

BADGER METER INC
Form 10-K
February 26, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, DC 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2018

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to

Commission File No. 001-06706

BADGER METER, INC.

(Exact name of registrant as specified in its charter)

Wisconsin	39-0143280
(State or other jurisdiction	(I.R.S. Employer
of incorporation or organization)	Identification No.)

4545 W. Brown Deer Road

Milwaukee, Wisconsin	53233
(Address of principal executive offices)	(Zip code)

(414) 355-0400

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(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Common Stock	New York Stock Exchange
(Title of each class)	(Name of each exchange on which registered)

Securities registered pursuant to Section 12(g) of the Act: None.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act.

Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10 K or any amendment to this Form 10 K.

Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	Smaller reporting company
Accelerated filer	Emerging growth company
Non accelerated filer	

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

State the aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold, or the average bid and asked price of such common equity: As of June 29, 2018, the aggregate market value of the shares of Common Stock held by non-affiliates of the

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Registrant was approximately \$1.28 billion. For purposes of this calculation only, (i) shares of Common Stock are deemed to have a market value of \$44.70 per share, the closing price of the Common Stock as reported on the New York Stock Exchange on June 29, 2018, and (ii) each of the Company's executive officers and directors is deemed to be an affiliate of the Company.

As of February 11, 2019, there were 29,112,354 shares of Common Stock outstanding with a par value of \$1 per share.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Company's Proxy Statement for the 2019 Annual Meeting of Shareholders, which will be filed with the Securities and Exchange Commission under Regulation 14A within 120 days after the end of the registrant's fiscal year, are incorporated by reference from the definitive Proxy Statement into Part III of this Annual Report on Form 10-K.

Special Note Regarding Forward Looking Statements

Certain statements contained in this Annual Report on Form 10-K, as well as other information provided from time to time by Badger Meter, Inc. (the “Company”) or its employees, may contain forward looking statements that involve risks and uncertainties that could cause actual results to differ materially from those in the forward looking statements. The words “anticipate,” “believe,” “estimate,” “expect,” “think,” “should,” “could” and “objective” or similar expressions are intended to identify forward looking statements. All such forward looking statements are based on the Company’s then current views and assumptions and involve risks and uncertainties. Some risks and uncertainties that could cause actual results to differ materially from those expressed or implied in forward looking statements include those described in Item 1A of this Annual Report on Form 10-K for the year ended December 31, 2018 and include, among other things:

- the continued shift in the Company’s business from lower cost, manually read meters toward more expensive, value-added automatic meter reading (AMR) systems, advanced metering infrastructure (AMI) systems and advanced metering analytics (AMA) systems that offer more comprehensive solutions to customers’ metering needs;
- the success or failure of newer Company products;
- changes in competitive pricing and bids in both the domestic and foreign marketplaces, and particularly in continued intense price competition on government bid contracts for lower cost, manually read meters;
- the actions (or lack thereof) of the Company’s competitors;
- changes in the general conditions of the United States and foreign economies, including to some extent such things as the length and severity of global economic downturns, international or civil conflicts that affect international trade, the ability of municipal water utility customers to authorize and finance purchases of the Company’s products, the Company’s ability to obtain financing, housing starts in the United States, and overall industrial activity;
- unusual weather, weather patterns or other natural phenomena, including related economic and other ancillary effects of any such events;
- economic policy changes, including but not limited to, trade policy and corporate taxation;
- the timing and impact of government funding programs that stimulate national and global economies, as well as the impact of government budget cuts or partial shutdowns of governmental operations;
- changes in the cost and/or availability of needed raw materials and parts, such as volatility in the cost of brass castings as a result of fluctuations in commodity prices, particularly for copper and scrap metal at the supplier level, foreign-sourced electronic components as a result of currency exchange fluctuations and/or lead times, and plastic resin as a result of changes in petroleum and natural gas prices;
- the Company’s ability to successfully integrate acquired businesses or products;
- changes in foreign economic conditions, particularly currency fluctuations in the United States dollar, the Euro and the Mexican peso;
- the inability to develop technologically advanced products;
- the failure of the Company’s products to operate as intended;

2

- the inability to protect the Company's proprietary rights to its products;
- the Company's expanded role as a prime contractor for providing complete technology systems to governmental entities, which brings with it added risks, including but not limited to, the Company's responsibility for subcontractor performance, additional costs and expenses if the Company and its subcontractors fail to meet the timetable agreed to with the governmental entity, and the Company's expanded warranty and performance obligations;
- disruptions and other damages to information technology, other networks, operations and property (Company or third party owned) due to breaches in data security or any other cybersecurity attack;
- transportation delays or interruptions;
- violations or alleged violations of the U.S. Foreign Corrupt Practices Act (FCPA) or other anti-corruption laws;
- the loss of or disruption in certain single-source suppliers; and
- changes in laws and regulations, particularly laws dealing with the content or handling of materials used in the Company's products.

All of these factors are beyond the Company's control to varying degrees. Shareholders, potential investors and other readers are urged to consider these factors carefully in evaluating the forward looking statements contained in this Annual Report on Form 10-K and are cautioned not to place undue reliance on such forward looking statements. The forward looking statements made in this document are made only as of the date of this document and the Company assumes no obligation, and disclaims any obligation, to update any such forward looking statements to reflect subsequent events or circumstances.

PART I

ITEM 1. BUSINESS

Badger Meter, Inc. (the “Company”) is a leading innovator, manufacturer and marketer of products incorporating flow measurement, control and communication solutions serving markets worldwide. The Company was incorporated in 1905.

Throughout this 2018 Annual Report on Form 10-K, the words “we,” “us” and “our” refer to the Company.

Available Information

The Company's internet address is <http://www.badgermeter.com>. The Company makes available free of charge through its Internet website its Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to those reports, on the same day they are electronically filed with, or furnished to, the Securities and Exchange Commission. The Company is not including the information contained on or available through its website as a part of, or incorporating such information by reference into, this Annual Report on Form 10-K.

Market Overview, Products, Systems and Solutions

Badger Meter is an innovator in flow measurement, control and related communication solutions, serving water utilities, municipalities, and commercial and industrial customers worldwide. The Company’s products measure water, oil, chemicals and other fluids, and are known for accuracy, long-lasting durability and for providing valuable and timely measurement data through various methods. The Company’s product lines fall into two categories: sales of water meters, radios and related technologies to municipal water utilities (municipal water) and sales of meters, valves and other products for industrial applications in water, wastewater, and other industries (flow instrumentation). The Company estimates that over 85% of its products are used in water related applications.

Municipal water, the largest sales category, is comprised of either mechanical or static (ultrasonic) water meters along with the related radio and software technologies and services used by municipal water utilities as the basis for generating their water and wastewater revenues. The largest geographic market for the Company’s municipal water products is North America, primarily the United States, because most of the Company's meters are designed and manufactured to conform to standards promulgated by the American Water Works Association. The majority of water meters sold by the Company continue to be mechanical in nature; however, ultrasonic meters are gaining in penetration due to a variety of factors, including their ability to maintain measurement accuracy over their useful life. Providing ultrasonic water meter technology, combined with advanced radio technology, provides the Company with the opportunity to sell into other geographical markets, for example the Middle East and Europe.

Flow instrumentation includes meters and valves sold worldwide to measure and control fluids going through a pipe or pipeline including water, air, steam, oil, and other liquids and gases. These products are used in a variety of industries and applications, with the Company’s primary market focus being water/wastewater; heating, ventilating and air conditioning (HVAC); oil and gas, and chemical and petrochemical. Flow instrumentation products are generally sold to original equipment manufacturers as the primary flow measurement device within a product or system, as well as through manufacturers’ representatives.

Municipal water meters (both residential and commercial) are generally classified as either manually read meters or remotely read meters via radio technology. A manually read meter consists of a water meter and a register that provides a visual totalized meter reading. Meters equipped with radio technology (endpoints) receive flow measurement data from battery-powered encoder registers attached to the water meter, which is encrypted and transmitted via radio frequency to a receiver that collects and formats the data appropriately for water utility usage and billing systems. These remotely read systems are classified as either automatic meter reading (AMR) systems, where

a vehicle equipped for meter reading purposes, including a radio receiver, computer and reading software, collects the data from utilities' meters; or advanced metering infrastructure (AMI) systems, where data is gathered utilizing a network (either fixed or cellular) of data collectors or gateway receivers that are able to receive radio data transmission from the utilities' meters. AMI systems eliminate the need for utility personnel to drive through service territories to collect data from the meters. These systems provide utilities with more frequent and diverse data from their meters at specified intervals.

The ORION® branded family of radio endpoints provides water utilities with a range of industry-leading options for meter reading. These include ORION Migratable (ME) for AMR meter reading, ORION (SE) for traditional fixed network applications, and ORION Cellular for an infrastructure-free meter reading solution. ORION Migratable makes the migration to fixed network easier for utilities that prefer to start with mobile reading and later adopt fixed network communications, allowing utilities to choose a solution for their current needs and be positioned for their future operational changes. ORION Cellular eliminates the need for utility-owned fixed network infrastructure, allows for gradual or full deployment, and decreases ongoing maintenance.

Critical to the water metering ecosystem is information and analytics. The Company's BEACON® Advanced Metering Analytics (AMA) software suite improves the utilities' visibility of their water and water usage. BEACON AMA is a secure, cloud-hosted software suite that includes a customizable dashboard, and has the ability to establish alerts for specific conditions. It also allows for consumer engagement tools that permit end water users (such as homeowners) to view and manage their water usage activity. Benefits to the utility include improved customer service, increased visibility through faster leak detection, the ability to promote and quantify the effects of its water conservation efforts, and easier compliance reporting.

Water meter replacement and the adoption and deployment of new technology comprise the majority of water meter product sales, including radio products. To a much lesser extent, housing starts also contribute to the new product sales base. Over the last decade, there has been a growing trend in the conversion from manually read water meters to meters with radio technology. This conversion rate is accelerating, with the Company estimating that approximately 60% of water meters installed in the United States have been converted to a radio solution technology.

The Company's net sales and corresponding net earnings depend on unit volume and product mix, with the Company generally earning higher average selling prices and margins on meters equipped with radio technology, and higher margins on ultrasonic compared to mechanical meters. The Company's proprietary radio products (i.e. ORION) generally result in higher margins than the remarketed, non-proprietary technology products. The Company also sells registers and endpoints separately to customers who wish to upgrade their existing meters in the field.

Flow instrumentation products are used in flow measurement and control applications across a broad industrial spectrum, occasionally leveraging the same technologies used in the municipal water category. Specialized communication protocols that control the entire flow measurement process and mandatory certifications drive these markets. The Company provides both standard and customized flow instrumentation solutions.

The industries served by the Company's flow instrumentation products face accelerating demands to contain costs, reduce product variability, and meet ever-changing safety, regulatory and sustainability requirements. To address these challenges, customers must reap more value from every component in their systems. This system-wide scrutiny has heightened the focus on flow instrumentation in industrial process, manufacturing, commercial fluid, building automation and precision engineering applications where flow measurement and control are critical.

A leader in both mechanical and static (ultrasonic) flow metering technologies for industrial markets, the Company offers one of the broadest flow measurement, control and communication portfolios in the market. This portfolio carries respected brand names including Recordall®, Hedland®, Dynasonics®, Blancett®, and Research Control®, and includes eight of the ten major flow meter technologies. Customers rely on the Company for application-specific solutions that deliver accurate, timely and dependable flow data and control essential for product quality, cost control, safer operations, regulatory compliance and more sustainable operations.

The Company's products are sold throughout the world through employees, resellers and representatives. Depending on the customer mix, there can be a moderate seasonal impact on sales, primarily relating to higher sales of certain municipal water products during the spring and summer months. No single customer accounts for more than 10% of the Company's sales.

Competition

The Company faces competition for both its municipal water and flow instrumentation product lines. The competition varies from moderate to strong depending upon the products involved and the markets served. Major competitors for utility water meters include Xylem, Inc. ("Sensus"), Roper Technologies, Inc. ("Neptune"), Master Meter, Inc. and Mueller Water Products, Inc. Together with Badger Meter, it is estimated that these companies sell in excess of 90% of the water meters in the North American market, which has historically been somewhat insulated from organic growth by other competitors due to the nature of the mechanical technology used and the standards promulgated by

the American Water Works Association. As static metering technology continues to gain traction, additional competitors include firms such as Kamstrup A/S, Diehl Metering GmbH and Itron, Inc., although these competitors lack brand recognition and do not have extensive water utility channel distribution, which impedes their ability to compete. In addition, as previously noted, the technology acceptance also provides competitive opportunities for Badger Meter outside North America.

The Company's primary competitors for water utility radio products in North America are Itron, Inc., Neptune and Sensus. While the vast majority of the Company's radio sales are of its own proprietary radio systems (ORION and GALAXY®), it is also a reseller of Itron® products. A number of the Company's competitors in certain markets have greater financial resources than the Company. The Company, however, believes it currently provides the leading technologies in water meters and water-dedicated radio solutions. As a result of significant research and development activities, the Company enjoys favorable patent positions and trade secret protections for several of its technologies, products and processes.

5

There are many competitors in the flow instrumentation markets due to the various end markets and applications being served. They include, among others, Emerson Electric Company, Krohne Messtechnik GmbH, Endress+Hauser AG, Yokogawa Electric Corporation and Cameron International. With a broad portfolio consisting of products utilizing eight of the ten major flow meter technologies, the Company is well positioned to compete in niche, specialized applications within these markets, primarily focused on the water/wastewater, HVAC, oil & gas and chemical/petrochemical end markets.

Backlog

The Company's total backlog of unshipped orders at December 31, 2018 and 2017 was \$29.9 million and \$28.9 million, respectively. The backlog is comprised of firm orders and signed contractual commitments, or portions of such commitments that call for shipment within 12 months. Backlog can be significantly affected by the timing of orders for large projects and the amounts can vary due to the timing of work performed.

Raw Materials and Components

Raw materials used in the manufacture of the Company's products include purchased castings made of metal or alloys (such as brass, which uses copper as its main component, aluminum, stainless steel and cast iron), plastic resins, glass, microprocessors and other electronic subassemblies, and components. There are multiple sources for these raw materials and components, but the Company relies on single suppliers for certain brass castings, resins and electronic subassemblies. The Company believes these items would be available from other sources, but that the loss of certain suppliers would result in a higher cost of materials, delivery delays, short-term increases in inventory and higher quality control costs in the short term. The Company carries business interruption insurance on key suppliers. The Company's purchases of raw materials are based on production schedules, and as a result, inventory on hand is generally not exposed to price fluctuations. World commodity markets and currency exchange rates may also affect the prices of material purchased in the future. The Company does not hold significant amounts of precious metals.

