

atp

Automatisierungstechnische Praxis

Oldenbourg Industrieverlag · www.atp-online.de · B3654

10/2008

Volume 50

Reprint

ABB

Cutting-edge
flow measurement

Power and productivity
for a better world™



Cutting-edge flow measurement

ABB: Consistent look & feel, smart functions, added value

For their process instrumentation portfolio ranging from pressure and temperature, analytical, recorders & controllers and actuators and positioners to flowmeters, ABB puts special emphasis on a consistent operating philosophy. All instruments have a similar appearance and are intuitively operable using standardized menu functions and displays. The resulting benefits include low stock keeping costs and reduced training and familiarization efforts.

The concept has been implemented successfully. A customer who was familiar with ABB's electromagnetic flowmeters, for example, was immediately able to commission an ABB Coriolis mass flowmeter without reading and understanding all details of the operating instructions before. "These features allow the customer to minimize his time and cost expenditures" says *Volker Huck*, Senior Vice President for Instrumentation Germany at ABB Automation Products. After having optimized its pressure, temperature and flow measurement

products, ABB is now gradually extending the successful platform strategy to the entire product range. Since the beginning of 2008 the ABB flow measurement product family has a new name: FlowMaster. The Coriolis mass flowmeter, electromagnetic flowmeter and variable area flowmeter series are already available on the market. Additionally, the ABB flow measurement instruments offer a series of intelligent functions beyond the homogeneous outer appearance and operating philosophy.

High-precision density measurement

Users wish to be well-informed about their running processes, automatically and with real-time data. For product quality assurance more and more customers rely on online density measurement using Coriolis mass flowmeters. "The special added value of instruments like our CoriolisMaster consists in using a multivariable instrument for both flow and

density measurement" says *Frank Frenzel*, Product Manager for Coriolis Mass Flowmeters at ABB. "And compared to other products CoriolisMaster is unbeatable with regard to its price."

Many users are not aware of the fact that environmental influences may considerably affect their measuring results under certain circumstances. When ambient conditions change, the instrument temperature and, thus, the measuring accuracy may change as well. Many instruments are installed outside. At night the ambient temperature may fall to 5°C, for example. When the instrument is exposed to sunlight the next morning, the temperature of the housing surface will rise. As a result, a stainless steel housing may be subject to heat strain. Thermal expansion and subsequent shrinkage give rise to a considerable drift error during density measurement – for all Coriolis type instruments. With a delta value of 30°C this error may affect the measuring accuracy by as much as a double-digit percentage value, espe-

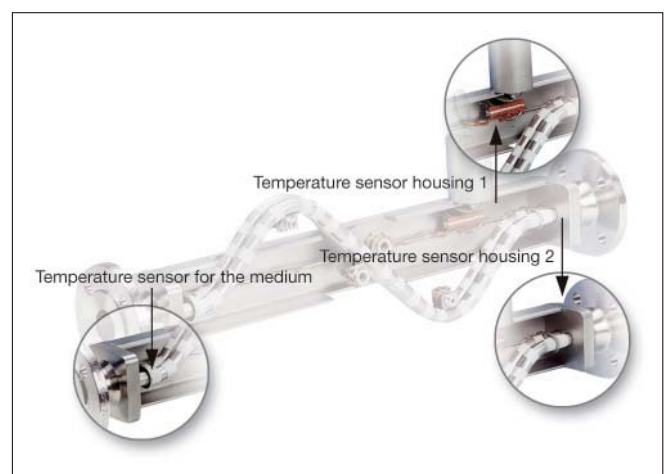
cially if no such effect has been taken into account beforehand. Every manufacturer has developed his own strategy to compensate measuring errors to a certain extent by using the appropriate algorithms. "The question is, however, which measuring points are best to be used for this" states *Frank Frenzel*. "What's new with our instruments is that we do not measure the temperature of the measuring tube only, but of the instrument housing as well. This means that we can also compensate for ambient temperature changes, which is – by the way – a unique selling point." As a result, the instruments provide for stable density measurement with an accuracy up to 0.001 kg/l even when installed outside and exposed to a harsh industrial environment and changing weather conditions.

