

Profiles

Customer Magazine 1/2017



Q.Sonic^{max}: New Benchmark in Accuracy

RABO® Goes America!

innogy: High Precision is the Key to Success

Cyber Security and Smart Security

Gas Customers First



*Piyush Sheth
Vice President and
General Manager,
Process Measurement
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We are all witnessing a crucial moment within the history of free trade and international business. For the first time, major nations are turning their back on the tried-and-true success story of globalization in favour of a policy of isolation that defines success solely by the amount of jobs created in country. Everybody will immediately think of President Trump and his “America first” policy but this is by far not limited to just the US – from Russia to the UK to Turkey to Saudi Arabia, nations are starting to erect both physical and commercial walls to prevent businesses from delivering and manufacturing goods across borders.

Honeywell is a truly global organization. Our employees originate from every nation on the planet, we have more than seventy manufacturing sites all around the world and we service our customers no matter if they are located in Canada, South Africa or Indonesia. We are committed to the global economy. But we have also always supported the local-for-local approach where local products are manufactured in country to serve specific in-country needs. Building with global know-how and with local emphasis is at the core of everything Honeywell is doing today.

The products and solutions that we are presenting in this edition of our Profiles showcase this approach for everybody to see – from the Q.Sonic^{max}, which was “invented” in Belgium but is being supported by a team working in Germany, the US, Belgium and India to the liquid metering station solutions that we have deployed in Tanzania, supported by a team

originating from the UAE, the Netherlands and India to the HON5020 global regulator that was developed in the United Kingdom and will now be manufactured in our Regulator Center of Excellence in Kassel, Germany. Every product benefits from our global approach to local challenges for our customers.

And while we are talking local approach here – it does not get any more local than your engineering and solutions team in Dortmund which is working out of a 14th-century mediaeval castle. Incidentally, this team is responsible for some of the most innovative and technologically advanced flow computer and gas composition analysis products – proving yet again that new ideas can thrive and succeed in environments, both old and new.

Honeywell is committed to the global gas business. But global business has its threats as well and one of the most prominent is the cyber security threat. This is why Honeywell has invested heavily in our own cyber security task force that does not only secure your IT infrastructure but, due to our intimate knowledge of your process infrastructure, can offer unique insights into protecting your IT from international threats as well.

We at Honeywell believe that we can only create sustainable growth if we work together; work together across borders, across languages, across continents, with the ultimate goal in mind: success for our gas customers first!

Piyush Sheth

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No Compromise on OIML Accuracy Class 0.5!

Q.Sonic^{max}: The New Benchmark in Accuracy for Custody Transfer

The world's first eight-path meter combining both reflective and direct measurements delivers the lowest possible uncertainty in the most demanding operations. Where accuracy is vital, Q.Sonic^{max} delivers industry-leading performance.

Background and Objectives

Q.Sonic^{max} was designed in the lab to perform in the realities of the field. Manifolds, elbows, reducers, short inlets and other elements all have a significant effect on the profile of the gas flow. Our unique path layouts accurately detect swirl and asymmetry, thus ensuring you get the certainty you need with the pipework you have.

In their International Recommendation OIML R137-1&2:2012, the International Organization of Legal Metrology (OIML) describes the metrological and technical requirements for gas flow meters of any measurement technology (including ultrasonic flow meters, Coriolis flow meters and turbine meters). In chapter 3.2.9 "accuracy class", OIML R137-1&2:2012 states: "class of measuring instruments or measuring systems that meet stated metrological requirements that are intended to keep measurement errors or instrumental uncertainties within specified limits under specified operating conditions."

Translated to the realities of the field, this means a reduced uncertainty of 0.08% with the Q.Sonic^{max} versus other USMs which could correlate to \$9,360 monthly or \$112,320 annual savings when considering a daily throughput of 100 MMSCFD at \$3.90 MCF in all situations with no exclusions from the standard or restriction on the flow range.