Research and Development

Expenditures for research and development activities related to the development of new products, the improvement of existing products and manufacturing process improvements were \$11.1 million in 2018 and \$10.6 million in both 2017 and 2016. Research and development activities are primarily sponsored by the Company. The Company also engages in some joint research and development with other companies and organizations.

Intangible Assets

The Company owns or controls several trade secrets and many patents, trademarks and trade names in the United States and other countries that relate to its products and technologies. No single patent, trademark, trade name or trade secret is material to the Company's business as a whole.

Environmental Protection

The Company is subject to contingencies related to environmental laws and regulations. A future change in circumstances with respect to these specific matters or with respect to sites formerly or currently owned or operated by the Company, off-site disposal locations used by the Company, and property owned by third parties that is near such sites, could result in future costs to the Company and such amounts could be material. Expenditures for compliance control provisions and regulations during 2018, 2017 and 2016 were not material.

Employees

The Company and its subsidiaries employed 1,531 persons at December 31, 2018. Approximately 110 of these employees are covered by a collective bargaining agreement with District 10 of the International Association of Machinists. The Company is currently operating under a three-year contract with the union, which expires on October 31, 2019. The Company believes it has good relations with the union and all of its employees.

6

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The following table sets forth certain information regarding the Executive Officers of the Registrant.

Name	Position	Age at 2/28/2019
Kenneth C. Bockhorst	President and Chief Executive Officer	46
Richard E. Johnson	Senior Vice President — Administration	64
Fred J. Begale	Vice President — Engineering	54
William R. A. Bergum	Vice President — General Counsel and Secretary	54
Gregory M. Gomez	Vice President — Business Development and Flow Instrumentation	54
Horst E. Gras	Vice President — International Operations	63
Trina L. Jashinsky	Vice President — Human Resources	56
Raymond G. Serdynski	Vice President — Manufacturing	62
Beverly L. P. Smiley	Vice President — Controller	69
Kimberly K. Stoll	Vice President — Sales and Marketing	52
Daniel R. Weltzien	Vice President — Accounting and External Reporting	40
Robert A. Wrocklage	Vice President — Finance, Chief Financial Officer and Treasurer	40

There are no family relationships between any of the executive officers. Officers are elected annually at the first meeting of the Board of Directors held after each annual meeting of the shareholders. Each officer holds office until his or her successor has been elected or until his or her death, resignation or removal. There is no arrangement or understanding between any executive officer and any other person pursuant to which he or she was elected as an officer.

Mr. Bockhorst was elected President in April 2018 and Chief Executive Officer in January 2019 after serving as Senior Vice President - Chief Operating Officer for the Company from October 2017 to April 2018. Prior to joining the Company, Mr. Bockhorst was Executive Vice President of the Energy segment, preceded by President of Hydratight and Global Vice President Operations of Enerpac, all within Actuant Corporation from March 2011 to October 2017.

Mr. Johnson was elected as Senior Vice President – Administration in January 2019 after serving as Senior Vice President – Finance, Chief Financial Officer and Treasurer from May 2003 to December 2018. Mr. Johnson will retire from the Company effective April 2019.

Mr. Begale has served as Vice President - Engineering for more than five years.

Mr. Bergum has served as Vice President - General Counsel and Secretary for more than five years.

Mr. Gomez was elected Vice President - Business Development and Flow Instrumentation in April 2017. Mr. Gomez served as Vice President - Flow Instrumentation from September 2014 to April 2017, and Vice President - Business Development from December 2010 to September 2014.

Mr. Gras has served as Vice President - International Operations for more than five years.

Ms. Jashinsky was elected Vice President - Human Resources in October 2016. Prior to joining the Company, Ms. Jashinsky was Vice President of Human Resources at Gannett Company, Inc. from February 2015 to July 2016, Senior Vice President Human Resources at Fiserv, Inc. from March 2014 to February 2015, and Vice President Global Corporate Human Resources at Johnson Controls, Inc. from May 2010 to February 2014.

Mr. Serdynski has served as Vice President - Manufacturing for more than five years.

Ms. Smiley has served as Vice President - Controller for more than five years. Ms. Smiley will retire from the Company effective March 2019.

Ms. Stoll has served as Vice President - Sales and Marketing for more than five years.

Mr. Weltzien was elected Vice President – Accounting and External Reporting in January 2019. Prior to joining the Company, Mr. Weltzien spent eight years with Actuant Corporation, holding various corporate and business unit financial leadership roles, most recently as Senior Director of Finance for its Hydratight business unit.

Mr. Wrocklage was elected Vice President – Finance, Chief Financial Officer and Treasurer in January 2019 after serving as Vice President - Finance for the Company from August 2018 to December 2018. Prior to joining the Company, Mr. Wrocklage spent ten years with Actuant Corporation, holding various corporate and business unit financial leadership roles, most recently as Vice President - Corporate Controller and Chief Accounting Officer.

Foreign Operations and Export Sales

The Company distributes its products through employees, resellers and representatives throughout the world. Additionally, the Company has a sales, distribution and manufacturing facility in Neuffen, Germany; sales and customer service offices in Mexico, Singapore, China, United Arab Emirates and Slovakia; manufacturing facilities in Nogales, Mexico, Brno, Czech Republic and Bern, Switzerland; and a development facility in Luleå, Sweden. The Company exports products from the United States that are manufactured in Milwaukee, Wisconsin; Racine, Wisconsin and Tulsa, Oklahoma.

Information about the Company's foreign operations and export sales is included in Note 9 "Industry Segment and Geographic Areas" in the Notes to Consolidated Financial Statements in Part II, Item 8 of this 2018 Annual Report on Form 10-K.

Financial Information about Industry Segments

The Company operates in one industry segment as an innovator, manufacturer and marketer of products incorporating flow measurement, control and communication solutions. Information about the Company's sales, operating earnings and assets is included in the Consolidated Financial Statements and in Note 9 "Industry Segment and Geographic Areas" in the Notes to Consolidated Financial Statements in Part II, Item 8 of this 2018 Annual Report on Form 10-K.

ITEM 1A. RISK FACTORS

Shareholders, potential investors and other readers are urged to consider the significant business risks described below in addition to the other information set forth or incorporated by reference in this 2018 Annual Report on Form 10-K, including the "Special Note Regarding Forward Looking Statements" at the front of this 2018 Annual Report on Form 10-K. If any of the events contemplated by the following risks actually occur, our financial condition or results of operations could be materially adversely affected. The following list of risk factors may not be exhaustive. We operate in a continually changing business, economic and geopolitical environment, and new risk factors may emerge from time to time. We can neither predict these new risk factors with certainty nor assess the precise impact, if any, on our business, or the extent to which any factor, or combination of factors, may adversely impact our results of operations. While there is much uncertainty, we do analyze the risks we face, perform a probability assessment of their impacts and attempt to soften their potential impact when and if possible.

Competitive pressures in the marketplace could decrease our revenues and profits.

Competitive pressures in the marketplace for our products could adversely affect our competitive position, leading to a possible loss of market share or a decrease in prices, either of which could result in decreased revenues and profits. We operate in an environment where competition varies from moderate to strong and a number of our competitors have greater financial resources. Our competitors also include alliance partners that sell products that do or may compete with our products, particularly those that provide radio solutions (including cellular). The principal elements of competition for our most significant product applications, residential and commercial water meters for the municipal water utility market (with various radio technology systems), are price, product technology, quality and service. The competitive environment is also affected by the movement toward radio technologies and away from manually read meters, the demand for replacement units and, to some extent, such things as global economic conditions, the timing and size of governmental programs such as stimulus fund programs, the ability of municipal water utility customers to authorize and finance purchases of our products, our ability to obtain financing, housing starts in the United States, and overall economic activity. For our flow instrumentation products, the competitive environment is affected by the general economic health of various industrial sectors particularly in the United States and Europe.

The inability to develop technologically advanced products could harm our future success.

We believe that our future success depends, in part, on our ability to develop technologically advanced products that meet or exceed appropriate industry standards. Although we believe that we currently have a competitive advantage in this area, maintaining such advantage will require continued investment in research and development, sales, marketing and manufacturing capabilities. There can be no assurance that we will have sufficient resources to make such investments or that we will be able to make the technological advances necessary to maintain such competitive advantage. If we are unable to maintain our competitive advantage, our future financial performance may be adversely affected. We are not currently aware of any emerging standards, technologies or new products that could render our existing products obsolete in the near term. The water utility industry is beginning to see the adoption of static (ultrasonic) water meters. Static water metering has lower barriers to entry that could affect the competitive landscape in North America. We believe we have a competitive product if the adoption rate for static meters were to accelerate.

8

The inability to obtain adequate supplies of raw materials and component parts at favorable prices could decrease our profit margins and negatively impact timely delivery to customers.

We are affected by the availability and prices for raw materials and component parts, including purchased castings made of metal or alloys (such as brass, which uses copper as its main component, aluminum, stainless steel and cast iron), plastic resins, glass, microprocessors and other electronic subassemblies, and components that are used in the manufacturing process. The inability to obtain adequate supplies of raw materials and component parts for our products at favorable prices could have a material adverse effect on our business, financial condition or results of operations by decreasing profit margins and by negatively impacting timely deliveries to customers. In the past, we have been able to offset price increases in raw materials and component parts by increased sales prices, active materials management, product engineering programs and the diversity of materials used in the production processes. However, we cannot be certain that we will be able to accomplish this in the future. Since we do not control the actual production of these raw materials and component parts, there may be delays caused by an interruption in the production or transportation of these materials for reasons that are beyond our control. World commodity markets and inflation may also affect raw material and component part prices.

Economic conditions could cause a material adverse impact on our sales and operating results.

As a supplier of products, the majority of which are to water utilities, we may be adversely affected by global economic conditions, delays in governmental programs created to stimulate the economy, and the impact of government budget cuts or partial shutdowns of governmental operations that affect our customers, including independent distributors, large city utilities, private water companies and numerous smaller municipal water utilities. These customers may delay capital projects, including non-critical maintenance and upgrades, or may not have the ability to authorize and finance purchases during economic downturns or instability in world markets. We also sell products for other applications to reduce our dependency on the municipal water market. A significant downturn in this market could cause a material adverse impact on sales and operating results. Therefore, a downturn in general economic conditions, as well as in the municipal water market, and delays in the timing or amounts of possible economic stimulus fund programs, government budget cuts or partial shutdowns of governmental operations, or the availability of funds to municipalities could result in a reduction in demand for our products and services and could harm the business.

Economic impacts due to leadership or policy changes in the countries where we do business could negatively affect our profitability.

We may be affected by adjustments to economic and trade policies, such as taxation, changes to or withdrawal from international trade agreements, or the like, when countries where we produce or sell our products change leadership or economic policies. These types of changes, as well as any related regulatory changes, could significantly increase our costs and adversely affect our profitability and financial condition.

Global and regional economic and political conditions could adversely affect our business.

In June 2016, voters in the United Kingdom approved the United Kingdom's exit from the European Union ("Brexit"), and the British government has indicated that it intends to negotiate the withdrawal of the United Kingdom from the European Union based on the results of this vote. The Brexit vote has created significant economic uncertainty in the United Kingdom and in Europe, the Middle East, and Asia, which may negatively impact our business results in those regions. In addition, the terms of Brexit, once negotiated, could potentially disrupt the markets we serve, the tax jurisdictions in which we operate, adversely change tax benefits or liabilities in these or other jurisdictions and may cause us to lose customers, suppliers and employees. In addition, Brexit could lead to legal uncertainty and potentially divergent national laws and regulations as the United Kingdom determines which European Union laws to replace or replicate. Any of these effects could adversely affect our business and results of operations.

Unusual weather and other natural phenomena could adversely affect our business.

Our sales may be adversely affected by unusual weather, weather patterns or other natural phenomena that could have an impact on the timing of orders in given periods, depending on the particular mix of customers being served by us at the time.

Failure to manufacture quality products could have a material adverse effect on our business.

If we fail to maintain and enforce quality control and testing procedures, our products will not meet required performance standards. Product quality and performance are a priority for us since our products are used in various applications where precise control of fluids is essential. Although we believe we have a very good reputation for product quality, any future production and/or sale of substandard products would seriously harm our reputation, resulting in both a loss of current customers to competitors and damage to our ability to attract new customers. In addition, if any of our products prove to be defective, we may be required to participate in a recall involving such products or incur warranty related expenses. A successful claim brought against us with respect to a defective product in excess of available insurance coverage, if any, or a requirement to participate in a major product recall, could have a material adverse effect on our business, results of operations or financial condition.

Litigation against us could be costly, time consuming to defend and could adversely affect our profitability.

From time to time, we are subject to legal proceedings and claims that arise in the ordinary course of business. For example, we may be subject to workers' compensation claims, employment/labor disputes, customer and supplier disputes, product liability claims, intellectual property disputes and contractual disputes related to warranties arising out of the conduct of our business. Litigation may result in substantial costs and may divert management's attention and resources, which could adversely affect our profitability or financial condition.

If our technology products do not operate as intended, our business could be materially and adversely affected.

We sell and install software products, including some that are provided in "the cloud," that may contain unexpected design defects or may encounter unexpected complications during installation or when used with other technologies utilized by the customer. A failure of our technology products to operate as intended and in a seamless fashion with other products or a failure of a cloud network could materially and adversely affect our results of operations, financial position and cash flows.

Our expanded role as a prime contractor brings certain risks that could have a material adverse effect to our business.

The Company periodically assumes the role as a prime contractor for providing complete technology systems to governmental entities, which brings with it added risks, including but not limited to, our responsibility for managing subcontractor performance and the potential for expanded warranty and performance obligations. While we have managed a limited number of these types of arrangements, it is possible to encounter a situation where we may not be able to perform up to the expectations of the governmental entity, and thus incur additional costs that could affect our profitability or harm our reputation.

Disruptions and other damages to our information technology and other networks and operations, and breaches in data security or cybersecurity attacks could have a negative financial impact and damage our reputation.

Our ability to serve customers, as well as increase revenues and control costs, depends in part on the reliability of our sophisticated technologies, system networks and cloud-based software. We use information technology and other systems to manage our business in order to maximize our revenue, effectiveness and efficiency. Unauthorized parties gaining access to digital systems and networks for purposes of misappropriating assets or sensitive financial, personal or business information, corrupting data, causing operational disruptions and other cyber-related risks could adversely impact our customer relationships, business plans and our reputation. In some cases, we are dependent on third-party technologies and service providers for which there is no certainty of uninterrupted availability or through which hackers could gain access to sensitive and/or personal information. These potential disruptions and cyber-attacks could negatively affect revenues, costs, customer demand, system availability and our reputation.