Comfortable concentration measurement

In principle, measuring the concentration of binary mixtures is not really new. Since 10 years



ABB's product-spanning, consistent operating concept providing, for example, uniformly designed displays for recorders, analytical instruments, electromagnetic flowmeters, pressure- and temperature transmitters.



High-precision density measurement using ABB's Coriolis mass flowmeter.



The advanced infrared interface allows to read out the instrument data for service purposes without the need to disassemble the converter. The interface can also be used for updating the firmware, adding future diagnostic functions, loading language packages or generating tag documentation.

ABB is offering the appropriate equipment as part of their product range. The calculation is usually based on polynomials describing a mixture's temperature, density or concentration dependence. Individually, however, these polynomials are only little informative. The customers normally use a table or matrix that specifies the density of a medium at different temperatures. The values are either entered directly into the instrument or downloaded via the DTM (Device Type Manager). The instrument manufacturer provides the opportunity to integrate the table into the software, allowing the user to change the values directly on the instrument. "Often the customer only wants to see specific ranges, for example as he is well aware of the fact that, at a certain temperature "X", the values do not match the laboratory values" says *Frank Frenzel*. "In the past the customer had to make laborious conversions. The advanced measuring method is much more comfortable and transparent."

The values for the matrix do not need to be complete, as the software interpolates missing values. At least one pair of numbers is needed, and a maximum of 100 numbers is possible. But often the relation is not linear.

For discontinuous curves as many values as possible should be used to have the curve mapped correctly. "The more values available the more precise are the measurement results. Precision, however, is only one aspect, as transparency is just as important" states *Frank Frenzel*. "This is no scientific revolution, but these little steps can make the users' lives much easier." In future, comfortable concentration measurement will be an integral part of the standard software package. Templates for typical sodium hydroxide, sugar solution, starch, alcohol or ethanol -applications have already been integrated.

Easy, quick and safe

The three new series of electromagnetic flowmeters – ProcessMaster, HygienicMaster and WaterMaster – which are often used in process engineering and in the pharmaceutical and the food and beverage industries have also been equipped with additional smart functionalities.

In practice, a constant or even decreasing number of operators have to cope with a rapidly increasing number of field instruments. Operators can hardly be familiar with all instruments in detail. Therefore,

the engineering efforts of the past few years mainly focused on taking into account this market trend. "Our primary goal was, to minimize error sources in the commissioning, instrument configuration, wiring and parameterization phase and to allow even inexperienced users to safely and quickly put their instruments into operation" points out *Uwe Mecke*, Product Manager for Electromagnetic Flowmeters at ABB. This is achieved, for example, by using the 'Easy Set-Up' function that guides the user through the configuration in a step-by-step procedure. All parameter limits are indicated in the menu, and invalid entries that are beyond the permissible range are rejected. This helps the plant operators to minimize their training efforts for the instruments. Instrument control is additionally facilitated by capacitive keys which allow for instrument parameterization without the need to open the housing.

'SensorMemory', a sensor-integrated data memory, is another outstanding feature allowing to replace sensors and converters independently from each other without losing any data or information. Interference-free digital communication between the converter and the SensorMemory ensures that the data residing in the sensor and the converter is always identical.

When the converter is replaced, it automatically loads the sensor calibration data, parameter settings and meter readings from the SensorMemory without requiring to unplug and plug memory modules. This feature considerably facilitates system re-commissioning. Replacing the sensor is also quite uncomplicated. The converter automatically recognizes the new sensor, loads the relevant new data – the calibration data for example – from the SensorMemory and saves the parameter settings and meter readings of the corresponding tag in the SensorMemory.