Testing in DBOOP with HMP Configuration



Test Procedure & Set-up

Although the OIML R137-1&2:2012 specification consists of more than just the flow disturbance test, this is the main focus when selecting an Accuracy Class 0.5 meter. During the different flow disturbance tests specified in Table 1, the meter accuracy is checked against the traceable reference to determine the magnitude of the shift caused by the disturbance. The shift of the error due to these disturbances, compared to the baseline (80 D straight inlet length), shall not exceed one third of the maximum permissible error (0.167% for Q_t to Q_{max}).

5.13.3 Flow disturbance

“For types of gas meters of which the accuracy is affected by flow disturbances, the shift of the error due to these disturbances shall not exceed one third of the maximum permissible error. In case such a gas meter is specified to be installed in specific piping arrangements producing only mild flow disturbances, the meter shall be marked as such and may only be installed in those specific piping configurations for which its accuracy has proven to stay within this requirement.”

Table 1: Piping Configurations for Flow Disturbance

Test		Test conditions	Remarks	Turbine	Ultrasonic	Thermal mass	Vortex
A		Reference conditions	approx. 80 D straight line		X	X	X
			approx. 10 D* straight line	X			
B		A single 90° bend	elbow radius: 1.5 D	X	X	X	X
C		Double out-of-plane bend	rotating left and right;	X	X	X	X
D			elbow radius: 1.5 D	X	X	X	X
E		Expander	one step difference of the pipe diameter is applied, angle of expansion/reduction part ≤ 15°		X	X	X
F		Reducer			X	X	X
G		Diameter step on the upstream flange	approx. +3% and -3%	X	X		X
+		Half pipe area plate	image shows first bend in piping and mounting of half-moon plate	X	X		

*Piping configurations acc. to OIML R137 Annex B (Table B.1)

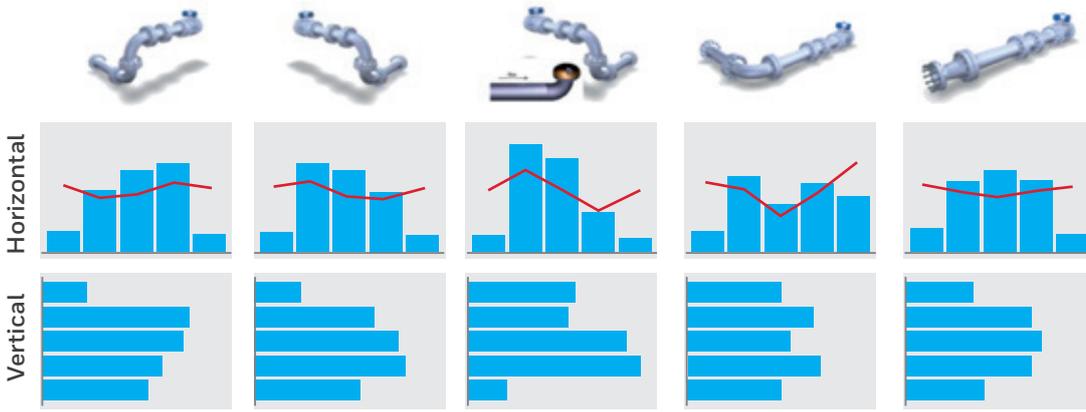
Testing was performed at four (4) flow rates for each flow disturbance. The flow rates defined in R137 are 25%, 40% and 100% of Q_{max} of the meter. An additional test at 9% was conducted. The piping configurations for flow disturbances according to OIML R137-1&2:2012 Annex B are presented in Table 1.

Observations During Testing

The number of paths and the variety of path types (diametrical, chordal and swirl) enhance the possibilities for diagnostic evaluation. Based on the individual path velocities, the effect of flow disturbances on flow profile and asymmetry can be identified (see Fig. 1). As expected, the combination of a double out-of-plane (DOOP) bend with a half-moon plate (HMP) creates the largest swirl and asymmetry in the flow profile. The profile indication in the table clearly reflects the severe flow disturbance.