Further, as the Company pursues its strategy to grow through acquisitions and to pursue newer technologies that improve our operations and cost structure, the Company is also expanding and improving its information technologies, resulting in a larger technological presence and corresponding exposure to cybersecurity risk. Certain new technologies present new and significant cybersecurity safety risks that must be analyzed and addressed before implementation. If we fail to assess and identify cybersecurity risks associated with acquisitions and new initiatives, we may become increasingly vulnerable to such risks.

If we are not able to protect our proprietary rights to our software and related products, our ability to market our software products could be hindered and our results of operations, financial position and cash flows could be materially and adversely affected.

We rely on our agreements with customers, confidentiality agreements with employees, and our trademarks, trade secrets, copyrights and patents to protect our proprietary rights. These legal protections and precautions may not

prevent misappropriation of our proprietary information. In addition, substantial litigation regarding intellectual property rights exists in the software industry, and software products may increasingly be subject to third-party infringement claims. Such litigation and misappropriation of our proprietary information could hinder our ability to market and sell products and services and our results of operations, financial position and cash flows could be materially and adversely affected.

Changes in environmental or regulatory requirements could entail additional expenses that could decrease our profitability.

We are subject to a variety of laws in various countries and markets, such as those regulating lead or other material content in certain of our products, the handling and disposal of certain electronic materials, the use and/or licensing of radio frequencies necessary for radio products, data privacy and protection, as well as customs and trade practices. We cannot predict the nature, scope or effect of future environmental or regulatory requirements to which our operations might be subject or the manner in which existing or future laws will be administered or interpreted. Currently, the cost of complying with existing laws is included as part of our on-going expenses and does not have a material effect on our business or financial position, but a change in the future could adversely affect our profitability.

Risks related to foreign markets could decrease our profitability.

Since we sell products worldwide as well as manufacture products in several countries, we are subject to risks associated with doing business internationally. These risks include such things as changes in foreign currency exchange rates, changes in political or economic conditions of specific countries or regions, potentially negative consequences from changes in tax laws or regulatory requirements, differing labor regulations, and the difficulty of managing widespread operations.

An inability to attract and retain skilled employees could negatively impact our growth and decrease our profitability.

Our success depends on our continued ability to identify, attract, develop and retain skilled personnel throughout our organization. Current and future compensation arrangements, including benefits, may not be sufficient to attract new employees or retain existing employees, which may hinder our growth.

Violations or alleged violations of laws that impose requirements for the conduct of our overseas operations, including the FCPA or other anti-corruption laws, trade sanctions and sanctioned parties restrictions could adversely affect our business.

In foreign countries where we operate, a risk exists that our employees, third party partners or agents could engage in business practices prohibited by applicable laws and regulations, such as the Foreign Corrupt Practices Act (FCPA). Such anti-corruption laws generally prohibit companies from making improper payments to foreign officials, require companies to keep accurate books and records, and maintain appropriate internal controls. Our policies mandate strict compliance with such laws and we devote resources to ensure compliance. However, we operate in some parts of the world that have experienced governmental corruption, and, in certain circumstances, local customs and practice might not be consistent with the requirements of anti-corruption laws. We remain subject to the risk that our employees, third party partners or agents will engage in business practices that are prohibited by our policies and violate such laws and regulations. Violations by us or a third party acting on our behalf could result in significant internal investigation costs and legal fees, civil and criminal penalties, including prohibitions on the conduct of our business and reputational harm.

We may also be subject to legal liability and reputational damage if we violate U.S. trade sanctions administered by the U.S. Treasury Department's Office of Foreign Assets Control (OFAC), the European Union, the United Nations and trade sanction laws, such as the Iran Threat Reduction and Syria Human Rights Act of 2012.

Failure to successfully identify, complete and integrate acquired businesses or products could adversely affect our operations.

As part of our business strategy, we continue to evaluate and may pursue selected business or product acquisition opportunities that we believe may provide us with certain operating and financial benefits. There can be no assurance that we will identify or complete transactions with suitable acquisition candidates in the future. If we complete any such acquisitions, they may require integration into our existing business with respect to administrative, financial, sales, marketing, manufacturing and other functions to realize these anticipated benefits. If we are unable to successfully integrate a business or product acquisition, we may not realize the benefits identified in our due diligence process, and our financial results may be negatively impacted. Additionally, significant unexpected liabilities may arise during or after completion of an acquisition.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

The principal facilities utilized by the Company at December 31, 2018 are listed below. The Company owns all such facilities except as noted. The Company believes that its facilities are generally well maintained and have sufficient capacity for its current needs.

Location	Principal use	Approximate area (square feet)	
Los Gatos, California, USA	Software development	3,600	(1)
Centennial, Colorado, USA	Distribution	12,000	
Tulsa, Oklahoma, USA	Manufacturing	59,500	
Milwaukee, Wisconsin, USA	Manufacturing and offices	324,200	
Racine, Wisconsin, USA	Manufacturing and offices	134,300	(2)
Brno, Czech Republic	Manufacturing	27,800	
Neuffen, Germany	Manufacturing and offices	24,700	
Nogales, Mexico	Manufacturing	181,300	
Luleå, Sweden	Electronic development	7,000	(3)
Bern, Switzerland	Manufacturing	16,800	(4)

(1) Leased facility. Lease term expires November 30, 2021.

(2) Leased facility. Lease term expires December 31, 2025.

(3) Leased facility. Lease term expires June 30, 2025.

(4) Building is owned, but land is leased from the government, as required. Lease term expires October 18, 2021.

ITEM 3. LEGAL PROCEEDINGS

In the normal course of business, the Company is named in legal proceedings from time to time. There are currently no material legal proceedings pending with respect to the Company.

The Company is subject to contingencies related to environmental laws and regulations. Information about the Company's compliance with environmental regulations is included in Part I, Item 1 of this 2018 Annual Report on Form 10-K under the heading "Environmental Protection."

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR THE REGISTRANT'S COMMON STOCK, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

The Company's Common Stock is traded on the New York Stock Exchange (NYSE Trading Symbol: BMI). At February 13, 2019, there were approximately 897 holders of the Company's Common Stock. Other information required by this Item is set forth in Note 2 "Common Stock" and Note 10 "Unaudited: Quarterly Results of Operations, Common Stock Price and Dividends" in the Notes to Consolidated Financial Statements in Part II, Item 8 of this 2018 Annual Report on Form 10-K.

The following information in Item 5 of this Annual Report on Form 10-K is not deemed to be "soliciting material" or to be "filed" with the Securities and Exchange Commission or subject to Regulation 14A or 14C under the Securities Exchange Act of 1934, as amended, or to the liabilities of Section 18 of the Securities Exchange Act of 1934, as amended, and will not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, except to the extent the Company specifically incorporates it by reference into such a filing.

The following graph compares on a cumulative basis the yearly percentage change since January 1, 2014 in (a) the total shareholder return on the Company's Common Stock with (b) the total return on the Russell 2000® Index, and (c) the total return of the peer group made up of 14 companies, including the Company, in similar industries and with similar market capitalization. The Russell 2000® Index is a trademark of the Frank Russell Company, and is used herein for comparative purposes in accordance with Securities and Exchange Commission regulations.

The graph assumes \$100 invested on December 31, 2013. It further assumes the reinvestment of dividends. The returns of each component company in the peer groups have been weighted based on such company's relative market capitalization.

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December 31	2013	2014	2015	2016	2017	2018
Badger Meter, Inc. Return %		11.00 %	0.03 %	27.71 %	30.94 %	4.10 %
Cumulative \$	\$ 100.00	\$ 111.00	\$ 111.04	\$ 141.80	\$ 185.68	\$ 193.29
Russell 2000 Index Return %		4.89 %	(4.41)%	21.31 %	14.65 %	(11.01)%
Cumulative \$	\$ 100.00	\$ 104.89	\$ 100.26	\$ 121.63	\$ 139.45	\$ 124.09
Peer Group Return %		0.24 %	(7.30)%	33.10 %	20.10 %	(20.18)%
Cumulative \$	\$ 100.00	\$ 100.24	\$ 92.92	\$ 123.68	\$ 148.54	\$ 118.56

The Peer Group consists of A. O. Smith Corp. (AOS), Badger Meter, Inc. (BMI), CIRCOR International, Inc. (CIR), ESCO Technologies Inc. (ESE), Franklin Electric Co, Inc. (FELE), Gorman-Rupp Company (GRC), Itron, Inc. (ITRI), Lindsay Corporation (LNN), Perma-Pipe International Holdings, Inc. (PPIH), Mueller Water Products (MWA), Northwest Pipe Company (NWPX), Rexnord Corporation (RXN), Helios Technologies (SNHY) and Watts Water Technologies, Inc. (WTS).

In February 2017, the Board of Directors authorized the repurchase of up to 400,000 shares of the Company's Common Stock through February 2020. The following table provides information about the Company's purchases during the quarter ended December 31, 2018 of equity securities that are registered by the Company pursuant to Section 12 of the Exchange Act.

	Total number of shares purchased as part of a	Average price paid per share	Total number of shares purchased publicly announced program	Maximum number of shares that may yet be purchased under the program
October 1, 2018 - October 31, 2018	—	\$ —	201,491	198,509
November 1, 2018 - November 30, 2018	—	—	201,491	198,509
December 1, 2018 - December 31, 2018	6,300	\$ 54.65	207,791	192,209
Total as of December 31, 2018	6,300		207,791	192,209

ITEM 6. SELECTED FINANCIAL DATA
BADGER METER, INC.

Ten Year Summary of Selected Consolidated Financial Data

	Years ended December 31,													
(except per share data)	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Results														
Operating income	\$433,732	402,440	393,761	377,698	364,768	334,122	319,660	262,915	276,634	250,000	230,000	210,000	190,000	170,000
Operating expenses	\$11,095	10,596	10,597	10,645	9,496	10,504	9,567	8,086	7,164	6,242	5,318	4,394	3,470	2,546
Operating income from continuing operations														
Operating income before taxes														
Operating expenses before taxes	\$35,852	55,622	49,844	41,152	44,912	38,009	43,471	27,349	44,438	38,600	32,850	27,100	21,350	15,600
Operating income from discontinued operations	\$27,790	34,571	32,295	25,938	29,678	24,617	28,032	19,161	28,662	20,000	15,000	10,000	5,000	0
Operating income (1)	\$n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Operating income from continuing operations	\$27,790	34,571	32,295	25,938	29,678	24,617	28,032	19,161	28,662	20,000	15,000	10,000	5,000	0
Operating income to sales	6.4	% 8.6	% 8.2	% 6.9	% 8.1	% 7.4	% 8.8	% 7.3	% 10.4	% 11.0	% 10.0	% 9.0	% 8.0	% 7.0
Operating income per share (2)														
Operating income from continuing operations	\$0.96	1.20	1.12	0.90	1.04	0.86	0.98	0.64	0.96	0.70	0.50	0.30	0.10	0.00
Operating income from discontinued operations	\$n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Operating earnings	\$0.96	1.20	1.12	0.90	1.04	0.86	0.98	0.64	0.96	0.70	0.50	0.30	0.10	0.00
Operating earnings from discontinued operations	\$0.95	1.19	1.11	0.90	1.03	0.85	0.98	0.64	0.96	0.70	0.50	0.30	0.10	0.00
Operating earnings from discontinued operations	\$n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Operating earnings	\$0.95	1.19	1.11	0.90	1.03	0.85	0.98	0.64	0.96	0.70	0.50	0.30	0.10	0.00
Operating earnings declared:														
Operating earnings - Stock	\$0.56	0.49	0.43	0.39	0.37	0.35	0.33	0.30	0.26	0.22	0.18	0.14	0.10	0.06
Operating earnings - high	\$57.12	52.10	39.36	32.94	30.46	28.18	24.30	22.74	22.75	21.11	19.47	17.83	16.19	14.55
Operating earnings - low	\$41.00	34.40	26.40	25.82	23.24	20.94	14.65	13.43	16.29	14.65	13.01	11.37	9.73	8.09
Operating earnings - average	\$49.21	47.80	36.95	29.30	29.68	27.25	23.71	14.72	22.11	20.47	18.83	17.19	15.55	13.91
Operating earnings *	\$10.42	9.53	8.80	8.00	7.41	6.82	5.98	5.93	5.60	5.26	4.92	4.58	4.24	3.90
Operating earnings standing at year-														

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Stock position	29,119	29,119	29,119	29,050	28,922	28,824	28,628	30,246	30,096
Working capital *	\$ 124,635	114,781	119,169	116,084	109,682	92,518	91,030	79,239	77,586
Working capital as a									
Percent of net sales *	28.7	% 28.5	% 30.3	% 30.7	% 30.1	% 27.7	% 28.5	% 30.1	% 28.0
Provided by									
Assets	\$ 60,350	49,751	56,185	35,831	35,735	34,818	34,802	31,317	18,396
Expenditures	\$ 8,643	15,069	10,596	19,766	12,332	14,311	8,202	5,336	9,238
Liabilities	\$ 392,691	391,727	349,699	355,480	341,158	316,058	290,453	218,910	215,864
and current portion									
Term debt	\$ 18,060	44,550	37,950	71,360	75,927	70,045	66,730	1,790	12,878
Debt	\$ n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Shareholders' equity	\$ 303,503	277,452	256,209	232,275	214,331	196,563	171,247	179,281	168,383
Percent of total debt									
Return on equity *	5.6	% 13.8	% 12.9	% 23.5	% 26.2	% 26.3	% 28.0	% 1.0	% 7.1
Shareholders' equity *	9.2	% 12.5	% 12.6	% 11.2	% 13.8	% 12.5	% 16.4	% 10.7	% 17.0
Debt to equity ratio *	51.8	40.2	33.3	32.6	28.8	32.1	24.3	23.2	23.2

(1) In 2009, discontinued operations represented the recognition of previously unrecognized tax benefits for certain deductions that were taken on prior tax returns related to the shutdown of the Company's French operations.

(2) All per share amounts and number of shares outstanding have been restated to reflect the 2016 2-for-1 stock split for the periods presented.

*Description of calculations as of the applicable year end:

Book value per share equals total shareholders' equity at year-end divided by the number of common shares outstanding.

Primary working capital equals receivables plus inventories minus payables and other current liabilities.

Primary working capital as a percent of net sales equals receivables plus inventories minus payables and other current liabilities, divided by net sales.

Debt as a percent of total debt and equity equals total debt (the sum of short-term debt, current portion of long-term debt and long-term debt) divided by the sum of total debt and total shareholders' equity at year-end.

Return on shareholders' equity equals earnings from continuing operations divided by total shareholders' equity at year-end.

