
- Petrochemicals
- Chemicals
- Food & Beverage
- Pharmaceutical/Life Sciences
- Pulp & Paper
- Metals & Mining
- Electric Power
- Water/Wastewater
- District Energy
- Other

Applications

- Custody Transfer: Oil/Petroleum Liquids
- Custody Transfer: Gas
- Non-custody Transfer of Gas
- Non-custody Transfer of Liquid
- Wet Gas Metering
- Allocation Metering: Oil/Petroleum Liquids
- Allocation Metering: Gas
- Steam
- LNG
- CNG
- Gas Gathering Stations
- Wellhead Monitoring
- In-plant Measurement
- HVAC
- Other

Distribution Channels

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

Customer Types

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

The study provides the following information about the primary elements market:

- Shipments of primary elements in revenues and units worldwide and by region in 2023 and 2024, with forecasts from 2024 to 2029
- Shipments of primary elements by type worldwide and by region in 2023 and 2024
- Average selling prices of primary elements by type worldwide and by region
- Shipments of orifice measuring points worldwide and by region
- Shipments of Pitot tubes worldwide and by region
- Shipments of Venturi tubes worldwide and by region
- Shipments of cones worldwide and by region
- Shipments of flow nozzles worldwide and by region
- Shipments of wedge elements worldwide and by region
- Shipments of other primary elements worldwide and by region

Other vital information in this study

- Growth rates worldwide and by region
- Discussion of market forces at work
- Market shares for the leading suppliers of primary elements
- Detailed product descriptions by supplier
- Company profiles
- Strategies for success

Company Profiles

We profile the major primary element suppliers, including:

- ABB
- AMETEK: Solartron ISA)
- Armstrong (Veris)
- Badger Meter (Preso®)
- BIF (a division of Logan Machine Company)
- Canalta Flow Measurement
- Daniel
- Dosch Messapparate GmbH
- EMCO Controls A/S
- Emerson
- McCrometer (Veralto)
- Primary Flow Signal (PFS)
- Samil Industry Co., Ltd.
- Sensia
- TASI Measurement – Vortek
- TMCo, Inc. (The Measurement Company)
- WIKA Group — Euromisure

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 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, 2022.

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.

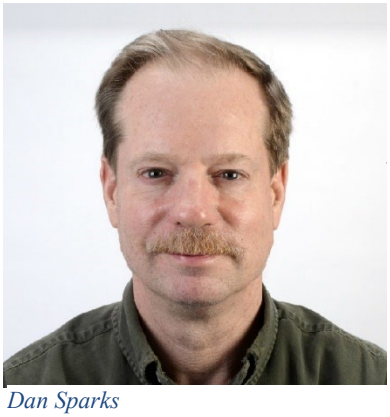
Belinda Burum

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 keeping our growing database up to date and researching companies and their products.

Dan Sparks, Research Director, earned a PhD in chemistry from the University of North Carolina, Chapel Hill. He served as director of product management and director of business development for Omega Engineering in Norwalk, Connecticut until February 2023, and before that was marketing director at Watlow; vice president and general manager at MTS Systems; and engineering director at Thermo Nicolet. We are glad to have him on board.



Dan Sparks

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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

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