Due to the variety of paths of the $Q.Sonic^{max}$, even the most challenging disturbances in the

Fig. 1: Flow Profile Diagnostics During Testing



test matrix are neutralized, resulting in Class 0.5 accuracy (see Fig. 2).

Results

The Q.Sonic^{max} showed excellent measurement behavior during the complete testing process. The shift compared to the reference conditions (baseline with 80 D inlet) at the different flow disturbances is < 0.1%. All errors were well within the accuracy limits of Class 0.5 (0.167 %). Even during low flow Q_t (320 m³/h), the results stayed well within the error limit.

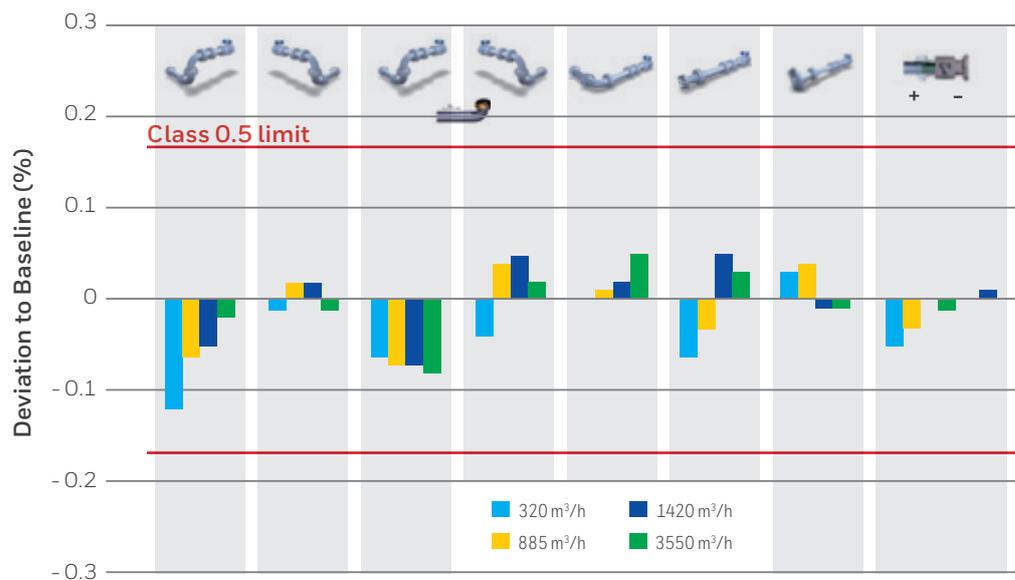
Conclusions

The Q.Sonic^{max} is uncompromising on uncertainty. Eight paths provide OIML Accuracy Class 0.5 even in cases of severe disturbance for the highest possible certainty in every situation. No exclusions from the standard or restricted flow rates have had to be accepted in order to comply with OIML Accuracy Class 0.5.

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Fig. 2: Flow Disturbance Test Results

Shifts vs. reference conditions with Class 0.5 accuracy limits



Smart Security in an Unsecure World

Since the UK Government announced that, by the end of 2020, it wanted gas and electricity smart meters installed in all 25+ million homes and small businesses, the rollout of smart metering has become one of the biggest challenges to ever face the energy industry and meter manufacturers.

The UK market is renowned for being one of the most complicated in Europe, with a number of energy suppliers vying for a market share, between which consumers can switch on a monthly basis if they wish.

Such changeable circumstances require careful planning and management and since 2011, the Department for Business, Energy and Industrial Strategy (BEIS), formally the Department for Energy and Climate Change (DECC), has been responsible for ensuring the smart meter implementation program meets the UK's requirements.

Honeywell played a key role in defining these requirements as one of the founder members of the Smart Specification Working Group (SSWG), where key industry participants worked together to create interchangeable and interoperable platforms based on Zigbee's Smart Energy Profile (SEP) Home Area Networks (HAN). Initially ratified in 2012 by the EU and designated in the UK, these requirements were formally identified as the Smart Energy Equipment Technical Specifications (SMETS1), with SMETS1 becoming the first tangible set of requisites for manufacturers to design their meters to. Honeywell has deployed over 250k SMETS1 compatible themis^{alpha} smart gas meters, having partnered with three of the UK's major energy suppliers for their foundation phase of installations.