Price/earnings ratio equals the year-end closing stock price for common stock divided by diluted earnings per share from continuing operations.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS
BUSINESS DESCRIPTION AND OVERVIEW

Badger Meter is an innovator in flow measurement, control and related communication solutions, serving water utilities, municipalities, and commercial and industrial customers worldwide. The Company's products measure water, oil, chemicals and other fluids, and are known for accuracy, long-lasting durability and for providing valuable and timely measurement data through various methods. The Company's product lines fall into two categories: sales of water meters, radios and related technologies to municipal water utilities (municipal water) and sales of meters, valves and other products for industrial applications in water, wastewater, and other industries (flow instrumentation). The Company estimates that over 85% of its products are used in water related applications.

Municipal water, the largest sales category, is comprised of either mechanical or static (ultrasonic) water meters along with the related radio and software technologies and services used by municipal water utilities as the basis for generating their water and wastewater revenues. The largest geographic market for the Company's municipal water products is North America, primarily the United States, because most of the Company's meters are designed and manufactured to conform to standards promulgated by the American Water Works Association. The majority of water meters sold by the Company continue to be mechanical in nature; however, ultrasonic meters are gaining in penetration due to a variety of factors, including their ability to maintain near absolute measurement accuracy over their useful life. Providing ultrasonic water meter technology, combined with advanced radio technology, provides the Company with the opportunity to sell into other geographical markets, for example the Middle East and Europe.

Flow instrumentation includes meters and valves sold worldwide to measure and control fluids going through a pipe or pipeline including water, air, steam, oil, and other liquids and gases. These products are used in a variety of industries and applications, with the Company's primary market focus being water/wastewater; heating, ventilating and air conditioning (HVAC); oil and gas, and chemical and petrochemical. Flow instrumentation products are generally sold to original equipment manufacturers as the primary flow measurement device within a product or system, as well as through manufacturers' representatives.

Municipal water meters (both residential and commercial) are generally classified as either manually read meters or remotely read meters via radio technology. A manually read meter consists of a water meter and a register that provides a visual totalized meter reading. Meters equipped with radio technology (endpoints) receive flow measurement data from battery-powered encoder registers attached to the water meter, which is encrypted and transmitted via radio frequency to a receiver that collects and formats the data appropriately for water utility usage and billing systems. These remotely read systems are classified as either automatic meter reading (AMR) systems, where a vehicle equipped for meter reading purposes, including a radio receiver, computer and reading software, collects the data from utilities' meters; or advanced metering infrastructure (AMI) systems, where data is gathered utilizing a network (either fixed or cellular) of data collectors or gateway receivers that are able to receive radio data transmission from the utilities' meters. AMI systems eliminate the need for utility personnel to drive through service territories to collect data from the meters. These systems provide the utilities with more frequent and diverse data from their meters at specified intervals.

The ORION branded family of radio endpoints provides water utilities with a range of industry-leading options for meter reading. These include ORION Migratable (ME) for AMR meter reading, ORION (SE) for traditional fixed network applications, and ORION Cellular for an infrastructure-free meter reading solution. ORION Migratable makes the migration to fixed network easier for utilities that prefer to start with mobile reading and later adopt fixed network communications, allowing utilities to choose a solution for their current needs and be positioned for their future operational changes. ORION Cellular eliminates the need for utility-owned fixed network infrastructure, allows for gradual or full deployment, and decreases ongoing maintenance.

Critical to the water metering ecosystem is information and analytics. The Company's BEACON Advanced Metering Analytics (AMA) software suite improves the utilities' visibility of their water and water usage. BEACON AMA is a secure, cloud-hosted software suite that includes a customizable dashboard, and has the ability to establish alerts for specific conditions. It also allows for consumer engagement tools that permit end water users (such as homeowners) to view and manage their water usage activity. Benefits to the utility include improved customer service, increased visibility through faster leak detection, the ability to promote and quantify the effects of its water conservation efforts, and easier compliance reporting.

Water meter replacement and the adoption and deployment of new technology comprise the majority of water meter product sales, including radio products. To a much lesser extent, housing starts also contribute to the new product sales base. Over the last decade, there has been a growing trend in the conversion from manually read water meters to meters with radio technology. This conversion rate is accelerating, with the Company estimating that approximately 60% of water meters installed in the United States have been converted to a radio solution technology.

17

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The Company's net sales and corresponding net earnings depend on unit volume and product mix, with the Company generally earning higher average selling prices and margins on meters equipped with radio technology, and higher margins on ultrasonic compared to mechanical meters. The Company's proprietary radio products (i.e. ORION) generally result in higher margins than the remarketed, non-proprietary technology products. The Company also sells registers and endpoints separately to customers who wish to upgrade their existing meters in the field.

Flow instrumentation products are used in flow measurement and control applications across a broad industrial spectrum, occasionally leveraging the same technologies used in the municipal water category. Specialized communication protocols that control the entire flow measurement process and mandatory certifications drive these markets. The Company provides both standard and customized flow instrumentation solutions.

The industries served by the Company's flow instrumentation products face accelerating demands to contain costs, reduce product variability, and meet ever-changing safety, regulatory and sustainability requirements. To address these challenges, customers must reap more value from every component in their systems. This system-wide scrutiny has heightened the focus on flow instrumentation in industrial process, manufacturing, commercial fluid, building automation and precision engineering applications where flow measurement and control are critical.

A leader in both mechanical and static (ultrasonic) flow metering technologies for industrial markets, the Company offers one of the broadest flow measurement, control and communication portfolios in the market. This portfolio carries respected brand names including Recordall®, Hedland®, Dynasonics®, Blancett®, and Research Control®, and includes eight of the ten major flow meter technologies. Customers rely on the Company for application-specific solutions that deliver accurate, timely and dependable flow data and control essential for product quality, cost control, safer operations, regulatory compliance and more sustainable operations.

The Company's products are sold throughout the world through employees, resellers and representatives. Depending on the customer mix, there can be a moderate seasonal impact on sales, primarily relating to higher sales of certain municipal water products during the spring and summer months. No single customer accounts for more than 10% of the Company's sales.

Business Trends

Across the globe, increasing regulations and a focus on sustainability are driving companies and utilities to better manage critical resources like water, monitor their use of hazardous materials and reduce exhaust gases. Some customers measure fluids to identify leaks and/or misappropriation for cost control or add measurement points to help automate manufacturing. Other customers employ measurement to comply with government mandates and laws. The Company provides flow measurement technology to measure water, hydrocarbon-based fluids, chemicals, gases and steams. This technology is critical to provide baseline usage data and to quantify reductions as customers' attempt to reduce consumption. For example, once water usage metrics are better understood, a strategy for water-use reduction can be developed with specific water-reduction initiatives targeted to those areas where it is most viable. With the Company's technology, customers have found costly leaks, pinpointed equipment in need of repair, and identified areas for process improvements.

Increasingly, customers in the water utility market are interested in more frequent and diverse data collection. Specifically, AMI technology enables water utilities to capture readings from each meter at more frequent and variable intervals. There are approximately 52,000 water utilities in the United States and the Company estimates that approximately 60% of them have converted to a radio solution. The Company believes it is well positioned to meet this continuing conversion trend with its comprehensive radio and software solutions.

In addition, the water utility industry is beginning the conversion from mechanical to static (ultrasonic) meters. Ultrasonic water metering maintains measurement accuracy over the life of the meter, reducing a utility's non-revenue water. The Company has nearly a decade of proven reliability in the market with its ultrasonic meters

and will be launching its next generation of ultrasonic metering with its D-Flow technology in 2019, which the Company believes will increase its competitive differentiation. While ultrasonic technology migration in North America could affect the competitive landscape, it also opens up further geographic penetration opportunities for the Company as previously described.

Finally, the concept of “Smart Cities” is beginning to take hold as one avenue to affect efficient city operations, conserve resources and improve service and delivery. Smart water solutions (“Smart Water”) are those that provide actionable information through data analytics from an interconnected and interoperable network of sensors and devices that help people and organizations efficiently use and conserve one of the world’s most precious resources. Badger Meter is well positioned to benefit from the advancement of Smart Water applications within the Smart Cities framework. Cities have a keen interest in Smart Water as it provides both a revenue base and conservation outcome. Badger Meter is one of approximately a dozen firms, and the only water metering company, that participates in the AT&T Smart City Alliance. By leveraging this alliance, the Company expects to be able to gain access and sell its broad smart water solutions to higher level decision makers within a city such as the mayor’s office. In addition, it allows Badger Meter to keep abreast of emerging cellular technology changes which the Company believes is the premier AMI solution.

Acquisitions

On April 2, 2018, the Company acquired 100% of the outstanding stock of Innovative Metering Solutions, Inc. (“IMS”) of Odessa, Florida, which was one of the Company's distributors serving Florida.

The total purchase consideration was approximately \$12.0 million, which included \$7.7 million in cash, a \$0.3 million working capital adjustment, a balance sheet holdback of \$0.7 million and a \$3.3 million settlement of pre-existing Company receivables. The working capital adjustment was settled in the second quarter of 2018 and the balance sheet holdback is recorded in payables and other current liabilities on the Company's Consolidated Balance Sheet as it is anticipated to be paid in the next twelve months. As of December 31, 2018, the Company had not completed its analysis for estimating the fair value of the assets acquired. This acquisition is further described in Note 3 “Acquisitions” in the Notes to Consolidated Financial Statements.

On November 1, 2017, the Company acquired certain assets of Utility Metering Services, Inc.'s business Carolina Meter & Supply (“Carolina Meter”) of Wilmington, North Carolina, which was one of the Company's distributors serving North Carolina, South Carolina and Virginia.

The total purchase consideration for the Carolina Meter assets was \$6.3 million, which included \$2.1 million in cash and settlement of \$4.2 million of pre-existing Company receivables. The Company's preliminary allocation of the purchase price included \$0.6 million of receivables, \$0.2 million of inventory, \$3.3 million of intangibles and \$2.2 million of goodwill. As of December 31, 2018, the Company completed its analysis for estimating the fair value of the assets acquired with no additional adjustments. This acquisition is further described in Note 3 “Acquisitions” in the Notes to Consolidated Financial Statements.

On May 1, 2017, the Company acquired 100% of the outstanding common stock of D-Flow Technology AB (“D-Flow”) of Luleå, Sweden. The D-Flow acquisition facilitates the continued advancement of the existing E-Series® ultrasonic product line while also adding a technology center for the Company.

The purchase price was approximately \$23.2 million in cash, plus a small working capital adjustment. The purchase price included \$2.0 million in payments that were made in 2018 and \$3.0 million in payments that are anticipated to be made in 2019 which are recorded in payables and other accrued liabilities on the Consolidated Balance Sheets at December 31, 2018. As of March 31, 2018, the Company completed its analysis for estimating the fair value of the assets acquired and liabilities assumed with no additional adjustments. This acquisition is further described in Note 3 “Acquisitions” in the Notes to Consolidated Financial Statements.

On October 20, 2016, the Company acquired certain assets of Precision Flow Measurement, Inc., doing business as Nice Instrumentation, of Manalapan Township, New Jersey. The acquisition added a new technology for the measurement of steam to the Company's HVAC line of products. The total purchase consideration for the Nice Instrumentation assets was \$2.0 million. This acquisition is further described in Note 3 “Acquisitions” in the Notes to Consolidated Financial Statements.

Revenue and Product Mix

As the industry continues to evolve, the Company has been at the forefront of innovation across metering, radio and software technologies in order to meet its customers' increasing expectations for accurate and actionable data. As technologies such as ORION Cellular and BEACON AMA managed solutions have become more readily adopted, the Company's revenue from Software as a Service (SaaS) has increased significantly, albeit from a small base, and is margin accretive.

The Company also seeks opportunities for additional revenue enhancement. For instance, the Company has made inroads into the Middle East market with its ultrasonic meter technology and is pursuing other geographic expansion opportunities. It is periodically asked to oversee and perform field installation of its products for certain customers. The Company assumes the role of general contractor and either performs the installation or hires installation subcontractors and supervises their work.

19

RESULTS OF OPERATIONS

Net Sales

Net sales in 2018 increased \$31.3 million, or 8%, to \$433.7 million from \$402.4 million in 2017. Sales into the municipal water market were \$334.7 million, an increase of 9% over the prior year's \$306.9 million, while sales into the flow instrumentation end markets were \$99.0 million, a 4% increase from 2017 sales of \$95.5 million. Municipal water sales benefitted from higher volumes in both the residential and commercial markets in the U.S. as well as further penetration into international markets, primarily in the Middle East. Overall residential sales increased 8% while commercial sales increased 4%. In addition to the higher volumes, the Company benefitted from favorable sales mix reflecting a higher percentage of meters with radios, ultrasonic metering technology and SaaS revenue associated with the data collection and software analytics deployed by certain water utility customers. Sales of products into the global flow instrumentation end markets increased 4% benefitting from the overall solid global industrial landscape. Sales were particularly strong into the water/wastewater and oil and gas markets, which have been a focus area for the Company. This growth was partially offset by lower sales into de-emphasized end markets such as automotive.

Net sales in 2017 increased 2% to \$402.4 million from \$393.8 million in 2016. Municipal water sales increased \$2.4 million, or 1%, to \$306.9 million in 2017 compared to \$304.5 million in 2016. The increase was primarily the result of higher commercial water meter sales. Sales of residential meters and related technologies were favorably impacted by the inclusion of sales from D-Flow and incremental sales from Carolina Meter, both of which were acquired in 2017. Sales of other residential related products decreased slightly between years due to delays of anticipated municipal projects. Overall, residential sales were essentially flat while commercial sales increased 3%, the latter due to slightly higher unit volumes. Flow instrumentation sales increased \$6.2 million, or 7%, to \$95.5 million from \$89.3 million in 2016. The increase was primarily due to a rebound in the oil and gas market as well as strengthening of industrial markets in general as the Company continued to broaden its distribution channels.

Operating Earnings

Operating earnings in 2018 were \$56.9 million, or 13.1% of sales, compared to \$56.6 million, or 14.1% of sales, in 2017. Gross profit increased \$6.6 million on higher sales volumes, but declined as a percent of sales from 38.7% in 2017 to 37.4% in 2018. This was largely the result of the higher sales and improved utility sales mix, partially offset by higher commodity cost increases in the first half of the year that were not fully offset by pricing until the latter half. Selling, engineering and administration ("SEA") expenses increased \$6.3 million year-over-year, which included the \$2.6 million of executive retirement charges incurred for the vesting of certain equity and cash awards for the retiring chief executive officer, chief financial officer and chief accounting officer. The remaining increase in SEA was associated with normal inflation for employee salaries and benefits, duplicative executive expenses associated with the CEO and CFO transitions, as well as higher engineering expenses to support product innovation and development.