Clear instructions

The above-mentioned instruments from the FlowMaster product family are among the first devices on the market that comply with the NAMUR recommendation NE107 "Self-Monitoring and Diagnosis of Field Devices". In this recommendation, the manufacturers and users have defined the required diagnostic capabilities, described the most common instrument errors and also taken into account their conception related to diagnostics. "With our new instrument line we as a manufacturer meet the NAMUR requirements, firstly in terms of the nomenclature of the individual state signals and,



Electromagnetic flowmeters from ABB's FlowMaster product family: ProcessMaster, Hygienic Master, and WaterMaster.



The EcoMaster Hygienic flowmeter from ABB is entirely manufactured from stainless steel. It is the world's smallest and lightest electromagnetic flowmeter in its class.

secondly, regarding clear instructions assigned to each error. "Regardless whether the error originates from the converter electronics, the sensor or the operating conditions" says *Uwe Mecke* proudly. The user can immediately localize an error – a special feature provided by ABB instruments which complements real additional value. Usually, the user has to cope with troubleshooting all alone. As unexpected plant downtimes represent the most critical and cost-intensive failures, both operators and maintenance personnel should be enabled to solve the problem as quickly as possible. With their integrated online help system ABB instruments feature clear user benefits. "Although other instruments on the market signal errors via electrical contacts, they do not provide any help or instructions for isolating the cause of the error" says *Uwe Mecke*. "In this respect we have made a quantum leap by offering smart instruments."

Electromagnetic flowmeters of the new generation do not only check the electronics and the sensor for operational reliability, but also – as required by NAMUR – verify the operating conditions of the controlled process. For example, they identify insufficiently filled pipes or covered electrodes that may affect the measurement. When a defined limit value is exceeded, an alarm is tripped and output displayed as a clear instruction on how to react. Diagnostic functions contribute to trouble-free production processes, increase the production volume and turnover, avoid unplanned downtimes and reduce the cost of ownership.

"Moreover, electromagnetic flowmeters from ABB feature an unequaled downwards-compatibility" says *Volker Huck*. "This shows our commitment and appreciation for our customers."

Small but powerful

With their EcoMaster Hygienic ABB offers a cost-effective flowmeter for the food and beverage and pharmaceutical industries.

This electromagnetic flowmeter is the world's smallest electromagnetic flowmeter in its class, entirely made of stainless steel. Its main applications are simple, continuous flow measurement of conductive liquids, pulps, slurries or pastes. Due to its all stainless steel housing the meter is best suited for use in corrosive environments. As a result, it can replace instruments with varnished alumi-

num housings that withstand such harsh operating conditions only for a limited time period.

"Of course, you cannot compare apples and oranges. EcoMaster Hygienic offers another functional range than Hygienic-Master", explains *Andreas Thoene*, Product Manager for Electromagnetic Flowmeters at ABB. "EcoMaster Hygienic meets the demand for low-end instruments. The very positive feedback from the users is a clear indicator that we are on the right way." As plants are getting more and more compact, the users can benefit from EcoMaster

Hygienic's small height of only 19 cm (for DN25, as an example). Some instruments from other manufacturers are as high as 30 cm. Another positive feature is the instrument design allowing for easy upgrading. In its basic version EcoMaster Hygienic has only one pulse output. Due to the modular design concept the customer can easily add a current output and/or display. Moreover, EcoMaster Hygienic is very easy to operate. Less is more, this slogan also applies to the price. Compared to standard instruments, the price of the "small one" is 20 to 30 percent lower.



Dr. Volker C. Huck is Senior Vice President for Instrumentation Germany at ABB Automation Products GmbH.



Frank Frenzel is global Product Manager for Coriolis Mass Flowmeters at the Instrumentation Division of ABB Automation Products.



Uwe Mecke is global Product Manager for Electromagnetic Flowmeters at the Instrumentation Division of ABB Automation Products.



Andreas Thoene is global Product Manager for Electromagnetic Flowmeters at the Instrumentation Division of ABB Automation Products.