Moving forward, Honeywell continued to support BEIS, developing a second iteration of the SMETS which saw further security requirements being added and a more detailed companion specification written to ensure the origi-



themis^{evo} – Integrated Meter

nal manufacturer remit to provide interoperable meters was met.

The development of SMETS2 saw Honeywell take the opportunity to update their meter, taking advantage of more recent components and implementing a more up-to-date, rationalized design. This new themis^{evo} integrated meter provides a more robust platform ready for future development, already in the knowledge that SMETS3 is in development, again with Honeywell's assistance, designed to incorporate ZigBee communications at a lower, 868 GHz frequency to allow smart meters to be installed in dwellings where the low quality signal strength prevents current 2.4 GHz meters from being installed.

Since SMETS requirement discussions first started, the top item on the agenda has always



themis^{evo} – New Electronic Index



Honeywell
Smart Energy –
Comprehensive
Portfolio

been security. While manufacturers had previously concentrated on their own individual devices, looking at how meters could be designed to deter, prevent and identify any form of tamper attack or security risk, the new Smart World needed a new approach. The then Department of Energy & Climate Change (DECC) and Government Communications Headquarters (GCHQ) agreed that the combination of these individual devices define the Smart Metering System. With this in mind, security requirements could be devised to ensure that one compromised device would not affect the overall system.

The UK National Cyber Security Centre (NCSC) was commissioned to define a suitable set of Security Characteristics that meter manufacturers could design their devices to, to ensure they meet the security requirements of the system. It was during this stage, as part of SSWG, that Honeywell provided advice and guidance on how gas meters then dealt with security risks and how future threats could be identified and nullified from a device perspective.

The NCSC has a defined set of design principles they look to when defining Security Characteristic requirements, such as ensuring sensitive information is validated by the device before it is used, confirming any commands to change the behavior of the device are from a trusted source and any attempts to compromise the device are identified and reported. During the development of Honeywell's smart gas meter, these requirements were identified as, and allocated to, three distinct but linked Characteristics: Development, Verification, and Deployment.

Development Characteristics are requirements that need to be incorporated into the design of the device. For example, ensuring that any physical attempt to compromise the gas meter is visible and is reported to the energy supplier who owns the meter.

Verification Characteristics are requirements that identify to a test house how they can test the Development Characteristics incorporated into the design of the device. For example, verifying how any attempt to compromise the gas meter by the test house can be proven to be both visible and reported.

Deployment Characteristics are requirements that describe to relevant users of the device how they should securely use the device and how they can detect any attempt to compromise the device. For example, the gas meter user guide could outline that any physical attempt to manipulate the meter index can be recognized by damage to seals and can also be identified by a tamper event being reported to them.

These sets of characteristics are now operational within the UK, with any meter manufacturer wanting to put their devices onto the market being required to ensure that they meet these specifications. This is verified by a third-party test house and, along with the relevant deployment instructions, certified by the NCSC.

It is these Security Characteristics that Honeywell's new themis^{ev0} integrated design meters adhere to, helping to ensure the security of the UK Smart Metering Infrastructure.

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Condition Monitoring and Diagnostics for Turbine Gas Meters

The performance of any rotating equipment is highly dependent on the health of the bearings that make drive shafts and other parts move smoothly with limited friction.

As an example, bearings in every car ensure that power from the drive train is transferred with high efficiency to the wheels that transmit power to the road. If bearings are damaged, power is lost and fuel economy goes down, which must be prevented. For this reason, vehicles undergo a thorough inspection every other year. The principle for turbine gas meters is similar: Bearings must be in a perfect state to maintain high levels of accuracy and increase the asset lifetime.

TurbinScope is a high-tech industrial offering that allows gas transmission or distribution companies and large industrial gas consumers to carry out online inspections of their turbine gas meters in the field and provides them with an indication of the health and performance of the meter. This can either lead to the realization that the instrument needs to be installed differently or be repaired, or in the best case scenario, gives peace of mind that everything is in order.