Operating earnings in 2017 were \$56.6 million, or 14.1% of sales, compared to \$52.7 million, or 13.4%, in 2016. The increase was the result of higher sales and gross margin, offset slightly by higher SEA expenses. Gross profit increased \$5.2 million and margins improved 50 basis points year-over-year due primarily to higher sales, the benefit of distributor acquisitions and improved utility sales mix, partially offset by higher commodity cost increases. SEA expenses increased a modest \$1.3 million, or approximately 1%. The slight increase was the net impact of costs associated with added employees from acquisitions, the related amortization of the intangibles from those transactions and normal inflationary increases, offset somewhat by lower healthcare costs.

Other Pension and Postretirement Costs

Other pension and postretirement costs were \$19.9 million in 2018 compared to \$1.0 million in 2017, with the increase primarily due to the Company's planned termination of its defined benefit pension plan. Following the pension termination charges taken in 2018, the pension termination is complete.

Other pension and postretirement costs were \$1.0 million in 2017 compared to \$1.9 million in 2016. Included in 2017 expenses was a pretax charge of \$0.6 million for non-cash pension settlements compared to \$1.5 million in 2016.

Interest Expense, Net

Net interest expense was \$1.2 million in 2018 compared to \$0.8 million in 2017 and \$0.9 million in 2016. The increase from 2017 to 2018 was due to higher interest rates. The slight decrease from 2016 to 2017 was impacted by the timing of cash flows.

Income Taxes

Income taxes as a percentage of earnings before income taxes were 22.5%, 37.0% and 35.2% for 2018, 2017 and 2016, respectively. The decrease in 2018 was due primarily to the lower U.S. Federal tax rate, which declined from 35% in 2017 and 2016 to 21% in 2018.

Earnings and Diluted Earnings per Share

For 2018, the increase in operating earnings and benefit of the lower effective tax rate was more than offset by the pension settlement charges resulting in net earnings of \$27.8 million in 2018 compared to \$34.6 million in 2017. On a diluted basis, earnings per share were \$0.95 in 2018 compared to \$1.19 in 2017.

For 2017, the increase in operating earnings was offset somewhat by the higher effective tax rate resulting in net earnings of \$34.6 million in 2017 compared to \$32.3 million in 2016. On a diluted basis, earnings per share were \$1.19 in 2017 compared to \$1.11 in 2016.

LIQUIDITY AND CAPITAL RESOURCES

The main sources of liquidity for the Company are cash from operations and borrowing capacity. In addition, depending on market conditions, the Company may access the capital markets to strengthen its capital position and to provide additional liquidity for general corporate purposes.

Primary Working Capital

We use primary working capital (PWC) as a percentage of sales as a key metric for working capital efficiency. We define this metric as the sum of Receivables and Inventories less Payables and Other Current Liabilities, divided by annual net sales. The following table shows the components of our PWC (in millions):

	12/31/2018		12/31/2017	
	\$	PWC%	\$	PWC%
Receivables	\$66,300	15.3 %	\$58,210	14.5 %
Inventories	80,804	18.6 %	85,172	21.2 %
Payables and Other Current Liabilities	(22,469)	-5.2 %	(28,601)	-7.1 %
Primary Working Capital	\$124,635	28.7 %	\$114,781	28.5 %

Overall PWC increased \$9.9 million due primarily to the higher sales volumes and increased mix of international sales activity. Receivables at December 31, 2018 were \$66.3 million compared to \$58.2 million at the end of 2017. The increase was due to the higher sales activity and increased days sales outstanding associated with international receivables due to their regionally higher payment terms. The Company believes its Receivables balance is fully collectible. Inventories at December 31, 2018 were \$80.8 million, a decline from \$85.2 million at December 31, 2017, primarily due to the higher sales volumes, improved inventory management and lower brass costs. Payables and Other Current Liabilities at December 31, 2018 were \$22.5 million, down from \$28.6 million at the end of 2017.

Cash Provided by Operations

Cash provided by operations in 2018 was \$60.4 million compared to \$49.8 million in 2017. The increase from 2017 was driven primarily by higher operating earnings (excluding the non-cash pension termination settlement charges), partially offset by higher primary working capital. The cash flow was more than adequate to fund capital expenditures of \$8.6 million along with dividends of \$16.3 million and \$10.0 million of acquisitions. The remaining cash flow was used to reduce short term borrowings.

Cash provided by operations in 2017 was \$49.8 million compared to \$56.2 in 2016. Higher working capital usage offset an increase in net earnings. The cash flow was more than adequate to fund \$15.1 million of capital expenditures, \$14.2 million in dividends and \$20.4 million in acquisitions with only a modest increase in short term

borrowings.

Capital expenditures were \$8.6 million, \$15.1 million and \$10.6 million in fiscal 2018, 2017 and 2016, respectively. Capital expenditures for fiscal 2019 are expected to be in the \$10-15 million range, but could vary depending on timing of R&D projects, growth opportunities and the amount of assets purchased.

Short-term debt decreased to \$18.1 million at December 31, 2018 from \$44.6 million at December 31, 2017 due to the strong cash flow from operations, partially offset by the payment of dividends and the 2018 acquisition of IMS. At the end of 2018, net debt (short-term debt less cash) represented 1.6% of the Company's total capitalization compared to 10.7% at the end of 2017. None of the debt is secured by the Company's assets.

21

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The Company's financial condition remains strong. In June 2018, the Company amended its May 2012 credit agreement with its primary lender and extended its term until September 2021. The credit agreement includes a \$125.0 million line of credit that supports commercial paper (up to \$70.0 million) and includes \$5.0 million of a Euro line of credit. While the facility is unsecured, there are a number of financial covenants with which the Company must comply, and the Company was in compliance as of December 31, 2018. The Company believes that its operating cash flows, available borrowing capacity, and its ability to raise capital provide adequate resources to fund ongoing operating requirements, future capital expenditures and the development of new products. The Company continues to take advantage of its local commercial paper market and carefully monitors the current borrowing market. The Company had \$111.5 million of unused credit lines available at December 31, 2018.

OFF-BALANCE SHEET ARRANGEMENTS

The Company had no off-balance sheet arrangements at December 31, 2018.

CONTRACTUAL OBLIGATIONS

The following table includes the Company's significant contractual obligations as of December 31, 2018. There are no material undisclosed guarantees.

	Payments due by period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
	(In thousands)				
Short-term debt	\$18,060	\$18,060	\$—	\$—	\$—
Operating leases	12,977	3,371	5,004	2,412	2,190
Total contractual obligations	\$31,037	\$21,431	\$5,004	\$2,412	\$2,190

Other than items included in the preceding table, as of December 31, 2018, the Company had no additional material purchase obligations other than those created in the ordinary course of business related to inventory and property, plant and equipment, which generally have terms of less than 90 days. The Company also has long-term obligations related to its postretirement plans which are discussed in detail in Note 7 "Employee Benefit Plans" in the Notes to Consolidated Financial Statements in Part II, Item 8 of this 2018 Annual Report on Form 10-K. Postretirement medical claims are paid by the Company as they are submitted, and they are anticipated to be \$0.4 million in 2019 based on actuarial estimates; however, these amounts can vary significantly from year to year because the Company is self-insured.

CRITICAL ACCOUNTING POLICIES AND USE OF ESTIMATES

The Company's accounting policies are more fully described in Note 1 "Summary of Significant Accounting Policies" in the Notes to Consolidated Financial Statements in Part II, Item 8 of this 2018 Annual Report on Form 10-K. As discussed in Note 1, the preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. The Company's more significant estimates relate primarily to the following judgmental reserves: allowance for doubtful accounts, reserve for obsolete inventories, and warranty and after-sale costs reserve. Each of these reserves is evaluated quarterly and is reviewed with the Company's internal Disclosure Committee and the Audit and Compliance Committee of the Board of Directors. The basis for the reserve amounts is

determined by analyzing the anticipated exposure for each account, and then selecting the most likely amount based upon historical experience and various other considerations that are believed to be reasonable under the circumstances. These methods have been used for all years in the presented financials and have been used consistently throughout each year. Actual results may differ from these estimates if actual experiences vary from the Company's assumptions.

The criteria used for calculating each of the reserve amounts vary by type of reserve. For the allowance for doubtful accounts reserve, significant past due balances are individually reviewed for collectability, while the balance of accounts is reviewed in conjunction with applying historical write-off ratios. The calculation for the obsolete and excess inventories reserve is determined by analyzing the relationship between the age and quantity of items on hand versus estimated usage to determine if excess quantities exist. The calculation for warranty and after-sale costs reserve uses criteria that include known potential problems on past sales as well as historical claim experience and current warranty trends. The changes in the balances of these reserves at December 31, 2018 compared to the prior year were due to normal business conditions and are not deemed to be significant. While the Company continually tries to improve its estimates, no significant changes in the underlying processes are expected for 2019.

The Company also uses estimates in three other significant areas: (i) stock-based compensation, (ii) income taxes, and (iii) evaluating goodwill at least annually for impairment. The actuarial valuations of benefit obligations and net periodic benefit costs rely on key assumptions including discount rates and long-term expected returns on plan assets for 2017.

The total cost of the Company's stock-based awards is equal to the grant date fair value per award multiplied by the number of awards granted, adjusted for forfeitures. Forfeitures are initially estimated based on historical Company information and subsequently updated over the life of the awards to ultimately reflect actual forfeitures, which could have an impact on the amount of stock compensation cost recognized from period to period. The grant date fair value of stock options relies on assumptions including the risk-free interest rate, dividend yield, market volatility and expected option life.

In calculating the provision for income taxes on an interim basis, the Company uses an estimate of the annual effective tax rate based upon the facts and circumstances known at each interim period. On a quarterly basis, the actual effective tax rate is adjusted as appropriate based upon the actual results compared to those forecasted at the beginning of the fiscal year. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The reserve for uncertainty in income taxes is a matter of judgment based on an evaluation of the individual facts and circumstances of each tax position in light of all available evidence, including historic data and current trends. A tax benefit is recognized when it is "more likely than not" to be sustained based solely on the technical merits of each tax position. The Company evaluates and updates all of these assumptions quarterly.

Goodwill impairment, if any, is determined by comparing the fair value of the reporting unit with its carrying value and is reviewed at least annually. Actual results may differ from these estimates.

OTHER MATTERS

The Company is subject to contingencies related to environmental laws and regulations. A future change in circumstances with respect to these specific matters or with respect to sites formerly or currently owned or operated by the Company, off-site disposal locations used by the Company, and property owned by third parties that is near such sites, could result in future costs to the Company and such amounts could be material. Expenditures for compliance with environmental control provisions and regulations during 2018, 2017 and 2016 were not material.

See the "Special Note Regarding Forward Looking Statements" at the front of this Annual Report on Form 10-K and Part I, Item 1A "Risk Factors" in this Annual Report on Form 10-K for the year ended December 31, 2018 for a discussion of risks and uncertainties that could impact the Company's financial performance and results of operations.

MARKET RISKS

In the ordinary course of business, the Company is exposed to various market risks. The Company operates in an environment where competition varies from moderate to strong. The Company believes it currently provides the leading technology in water meters and radio systems for water utilities. A number of the Company's competitors in certain markets have greater financial resources. Competitors also include alliance partners that sell products that do or may compete with our products, particularly those that provide radio solutions. As the global water metering market begins to shift to adopt ultrasonic technology, the number of competitors may increase. In addition, the market's level of acceptance of the Company's newer product offerings, including the BEACON AMA system, may have a significant effect on the Company's results of operations. As a result of significant research and development activities, the Company enjoys favorable patent positions for several of its products.

The Company's ability to generate operating income and to increase profitability depends somewhat on the general conditions of the United States and foreign economies, including to some extent such things as the length and severity of global economic downturns; the timing and size of governmental programs such as stimulus fund programs, as well as the impact of government budget cuts or partial shutdowns of governmental operations; international or civil conflicts that affect international trade; the ability of municipal water utility customers to authorize and finance purchases of the Company's products; the Company's ability to obtain financing; housing starts in the United States; and overall industrial activity. In addition, changes in governmental laws and regulations, particularly laws dealing

with the content or handling of materials, customs or trade practices, may impact the results of operations. These factors are largely beyond the Company's control and depend on the economic condition and regulatory environment of the geographic region of the Company's operations.

The Company relies on single suppliers for certain castings and components in several of its product lines. Although alternate sources of supply exist for these items, the loss of certain suppliers could temporarily disrupt operations in the short term. The Company attempts to mitigate these risks by working closely with key suppliers, purchasing minimal amounts from alternative suppliers and by purchasing business interruption insurance where appropriate.

Raw materials used in the manufacture of the Company's products include purchased castings made of metal or alloys (such as brass, which uses copper as its main component, aluminum, stainless steel and cast iron), plastic resins, glass, microprocessors and other electronic subassemblies, and components. The Company does not hold significant amounts of precious metals. The price and availability of raw materials is influenced by economic and industry conditions, including supply and demand factors that are difficult to anticipate and cannot be controlled by the Company. Commodity risk is managed by keeping abreast of economic conditions and locking in purchase prices for quantities that correspond to the Company's forecasted usage.

The Company's foreign currency risk relates to the sales of products to foreign customers and purchases of material from foreign vendors. The Company uses lines of credit with U.S. and European banks to offset currency exposure related to European receivables and other monetary assets. As of December 31, 2018 and 2017, the Company's foreign currency net monetary assets were partially offset by comparable debt resulting in no material exposure to the results of operations. The Company believes the effect of a change in foreign currency rates will not have a material adverse effect on the Company's financial position or results of operations, either from a cash flow perspective or on the financial statements as a whole.

The Company typically does not hold or issue derivative instruments and has a policy specifically prohibiting the use of such instruments for trading purposes.

The Company's short-term debt on December 31, 2018 was floating rate debt with market values approximating carrying value. Future annual interest costs for short-term debt fluctuate based upon short-term interest rates. For the short-term debt balance as of December 31, 2018, the effect of a 1% change in interest rates is approximately \$0.2 million.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Information required by this Item is set forth in Part II, Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations" under the heading "Market Risks" in this 2018 Annual Report on Form 10-K.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTAL DATA BADGER METER, INC.

Management's Annual Report on Internal Control over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) under the Securities Exchange Act of 1934. The Company's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles.

Due to its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

The Company's management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2018 using the criteria set forth in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework). Based on this assessment, the Company's management believes that, as of December 31, 2018, the Company's internal control over financial reporting was effective based on those criteria.

Ernst & Young LLP, an independent registered public accounting firm, has audited the Consolidated Financial Statements included in this Annual Report on Form 10-K and, as part of its audit, has issued an attestation report, included herein, on the effectiveness of the Company's internal control over financial reporting.