Contact:

ABB Automation Products GmbH, Germany

Mail: presse@de.abb.com

Internet: www.abb.com/instrumentation

Automation Technology as a Companion of Continuous Advancement



Dear Ladies and Gentlemen,

Hereby I introduce myself as a new ATP editor. My name is Volker Huck and I am Senior Vice President for Instrumentation Germany at ABB Automation Products GmbH.

I am looking forward to holding this challenging function in cooperation with the three other editors. As an

advisory board member for GMA (German association for measurement- and automation technology - Gesellschaft für Mess- und Automatisierungstechnik) of VDI/VDE (Association of German Engineers/ Electricians - Verein Deutscher Ingenieure/Elektrotechniker) I have been observing the development in the field of automation technology for many years. According to ZVEI (German Electrical and Electronics Industry Association - Zentralverband Elektrotechnik und Elektroindustrie) the automation industry's annual growth rate of 6 to 15 percent has been considerably higher than the increase in the German gross domestic product over the last four years. Germany has an export share of more than 75 percent and is a country with excellent know-how and international success in this industrial sector. Automation technology has become an essential economical factor and has in fact changed from a "job killer" to a real pioneer, allowing for today's high quality of life.

In our day, automation technology helps us increase productivity and, thus, keep workplaces in Europe. Tomorrow, it will become more and more important for our existence. We will have to cope with future challenges like climate protection, preservation of natural resources and a sustainable way of life. In order to be able to keep our leading position in this field, we will have to rethink. Automation technology is a trailblazer that our society must support with enthusiasm. We must commit ourselves to encourage - especially at schools and universities and in economy - the acceptance of a technology that stands for man and his standard of living.

The advancement of this important technology will be an exciting task. A further integration of the individual automation technologies into process automation, sensor and actor technologies using better and quicker communication systems will allow for new, complex applications. Some of these approaches are already under discussion or realization. With wireless communication, standardized device type management and standard diagnoses as specified in the NAMUR recommendation NE 107 we already hold important building blocks in our hands. A fascinating development is in progress.

Future continuation of this development will require substantial training and instruction effort in order to ensure sufficient personnel qualification. For 50 years, the ATP has contributed to this effort, informing its audience in detail and on a very sophisticated technical level. In my new position as an ATP editor, of which I am proud due to this high standard, I appreciate and support the synergy effects resulting from interdisciplinary cooperation of enterprises, research and education.

In order to allow for further successful advancement in automation technology, it is mandatory to communicate topical subjects and make them accessible to an interested audience of specialists. This is a challenge for us, the editors, to provide the ATP audience with exciting and inspiring reports and publications. I am very pleased about this opportunity and the tasks related to it. The ATP anniversary issue from August 2008 has shown how continuous advancement may look like and how it has developed over the past 50 years. If we follow this path, continuous advancement in automation technology will be our companion.

Sincerely yours,

Volker C. Huck

Volker C. Huck has been Senior Vice President for Instrumentation at ABB Automation Products since 2005 and new ATP editor since July 2008.

ABB is a leader in power and automation technologies that enable utility and industry customers as well as wholesalers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 120,000 people.

www.abb.com/instrumentation

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in Germany (01.2009)

© ABB 2009



Germany

ABB Automation
Products GmbH
Borsigstr. 2
63755 Alzenau
Tel: +49 551 905 534
Fax: +49 551 905 555

UK

ABB Limited
Oldends Lane
Stonehouse
Gloucestershire GL10 3TA
Tel: +44 1453 826 661
Fax: +44 1453 829 671

Italy

ABB SACE
a division of ABB S.p.A.
Via Statale 113
22016 Lenno (CO)
Tel: +39 0344 58111
Fax: +39 0344 56278

USA

ABB Inc
Automation Technology
Products
125 E. County Line Rd
Warminster PA 18974-4995
Tel: +1 215 674 6000
Fax: +1 215 674 7183

China

ABB (China) Ltd.
No.27 Industrial Building,
Fu Te Dong San Rd.
Waigaoqiao Free Trade
Zone, 200131
Shanghai
Tel: +86 (0) 21 61056666
Fax: +86 (0) 21 61056992