BADGER METER, INC.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Badger Meter, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Badger Meter, Inc.'s internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Badger Meter, Inc. ("the Company") maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes and our report dated February 26, 2019, expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Milwaukee, Wisconsin

February 26, 2019

25

BADGER METER, INC.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Badger Meter, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Badger Meter, Inc. (“the Company”) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive income, shareholders’ equity and cash flows for each of the three years in the period ended December 31, 2018, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company’s internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 26, 2019 expressed an unqualified opinion thereon.

Adoption of New Accounting Standard

As discussed in Note 1 “Summary of Significant Accounting Policies” in the Notes to Consolidated Financial Statements, the Company changed its method of accounting for defined benefit and post-retirement plan expenses in 2018 through retrospective application.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as Badger Meter, Inc.’s auditor since 1927.

Milwaukee, Wisconsin

February 26, 2019

BADGER METER, INC.

Consolidated Balance Sheets

	December 31,	
	2018	2017
	(Dollars in thousands)	
Assets		
Current assets:		
Cash	\$ 13,086	\$ 11,164
Receivables	66,300	58,210
Inventories:		
Finished goods	23,476	23,125
Work in process	17,097	22,035
Raw materials	40,231	40,012
Total inventories	80,804	85,172
Prepaid expenses and other current assets	4,469	4,077
Total current assets	164,659	158,623
Property, plant and equipment, at cost:		
Land and improvements	9,066	9,119
Buildings and improvements	67,932	67,604
Machinery and equipment	136,724	135,762
	213,722	212,485
Less accumulated depreciation	(123,401)	(118,884)
Net property, plant and equipment	90,321	93,601
Intangible assets, at cost less accumulated amortization	55,418	59,326
Other assets	8,872	9,897
Deferred income taxes	2,163	2,856
Goodwill	71,258	67,424
Total assets	\$ 392,691	\$ 391,727
Liabilities and Shareholders' Equity		
Current liabilities:		
Short-term debt	\$ 18,060	\$ 44,550
Payables and other current liabilities	22,469	28,601
Accrued compensation and employee benefits	13,768	15,509
Warranty and after-sale costs	4,206	3,367
Income and other taxes	1,512	1,082
Total current liabilities	60,015	93,109
Other long-term liabilities	13,972	4,073
Deferred income taxes	3,332	3,434
Accrued non-pension postretirement benefits	5,184	5,703
Other accrued employee benefits	6,685	7,956
Commitments and contingencies (Note 6)		
Shareholders' equity:		
Common Stock, \$1 par; authorized 40,000,000 shares; issued		
	37,198,298 shares in 2018 and 37,164,698 shares in 2017	37,198
		37,165
Capital in excess of par value	38,082	32,182
Reinvested earnings	257,313	244,224

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Accumulated other comprehensive income (loss)	580	(10,893)
Less: Employee benefit stock	(306)	(460)
Treasury stock, at cost; 8,079,727 shares in 2018 and		
8,046,166 shares in 2017	(29,364)	(24,766)
Total shareholders' equity	303,503	277,452
Total liabilities and shareholders' equity	\$392,691	\$391,727

See accompanying notes.

27

BADGER METER, INC.

Consolidated Statements of Operations

	Years ended December 31,		
	2018	2017	2016
	(In thousands except per share amounts)		
Net sales	\$433,732	\$402,440	\$393,761
Cost of sales	271,383	246,694	243,185
Gross margin	162,349	155,746	150,576
Selling, engineering and administration	105,480	99,151	97,904
Operating earnings	56,869	56,595	52,672
Interest expense, net	1,157	789	921
Other pension and postretirement costs	19,860	973	1,907
Earnings before income taxes	35,852	54,833	49,844
Provision for income taxes	8,062	20,262	17,549
Net earnings	\$27,790	\$34,571	\$32,295
Earnings per share:			
Basic	\$0.96	\$1.20	\$1.12
Diluted	\$0.95	\$1.19	\$1.11
Shares used in computation of earnings per share:			
Basic	28,993	28,927	28,887
Impact of dilutive securities	196	184	163
Diluted	29,189	29,111	29,050

See accompanying notes.

BADGER METER, INC.

Consolidated Statements of Comprehensive Income

	Years ended December 31,		
	2018	2017	2016
	(Dollars in thousands)		
Net earnings	\$27,790	\$34,571	\$32,295
Other comprehensive income :			
Foreign currency translation adjustment	(484)	1,844	(328)
Pension and postretirement benefits, net of tax	13,657	(1,102)	1,473
Comprehensive income	\$40,963	\$35,313	\$33,440

See accompanying notes.

BADGER METER, INC.

Consolidated Statements of Cash Flows

	Years ended December 31,		
	2018	2017	2016
	(Dollars in thousands)		
Operating activities:			
Net earnings	\$27,790	\$34,571	\$32,295
Adjustments to reconcile net earnings to net cash provided by operations:			
Depreciation	11,354	12,056	10,715
Amortization	12,961	12,342	11,727
Deferred income taxes	(5,269)	(4,100)	710
Pension termination settlement charges	19,900	—	—
Contributions to pension plan	(2,860)	(825)	(1,000)
Noncurrent employee benefits	464	714	660
Stock-based compensation expense	4,174	1,725	1,537
Changes in:			
Receivables	(7,999)	(967)	(3,561)
Inventories	4,859	(6,167)	955
Prepaid expenses and other current assets	(5,062)	(6,237)	(961)
Liabilities other than debt	38	6,639	3,108
Total adjustments	32,560	15,180	23,890
Net cash provided by operations	60,350	49,751	56,185
Investing activities:			
Property, plant and equipment additions	(8,643)	(15,069)	(10,596)
Acquisitions, net of cash acquired	(8,048)	(20,376)	(1,800)
Net cash used for investing activities	(16,691)	(35,445)	(12,396)
Financing activities:			
Net (decrease) increase in short-term debt	(21,012)	6,376	(33,096)
Payment of contingent acquisition consideration	(2,034)	—	—
Dividends paid	(16,265)	(14,215)	(12,461)
Proceeds from exercise of stock options	1,443	1,215	568
Purchase of common stock for treasury stock	(4,795)	(4,402)	—
Issuance of treasury stock	523	600	518
Net cash used for financing activities	(42,140)	(10,426)	(44,471)
Effect of foreign exchange rates on cash	403	(54)	(143)
Increase (decrease) in cash	1,922	3,826	(825)
Cash — beginning of year	11,164	7,338	8,163
Cash — end of year	\$13,086	\$11,164	\$7,338
Supplemental disclosures of cash flow information:			
Cash paid during the year for:			
Income taxes	\$12,503	\$17,912	\$19,723
Interest	\$1,175	\$867	\$952
Non cash transactions:			
Settlement of Innovative Metering Systems payables prior	\$3,246	\$—	\$—

to the acquisition			
Settlement of Carolina Meter & Supply payables prior			
to the acquisition	\$—	\$4,176	\$—

See accompanying notes.

30

BADGER METER, INC.

Consolidated Statements of Shareholders' Equity

	Years ended December 31,			Accumulated			Total
	Common Stock at \$1 par value	excess of par value	Reinvested earnings	income (loss)	Employee benefit stock	Treasury stock	
Balance, December 31, 2015	\$41,103	\$31,626	\$204,044	\$ (12,780)	\$ (768)	\$(30,950)	\$232,275
Net earnings	—	—	32,295	—	—	—	32,295
Pension and postretirement benefits							
(net of \$1,019 tax effect)	—	—	—	1,473	—	—	1,473
Foreign currency translation	—	—	—	(328)	—	—	(328)
Cash dividends of \$0.43 per share	—	—	(12,463)	—	—	—	(12,463)
Stock options exercised	19	528	—	—	—	22	569
Tax benefit on stock options and dividends	—	(110)	—	—	—	—	(110)
ESSOP transactions	—	289	—	—	154	—	443
Stock-based compensation	—	1,537	—	—	—	—	1,537
Retirement of treasury stock	(4,000)	(6,260)	—	—	—	10,260	—
Issuance of treasury stock (41 shares)	—	412	—	—	—	106	518
Balance, December 31, 2016	37,122	28,022	223,876	(11,635)	(614)	(20,562)	256,209
Net earnings	—	—	34,571	—	—	—	34,571
Pension and postretirement benefits							
(net of \$292 tax effect)	—	—	—	(1,102)	—	—	(1,102)
Foreign currency translation	—	—	—	1,844	—	—	1,844
Cash dividends of \$0.49 per share	—	—	(14,223)	—	—	—	(14,223)
Stock options exercised	43	1,798	—	—	—	30	1,871
ESSOP transactions	—	205	—	—	154	—	359
Stock-based compensation	—	1,725	—	—	—	—	1,725
Purchase of common stock for treasury stock	—	—	—	—	—	(4,402)	(4,402)
Issuance of treasury stock (61 shares)	—	432	—	—	—	168	600
Balance, December 31, 2017	37,165	32,182	244,224	(10,893)	(460)	(24,766)	277,452
Net earnings	—	—	27,790	—	—	—	27,790
	—	—	—	13,657	—	—	13,657

Pension and postretirement
benefits

(net of \$5,127 tax effect)

Foreign currency translation	—	—	—	(484)	—	—	(484)
Cash dividends of \$0.56 per share	—	—	(16,273)	—	—	—	(16,273)
ASU 2014-09 adoption impact	—	—	(128)	—	—	—	(128)
ASU 2018-02 adoption impact	—	—	1,700	(1,700)	—	—	—
Stock options exercised	33	1,410	—	—	—	68	1,511
ESSOP transactions	—	(78)	—	—	154	—	76
Stock-based compensation	—	4,174	—	—	—	—	4,174
Purchase of common stock for treasury stock	—	—	—	—	—	(4,795)	(4,795)
Issuance of treasury stock (40 shares)	—	394	—	—	—	129	523
Balance, December 31, 2018	\$37,198	\$38,082	\$257,313	\$580	\$ (306)	\$(29,364)	\$303,503

*Each common share of stock equals \$1 par value; therefore, the number of common shares is the same as the dollar value.

See accompanying notes.

BADGER METER, INC.

Notes to Consolidated Financial Statements

December 31, 2018, 2017 and 2016

Note 1 Summary of Significant Accounting Policies

Profile

Badger Meter is an innovator in flow measurement, control and related communication solutions, serving water utilities, municipalities and commercial and industrial customers worldwide. The Company's products measure water, oil, chemicals and other fluids, and are known for accuracy, long-lasting durability and for providing valuable and timely measurement data through various methods. The Company's product lines fall into two categories: sales of water meters, radios and related technologies to municipal water utilities (municipal water) and sales of meters, valves and other products for industrial applications in water, wastewater and other industries (flow instrumentation). The Company estimates that over 85% of its products are used in water applications.

Municipal water, the largest sales category, is comprised of either mechanical or static (ultrasonic) water meters along with the related radio and software technologies and services used by municipal water utilities as the basis for generating their water and wastewater revenues. The largest geographic market for the Company's municipal water products is North America, primarily the United States, because most of the Company's meters are designed and manufactured to conform to standards promulgated by the American Water Works Association. The majority of water meters sold by the Company continue to be mechanical in nature; however, ultrasonic meters are gaining in penetration due to a variety of factors, including their ability to maintain near absolute measurement accuracy over their useful life. Providing ultrasonic water meter technology, combined with advanced radio technology, provides the Company with the opportunity to sell into other geographical markets, for example the Middle East and Europe.

Flow instrumentation includes meters and valves sold worldwide to measure and control fluids going through a pipe or pipeline including water, air, steam, oil, and other liquids and gases. These products are used in a variety of industries and applications, with the Company's primary market focus being water/wastewater; heating, ventilating and air conditioning (HVAC); oil and gas, and chemical and petrochemical. Flow instrumentation products are generally sold to original equipment manufacturers as the primary flow measurement device within a product or system, as well as through manufacturers' representatives.

Consolidation

The consolidated financial statements include the accounts of the Company and its wholly owned subsidiaries. All intercompany transactions have been eliminated in consolidation.

Receivables

Receivables consist primarily of trade receivables. The Company does not require collateral or other security and evaluates the collectability of its receivables based on a number of factors. An allowance for doubtful accounts is recorded for significant past due receivable balances based on a review of the past due items and the customer's ability and likelihood to pay, as well as applying a historical write-off ratio to the remaining balances. Changes in the Company's allowance for doubtful accounts are as follows:

Provision	Write-offs	Balance
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	Balance	and reserve	less		at end
	at			adjustments	recoveries
	beginning				of year
	of				year
	year				
	(In thousands)				
2018	\$387	\$ —	\$ (27)	\$ 360
2017	\$425	\$ 285	\$ (323)	\$ 387
2016	\$477	\$ 2	\$ (54)	\$ 425

Inventories

Inventories are valued at the lower of cost or market. Cost is determined using the first-in, first-out method. The Company estimates and records provisions for obsolete and excess inventories. Changes to the Company's obsolete and excess inventories reserve are as follows:

	Balance at beginning of year (In thousands)	Net additions charged to earnings	Disposals	Balance at end of year
2018	\$3,881	\$ 2,195	\$ (1,945)	\$4,131
2017	\$3,639	\$ 1,295	\$ (1,053)	\$3,881
2016	\$3,836	\$ 1,017	\$ (1,214)	\$3,639

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Depreciation is provided over the estimated useful lives of the respective assets by the straight-line method. The estimated useful lives of assets are: for land improvements, 15 years; for buildings and improvements, 10 to 39 years; and for machinery and equipment, 3 to 20 years.

Capitalized Software and Hardware

Capitalized internal use software and hardware included in other assets in the Consolidated Balance Sheets were \$5.2 million and \$6.0 million at December 31, 2018 and 2017, respectively. These amounts are amortized on a straight-line basis over the estimated useful lives of the software and/or hardware, ranging from 1 to 5 years. Amortization expense recognized for the years ending December 31, 2018, 2017 and 2016 was \$3.2 million, \$2.8 million and \$3.1 million, respectively.

Long-Lived Assets

Property, plant and equipment and identifiable intangible assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. If the sum of the expected undiscounted cash flows is less than the carrying value of the related asset or group of assets, a loss is recognized for the difference between the fair value and carrying value of the asset or group of assets.

Intangible Assets

Intangible assets are amortized on a straight-line basis over their estimated useful lives, ranging from 5 to 20 years. The Company does not have any intangible assets deemed to have indefinite lives. Amortization expense recognized for 2018 was \$7.5 million compared to \$6.8 million in 2017 and \$6.1 million in 2016. Amortization expense expected to be recognized is \$7.2 million in 2019, \$7.0 million in both 2020 and 2021, \$5.9 million in 2022, \$5.5 million in 2023 and \$22.8 million thereafter. The carrying value and accumulated amortization by major class of intangible assets are as follows:

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	December 31, 2018		December 31, 2017	
	Gross carrying amount	Accumulated amortization	Gross carrying amount	Accumulated amortization
	(In thousands)			
Technologies	\$47,647	\$ 24,785	\$47,647	\$ 21,882
Intellectual property	10,000	833	10,000	333
Non-compete agreements	2,322	2,076	2,322	1,923
Licenses	650	492	650	475
Customer lists	8,023	2,623	8,023	2,011
Customer relationships	25,220	12,282	21,620	9,649
Trade names	9,595	4,948	9,595	4,258
Total intangibles	\$103,457	\$ 48,039	\$99,857	\$ 40,531

33

Goodwill

Goodwill is tested for impairment annually during the fourth fiscal quarter or more frequently if an event indicates that the goodwill might be impaired. Potential impairment is identified by comparing the fair value of a reporting unit with its carrying value. No adjustments were recorded to goodwill as a result of these reviews during 2018, 2017 and 2016.

Goodwill was \$71.3 million and \$67.4 million at December 31, 2018 and 2017, respectively. The increase resulted from the acquisition of Innovative Metering Solutions of Odessa, Florida in 2018. This acquisition is further described in Note 3 “Acquisitions.”

Warranty and After-Sale Costs

The Company estimates and records provisions for warranties and other after-sale costs in the period in which the sale is recorded, based on a lag factor and historical warranty claim experience. After-sale costs represent a variety of activities outside of the written warranty policy, such as investigation of unanticipated problems after the customer has installed the product or analysis of water quality issues. Changes in the Company's warranty and after-sale costs reserve are as follows:

	Balance at	Net additions charged to beginning of year	Adjustments to pre-existing warranties	Costs incurred	Balance at end of year
		earnings			
		(In thousands)			
2018	\$3,367	\$ 3,269	\$ 5	\$(2,435)	\$ 4,206
2017	\$2,779	\$ 4,520	\$ (439)	\$(3,493)	\$ 3,367
2016	\$3,133	\$ 3,559	\$ (554)	\$(3,359)	\$ 2,779

Research and Development

Research and development costs are charged to expense as incurred and amounted to \$11.1 million in 2018 and \$10.6 million in both 2017 and 2016.

Stock-Based Compensation Plans

As of December 31, 2018, the Company has an Omnibus Incentive Plan under which 1,400,000 shares are reserved for restricted stock and stock option grants for employees as well as stock grants for directors as described in Note 5 “Stock Compensation.” The plan was originally approved in 2011 and replaced all prior stock-based plans except for shares and options previously issued under those plans.

The Company recognizes the cost of stock-based awards in net earnings for all of its stock-based compensation plans on a straight-line basis over the service period of the awards. The Company estimates the fair value of its option awards using the Black-Scholes option-pricing formula, and records compensation expense for stock options ratably

over the stock option grant's vesting period. The Company values restricted stock and stock grants for directors on the closing price of the Company's stock on the day the grant was awarded. Total stock compensation expense recognized by the Company was \$4.2 million for 2018, \$1.8 million for 2017 and \$1.6 million for 2016.

Healthcare

The Company estimates and records provisions for healthcare claims incurred but not reported, based on medical cost trend analysis, reviews of subsequent payments made and estimates of unbilled amounts.

34

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Accumulated Other Comprehensive Income (Loss)

Components of accumulated other comprehensive income (loss) at December 31, 2018 are as follows:

	Pension and postretirement benefits	Foreign currency	Total
	(In thousands)		
Balance at beginning of period	\$(11,597)	\$ 704	\$(10,893)
Other comprehensive income (loss) before reclassifications	—	(484)	(484)
Amounts reclassified from accumulated other comprehensive income (loss), net of tax of \$(5.1 million)	13,657	—	13,657
Net current period other comprehensive income (loss), net	13,657	(484)	13,173
Cumulative impact of adopting ASU 2018-02	(1,700)	—	(1,700)
Accumulated other comprehensive income	\$360	\$ 220	\$580

Details of reclassifications out of accumulated other comprehensive income during 2018 are as follows:

	Amount reclassified from accumulated other comprehensive loss (In thousands)
Amortization of employee benefit plan items:	
Prior service cost (1)	\$ (13)
Settlement expense (1)	19,900
Actuarial loss (1)	(1,103)
Total before tax	18,784
Income tax impact	(5,127)
Amount reclassified out of accumulated other comprehensive income	\$ 13,657

(1) These accumulated other comprehensive loss components are included in the computation of benefit plan costs in Note 7 “Employee Benefit Plans.”

Components of accumulated other comprehensive (loss) income at December 31, 2017 are as follows:

	Pension and postretirement benefits	Foreign currency	Total
	(In thousands)		
Balance at beginning of period	\$(10,495)	\$(1,140)	\$(11,635)
Other comprehensive income before reclassifications	—	1,844	1,844
Amounts reclassified from accumulated other comprehensive loss, net of tax of \$0.3 million	(1,102)	—	(1,102)
Net current period other comprehensive (loss) income, net	(1,102)	1,844	742
Accumulated other comprehensive (loss) income	\$(11,597)	\$ 704	\$(10,893)

Details of reclassifications out of accumulated other comprehensive loss during 2017 are as follows:

	Amount
	reclassified from
	accumulated other
	comprehensive
	loss
	(In thousands)
Amortization of employee benefit plan items:	
Prior service cost (1)	\$ (25)
Settlement expense (1)	641
Actuarial loss (1)	(2,010)
Total before tax	(1,394)
Income tax impact	292
Amount reclassified out of accumulated other comprehensive loss	\$ (1,102)

(1) These accumulated other comprehensive loss components are included in the computation of benefit plan costs in Note 7 “Employee Benefit Plans.”

Use of Estimates

The preparation of financial statements in conformity with U.S. Generally Accepted Accounting Principles (“GAAP”) requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates.

Fair Value Measurements of Financial Instruments

The carrying amounts of cash, receivables and payables in the financial statements approximate their fair values due to the short-term nature of these financial instruments. Short-term debt is comprised of notes payable drawn against the Company's lines of credit and commercial paper. Because of its short-term nature, the carrying amount of the short-term debt also approximates fair value. Included in other assets are insurance policies on various individuals who were associated with the Company. The carrying amounts of these insurance policies approximate their fair value.

Subsequent Events

The Company evaluates subsequent events at the date of the balance sheet as well as conditions that arise after the balance sheet date but before the financial statements are issued. The effects of conditions that existed at the balance sheet date are recognized in the financial statements. Events and conditions arising after the balance sheet date but before the financial statements are issued are evaluated to determine if disclosure is required to keep the financial statements from being misleading. To the extent such events and conditions exist, if any, disclosures are made regarding the nature of events and the estimated financial effects for those events and conditions. For purposes of preparing the accompanying consolidated financial statements and the notes to these financial statements, the

Company evaluated subsequent events through the date the accompanying financial statements were issued.

New Pronouncements

In August 2018, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) No. 2018-14 “Compensation - Retirement Benefits - Defined Benefit Plans - General (Subtopic 715-20),” which modifies the annual disclosure requirements for defined benefit pension and other postretirement benefit plans. This ASU as modified added and deleted specific disclosures in an effort to improve the usefulness for financial statement users while also reducing unnecessary costs for companies. The ASU is effective for annual periods beginning after December 15, 2020 with early adoption being permitted in any interim reporting period within the annual reporting period. The Company is currently assessing the impact of adopting ASU 2018-14.

In August 2018, the FASB issued ASU No. 2018-13 “Fair Value Measurement (Topic 820),” which is designed to improve the effectiveness of disclosures related to fair value measurements. This ASU is effective for annual periods beginning after December 15, 2019 and early adoption is allowed in any interim reporting period within the annual reporting period. The Company is currently assessing the impact of adopting ASU 2018-13.

In February 2018, the FASB issued ASU 2018-02 “Income Statement - Reporting Comprehensive Income (Loss) (Topic 220).” Under existing U.S. GAAP, the effects of changes in tax rates and laws on deferred tax balances are recorded as a component of income tax expense in the period in which the law was enacted. When deferred tax balances related to items originally recorded in accumulated other comprehensive (loss) income are adjusted, certain tax effects become stranded in accumulated other comprehensive (loss) income. The Company’s provisional adjustments recorded in 2017 to account for the impact of the Tax Cuts and Jobs Act resulted in such stranded tax effects. The amendments in ASU 2018-02 allow a reclassification from accumulated other comprehensive (loss) income to reinvested earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act of 2017. The guidance is effective for annual years beginning after December 15, 2018 with early adoption permitted in any interim reporting period. The Company elected to early-adopt this standard in the quarter ended September 30, 2018. This election resulted in a reclassification of \$1.7 million from accumulated other comprehensive income (loss) to reinvested earnings.

In May 2017, the FASB issued ASU 2017-09 “Compensation - Stock Compensation (Topic 718),” which clarifies when a change to terms or conditions of a share-based payment award must be accounted for as a modification. The new guidance requires modification accounting if the vesting condition, fair value or the award classification is not the same both before and after a change to the terms and conditions of the award. The new guidance was adopted on a prospective basis on January 1, 2018. The adoption of this standard did not have a significant impact on the Company's consolidated financial statements.

In March 2017, the FASB issued ASU 2017-07 “Compensation - Retirement Benefits (Topic 715),” which changes the presentation of defined benefit and post-retirement benefit plan expense on the income statement by requiring separation between operating and non-operating expense. Under the ASU, the service cost of net periodic benefit expense is an operating expense that will be reported with similar compensation costs. The non-operating components, which include all other components of net periodic benefit expense, are reported outside of operating income. The ASU also stipulates that only the service cost component of pension and postretirement (benefits) costs is eligible for capitalization. The ASU was adopted by the Company on January 1, 2018. Application was done retrospectively for the presentation of the components of these (benefits) costs. In the Consolidated Statements of Operations, the Company previously recorded service and other (benefits) costs in operating cost and expense accounts along with compensation costs. The adoption of the standard resulted in reclassification of those (benefits) costs to the other pension and postretirement (benefits) costs line in the Consolidated Statements of Operations. Adoption of the standard increased operating earnings for the year ended December 31, 2018 by \$19.9 million and by \$1.0 million for the year-ended December 31, 2017. A corresponding amount was reclassified to other pension and postretirement (benefits) costs for each of these years. The specific net periodic benefit components are disclosed in Note 7 “Employee Benefit Plans.”

In January 2017, the FASB issued ASU 2017-04 “Intangibles - Goodwill and Other (Topic 350).” The update requires a single-step quantitative test to measure potential impairment based on the excess of a reporting unit's carrying amount over its fair value. A qualitative assessment can still be completed first for an entity to determine if a quantitative impairment test is necessary. The ASU is effective on a prospective basis for annual periods beginning after December 15, 2019 and interim periods thereafter. Early adoption is permitted for interim or annual goodwill impairment tests

performed on testing dates after January 1, 2017. The Company does not anticipate that the adoption of ASU 2017-04 will have a significant impact on the Company's financial statements.

In August 2016, the FASB issued ASU No. 2016-15 "Statement of Cash Flows (Topic 230)," which clarifies guidance on the classification of certain cash receipts and payments in the statement of cash flows. This ASU was effective for annual periods beginning after December 15, 2017, including interim periods within those annual reporting periods. The adoption of this ASU did not have a significant impact on the categorization of operating, investing and financing activities on the Consolidated Statements of Cash Flows.

In February 2016, the FASB issued ASU 2016-02 “Leases (Topic 842),” which requires lessees to record most leases on their balance sheets. Lessees initially recognize a lease liability (measured at the present value of the lease payments over the lease term) and a right-of-use (“ROU”) asset (measured at the lease liability amount, adjusted for lease prepayments, lease incentives received and the lessee's initial direct costs). Lessees can make an accounting policy election not to recognize ROU assets and lease liabilities for leases with a lease term of 12 months or less as long as the leases do not include options to purchase the underlying assets that the lessee is reasonably certain to exercise. For lessors, the guidance modifies the classification criteria and the accounting for sales-type and direct financing leases. The ASU also provides several optional practical expedients for the ongoing accounting for leases. The standard includes the use of a modified retrospective approach for leases that exist or are entered into after the beginning of the earliest comparative period in the financial statements. Full retrospective application is prohibited.

In July 2018, the FASB issued ASU No. 2018-11 “Targeted Improvements (Topic 842).” This ASU provides for an optional method of transition which allows companies to adopt the new leasing standard with a cumulative effect adjustment to reinvested earnings. Under this transition method, comparative periods would continue to be reported in accordance with the existing lease guidance under ASC 840 Leases. The Company plans to adopt the ASU with this optional transition methodology beginning on the effective date of January 1, 2019. The Company also intends to elect the practical expedient which will exclude short-term leases from ROU asset or lease liability recognition on the consolidated balance sheet. In addition, the Company has elected the practical expedient to not separate lease and non-lease components. The Company also plans to elect the package of practical expedients that is permitted under the transition guidance, which, among other things, allows the Company to carry forward historical lease classifications. The Company expects that upon adoption, the consolidated balance sheet will increase by \$11 million for the recognition of ROU assets and lease liabilities which will also create corresponding deferred tax assets and liabilities.

Note 2 Common Stock

Common Stock

The Company has Common Stock. The Company had a Common Share Purchase Rights plan that was in effect since February 15, 2008, but it expired on May 26, 2018 and the Board of Directors elected not to renew it.

On August 12, 2016, the Company announced a 2-for-1 stock split in the form of a 100% stock dividend payable on September 15, 2016 to shareholders of record at the close of business on August 31, 2016. In this report, all per share amounts and number of shares have been restated to reflect the stock split for all periods presented.

Stock Options

Stock options to purchase 21,887 shares of the Company's Stock in 2018, 55,223 shares in 2017 and 91,330 shares in 2016 were not included in the computation of dilutive securities because their inclusion would have been anti-dilutive.

Note 3 Acquisitions

Acquisitions are accounted for under the purchase method, and accordingly, the results of operations were included in the Company's financial statements from the date of acquisition. The acquisitions did not have a material impact on the Company's consolidated financial statements or the notes thereto.

On April 2, 2018, the Company acquired 100% of the outstanding stock of Innovative Metering Solutions, Inc. (“IMS”) of Odessa, Florida, which was one of the Company's distributors serving Florida.

The total purchase consideration was approximately \$12.0 million, which included \$7.7 million in cash, a \$0.3 million working capital adjustment, a balance sheet holdback of \$0.7 million and a \$3.3 million settlement of pre-existing Company receivables. The working capital adjustment was settled in the second quarter of 2018 and the balance sheet holdback is recorded in payables and other current liabilities on the Company's Consolidated Balance Sheets as it is anticipated to be paid in the next twelve months. The Company's preliminary allocation of the purchase price at December 31, 2018 included \$3.8 million of receivables, \$0.8 million of inventories, \$0.1 million of machinery and equipment, \$3.6 million of intangibles and \$3.7 million of goodwill. The intangible assets acquired are customer relationships with an estimated average useful life of 10 years.

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The preliminary allocation of the purchase price to the assets acquired was based upon the estimated fair values at the date of acquisition. As of December 31, 2018, the Company had not completed its analysis for estimating the fair value of the assets acquired.

On November 1, 2017, the Company acquired certain assets of Utility Metering Services, Inc.'s business Carolina Meter & Supply ("Carolina Meter") of Wilmington, North Carolina, which was one of the Company's distributors serving North Carolina, South Carolina and Virginia.

The total purchase consideration for the Carolina Meter assets was \$6.3 million, which included \$2.1 million in cash and settlement of \$4.2 million of pre-existing Company receivables. The Company's preliminary allocation of the purchase price included \$0.6 million of receivables, \$0.2 million of inventory, \$3.3 million of intangibles and \$2.2 million of goodwill. The intangible assets acquired are primarily customer relationships with an estimated average useful life of 12 years. The preliminary allocation of the purchase price to the assets acquired was based upon the estimated fair values at the date of acquisition. As of December 31, 2018, the Company completed its analysis for estimating the fair value of the assets acquired with no additional adjustments.

On May 1, 2017, the Company acquired 100% of the outstanding common stock of D-Flow Technology AB ("D-Flow") of Luleå, Sweden. The D-Flow acquisition facilitates the continued advancement of the existing E-Series® ultrasonic product line while also adding a technology center for the Company.

The purchase price was approximately \$23.2 million in cash, plus a small working capital adjustment. The purchase price included \$2.0 million in payments that were made in 2018 and \$3.0 million in payments that are anticipated to be made in 2019, which are recorded in payables and other accrued liabilities on the Consolidated Balance Sheets at December 31, 2018. The Company's preliminary allocation of the purchase price included approximately \$0.3 million of receivables, \$0.6 million of inventory, \$0.2 million of property, plant and equipment, \$10.9 million of intangibles and \$16.1 million of goodwill. The majority of the intangible assets acquired related to ultrasonic technology. The Company also assumed \$4.9 million of liabilities as part of the acquisition. As of March 31, 2018, the Company completed its analysis for estimating the fair value of the assets acquired and liabilities assumed with no additional adjustments.

On October 20, 2016, the Company acquired certain assets of Precision Flow Measurement, Inc., doing business as Nice Instrumentation, of Manalapan Township, New Jersey. The acquisition added new technology for the measurement of steam to the Company's HVAC line of products. The total purchase consideration for the Nice Instrumentation assets was \$2.0 million.

Note 4 Short-term Debt and Credit Lines

Short-term debt at December 31, 2018 and 2017 consisted of:

	2018	2017
	(In thousands)	
Notes payable to banks	\$4,560	\$8,300
Commercial paper	13,500	36,250
Total short-term debt	\$18,060	\$44,550

Included in notes payable to banks at December 31, 2018 was \$4.6 million outstanding under a 4.0 million Euro-based revolving loan facility that does not expire, and which bore interest at 1.14%. Included in notes payable to banks at December 31, 2017 was \$4.8 million outstanding under a 4.0 million Euro-based revolving loan facility that does not expire, and which bore interest at 1.13%.

In June 2018, the Company amended its May 2012 credit agreement with its primary lender and extended its term until September 2021. The credit agreement includes a \$125.0 million line of credit that supports commercial paper (up to \$70.0 million) and includes \$5.0 million of a Euro line of credit. Borrowings of commercial paper bore interest at 3.11% in 2018 and 2.10% in 2017. Under the principal line of credit, the Company had \$111.5 million of unused credit lines available out of the total of \$114.9 million available short-term credit lines at December 31, 2018. While the facility is unsecured, there are a number of financial covenants with which the Company must comply, and the Company was in compliance as of December 31, 2018.

Note 5 Stock Compensation

As of December 31, 2018, the Company has an Omnibus Incentive Plan under which 1,400,000 shares are reserved for restricted stock and stock options grants for employees, as well as stock grants for directors. The plan was originally approved in 2011 and replaced all prior stock-based plans except for shares and options previously issued under those plans. As of December 31, 2018 and 2017, there were 548,653 shares and 629,615 shares, respectively, of the Company's Common Stock available for grant under the 2011 Omnibus Incentive Plan. The Company recognizes the cost of stock-based awards in net earnings for all of its stock-based compensation plans on a straight-line basis over the service period of the awards. Included in 2018 compensation expense is executive retirement charges incurred for the vesting of certain equity awards for the retiring chief executive officer, chief financial officer and chief accounting officer. The following sections describe the three types of grants in more detail.

Stock Options

The Company estimates the fair value of its option awards using the Black-Scholes option-pricing formula, and records compensation expense for stock options ratably over the stock option grant's vesting period. Stock option compensation expense recognized by the Company for the year ended December 31, 2018 related to stock options was \$2.1 million compared to \$0.7 million in 2017 and \$0.5 million in 2016.

The following table summarizes the transactions of the Company's stock option plans for the three-year period ended December 31, 2018:

	Number of shares	Weighted- average exercise price
Options outstanding - December 31, 2015	369,612	\$ 22.35
Options granted	42,302	\$ 33.98
Options exercised	(27,656)	\$ 20.59
Options forfeited	—	n/a
Options outstanding - December 31, 2016	384,258	\$ 23.75
Options granted	55,223	\$ 36.75
Options exercised	(53,198)	\$ 22.83
Options forfeited	—	n/a
Options outstanding - December 31, 2017	386,283	\$ 25.74
Options granted	43,778	\$ 48.20
Options modified	80,642	\$ 52.44
Options exercised	(53,161)	\$ 21.47
Options canceled	(80,642)	\$ 37.04
Options forfeited	—	n/a
Options outstanding - December 31, 2018	376,900	\$ 28.95
Price range \$ 18.08 — \$ 19.21		
(weighted-average contractual life of 2.7 years)	118,900	\$ 18.35
Price range \$ 19.30 — \$ 28.33		
(weighted-average contractual life of 5.3 years)	119,139	\$ 27.17

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Price range \$ 28.34 — \$ 48.20		
(weighted-average contractual life of 8.2 years)	138,861	\$ 39.55
Options outstanding - December 31, 2018	376,900	
Exercisable options —		
December 31, 2016	242,522	\$ 21.01
December 31, 2017	239,043	\$ 21.59
December 31, 2018	321,122	\$ 27.16

The following assumptions were used for valuing options granted in the years ended December 31:

	2018	2017
Per share fair value of options granted during the period	\$18.50	\$14.38
Risk-free interest rate	2.59 %	2.06 %
Dividend yield	1.05 %	1.22 %
Volatility factor	43.2 %	46.6 %
Weighted-average expected life in years	5.3	5.3

The expected life is based on historical exercise behavior and the projected exercise of unexercised stock options. The risk-free interest rate is based on the U.S. Treasury yield curve in effect on the date of grant for the respective expected life of the option. The expected dividend yield is based on the expected annual dividends divided by the grant date market value of the Company's Common Stock. The expected volatility is based on the historical volatility of the Company's Common Stock.

The following table summarizes the aggregate intrinsic value related to options exercised, outstanding and exercisable as of and for the years ended December 31:

	2018	2017
	(In thousands)	
Exercised	\$1,590	\$814
Outstanding	\$8,390	\$7,966
Exercisable	\$7,722	\$5,921

As of December 31, 2018, the unrecognized compensation cost related to stock options was approximately \$0.7 million, which will be recognized over a weighted average period of 2.6 years.

Director Stock Grant

Non-employee directors receive an annual award of \$57,000 worth of restricted shares of the Company's Common Stock under the shareholder-approved 2011 Omnibus Incentive Plan. The Company values stock grants for directors on the closing price of the Company's stock on the day the grant was awarded. The Company records compensation expense for this plan ratably over the annual service period beginning May 1. Director stock compensation expense recognized by the Company for the years ended December 31, 2018 and 2017 was \$0.5 million compared to \$0.4 million in 2016. As of December 31, 2018, the unrecognized compensation cost related to the director stock award that is expected to be recognized over the remaining three months is estimated to be approximately \$0.1 million.

Restricted Stock

The Company periodically issues nonvested shares of the Company's Common Stock to certain eligible employees. The Company values restricted stock on the closing price of the Company's stock on the day the grant was awarded. The Company records compensation expense for this plan ratably over the vesting periods. Restricted stock compensation expense recognized by the Company for the year ended December 31, 2018 was \$2.1 million compared

to \$1.1 million in 2017 and \$1.0 million in 2016.

41

The fair value of nonvested shares is determined based on the market price of the shares on the grant date.

	Shares	Fair value per share
Nonvested at December 31, 2015	120,248	\$26.99
Granted	29,268	\$33.98
Vested	(40,700)	\$25.56
Forfeited	(3,500)	\$29.18
Nonvested at December 31, 2016	105,316	\$29.41
Granted	50,519	\$40.69
Vested	(40,762)	\$27.18
Forfeited	(3,600)	\$33.37
Nonvested at December 31, 2017	111,473	\$35.21
Granted	32,268	\$49.10
Modified	30,488	\$52.47
Vested	(68,289)	\$40.16
Canceled	(30,488)	\$38.62
Forfeited	(2,550)	\$36.83
Nonvested at December 31, 2018	72,902	\$42.58

As of December 31, 2018, there was \$1.8 million of unrecognized compensation cost related to nonvested restricted stock that is expected to be recognized over a weighted average period of 2.0 years.

Note 6 Commitments and Contingencies

Commitments

The Company makes commitments in the normal course of business. The Company leases equipment, vehicles and facilities under non-cancelable operating leases, some of which contain renewal options. Total future minimum lease payments consisted of the following at December 31, 2018:

	Total leases (In thousands)
2019	\$ 3,371
2020	2,785
2021	2,219
2022	1,221
2023	1,191
Thereafter	2,190

Total lease obligations \$ 12,977

Total rental expense charged to operations under all operating leases was \$3.7 million, \$3.6 million and \$3.3 million in 2018, 2017 and 2016, respectively.

Contingencies

In the normal course of business, the Company is named in legal proceedings. There are currently no material legal proceedings pending with respect to the Company.

The Company is subject to contingencies related to environmental laws and regulations. A future change in circumstances with respect to specific matters or with respect to sites formerly or currently owned or operated by the Company, off-site disposal locations used by the Company, and property owned by third parties that is near such sites, could result in future costs to the Company and such amounts could be material. Expenditures for compliance with environmental control provisions and regulations during 2018, 2017 and 2016 were not material.

The Company relies on single suppliers for most brass castings and certain resin and electronic subassemblies in several of its product lines. The Company believes these items would be available from other sources, but that the loss of certain suppliers would result in a higher cost of materials, delivery delays, short-term increases in inventory and higher quality control costs in the short term. The Company attempts to mitigate these risks by working closely with key suppliers, purchasing minimal amounts from alternative suppliers and by purchasing business interruption insurance where appropriate.

The Company reevaluates its exposures on a periodic basis and makes adjustments to reserves as appropriate.

Note 7 Employee Benefit Plans

Historically, the Company maintained a non-contributory defined benefit pension plan that covered substantially all U.S. employees who were employed at December 31, 2011. After that date, no further benefits were accrued in the plan. For the frozen pension plan, benefits were based primarily on years of service and, for certain employees, levels of compensation.

The Company maintains supplemental non-qualified plans for certain officers and other key employees, and an Employee Savings and Stock Option Plan (“ESSOP”) for the majority of the U.S. employees.

The Company also has a postretirement healthcare benefit plan that provides medical benefits for certain U.S. retirees and eligible dependents hired prior to November 1, 2004. Employees are eligible to receive postretirement healthcare benefits upon meeting certain age and service requirements. No employees hired after October 31, 2004 are eligible to receive these benefits. This plan requires employee contributions to offset benefit costs.

Amounts included in accumulated other comprehensive income (loss), net of tax, at December 31, 2018 that have not yet been recognized in net periodic benefit cost are as follows:

	Other	
	Pension	
	postretirement	
	plans	
	benefits	
	(In thousands)	
Net actuarial loss (gain)	\$ 129	\$ (868)

Amounts included in accumulated other comprehensive income (loss), net of tax, at December 31, 2018 expected to be recognized in net periodic benefit cost during the fiscal year ending December 31, 2019 are as follows:

	Other	
	Pension	
	postretirement	
	plans	
	benefits	
	(In thousands)	
Net actuarial loss (gain)	\$ 29	\$ (77)

Qualified Pension Plan

In 2018, the Company completed termination of its non-contributory defined benefit pension plan. In connection with the Company's activities to terminate the plan, lump-sum distributions were made in the second quarter of 2018 to individuals who elected lump sum distributions, including rolling over their accounts or transferring them to a qualified Company plan. In the third quarter of 2018, annuity contracts were purchased to settle obligations for the remaining participants. As a result, the Company recorded pre-tax settlement charges of \$8.2 million and \$11.7 million during the second and third quarters of 2018, respectively.

The following table sets forth the components of net periodic pension cost for the years ended December 31, 2018, 2017 and 2016 based on a December 31 measurement date:

	2018	2017	2016
	(In thousands)		
Service cost - benefits earned during the year	\$—	\$2	\$3
Interest cost on projected benefit obligations	305	1,228	1,711
Expected return on plan assets	(835)	(1,596)	(2,199)
Amortization of net loss	262	525	575
Settlement expense	19,900	641	1,510
Net periodic pension cost	\$19,632	\$800	\$1,600

Actuarial assumptions used in the determination of the net periodic pension cost are:

	2018	2017	2016
Discount rate	2.00%	3.90%	4.14%
Expected long-term return on plan assets	3.00%	4.00%	5.25%
Rate of compensation increase	n/a	n/a	n/a

The Company's discount rate assumptions for the qualified pension plan are based on the average yield of a hypothetical high quality bond portfolio with maturities that approximately match the estimated cash flow needs of the plan. The assumptions for expected long-term rates of return on assets are based on historical experience and estimated future investment returns, taking into consideration anticipated asset allocations, investment strategies and the views of various investment professionals. The use of these assumptions can cause volatility if actual results differ from expected results.

The following table provides a reconciliation of benefit obligations, plan assets and funded status based on a December 31 measurement date:

	2018	2017
	(In thousands)	
Change in benefit obligation:		
Benefit obligation at beginning of plan year	\$42,898	\$42,030
Service cost	—	2
Interest cost	305	1,228
Actuarial loss	(198)	2,940
Benefits paid	(43,005)	(3,302)
Projected benefit obligation at measurement date	\$—	\$42,898
Change in plan assets:		
Fair value of plan assets at beginning of plan year	\$41,517	\$42,061
Actual return on plan assets	(1,375)	1,933