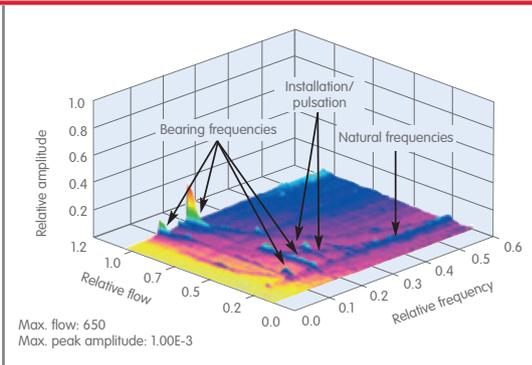


Getting the most out of your existing assets with TurbinScope



TurbinScope Hardware

Graphical Analysis of Turbine Meter Bearings



TurbinScope – what makes it unique?

Meanwhile, online diagnostics are seen as a standard for ultrasonic gas meters and users benefit from the advantages including reduction in maintenance time, preventive service and extended calibration intervals. TurbinScope brings these advantages to turbine gas meters and gives users confidence in the meter read-

Have You Seen This?

Fun From the Gas World

ings. TurbinScope is a unique offering that can be used for Honeywell Elster turbine meters and third-party meters equipped with an HF sensor at the meter rotor.

How does it work?

The TurbinScope hardware is connected to the high-frequency output of a turbine meter which detects the revolutions of the turbine rotor at a very high resolution. TurbinScope registers the data over a certain period of time which is the basis for detailed analysis. Making sense of the data is key to understanding the health of the meter. As part of the TurbinScope® offering, Honeywell provides detailed analyses and reports in written and graphical form so you do not have to be an expert to get the benefits of TurbinScope. The hardware is connected by Honeywell or customer service engineers. Data can be displayed locally on a laptop on site or remotely through a wireless connection to reduce the overall time of the analysis.

What are the benefits?

Customers that have chosen to utilize the possibilities of TurbinScope have benefitted significantly – from understanding where mis-measurements were coming from, detecting bearing damage before it had a major impact on the metering performance to understanding process influences that helped optimizing their start-up procedure to safeguard their assets. If you are interested in finding out more, please feel free to get in contact with us and we would be delighted to give you a demonstration or further information.

Tim Vogel

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Thank you very much for the imaginative photos on the topic of gas! All those who send in contributions will receive a small gift as a thank you. Please send any amusing discoveries to: gudrun.biedermann@honeywell.com.



Gas Pipe Slug Spotted by Matt Partridge



Outdoor System in Mexico Spotted by Sebastian Hintz

USA Becomes the Largest Market for Rotary Gas Meters

RABO[®] Goes America!



Following the very successful market launch of the RABO product range in numerous countries around the world*, Honeywell is working intensely on the widespread development of the largest market for rotary gas meters – the United States of America.

Supported by the experienced Honeywell sales organization as well as qualified distributors (Channel Partners), great successes have been achieved in recent months, including the biggest single order worldwide for RABO rotary gas meters for a total of 8,000 meters in the period 2016 – 2019!

As with products and goods in other sectors of industry, it is not so easy to sell rotary gas meters with European designs in America without first satisfying local product and approval requirements. On the one hand, these are

American Standard
for Rotary Gas Meters
(ANSI B109.3)



Fig. 1: RABO-ID with Honeywell Gas Volume Corrector Fitted



special product characteristics, such as for example the RABO-ID with mechanical index drive for generating impulses for American gas volume correctors (see Fig. 1), and on the other, the necessary product certification in accordance with the American standard ANSI B109.3 for rotary gas meters.

* See Profiles 3/2016

At the moment, the market for rotary gas meters in North America is dominated by local manufacturers like GE-Dresser (USA) and Romet (Canada), however these have outmoded product designs in comparison to the modern RABO product range from Honeywell.

The RABO design stands out in particular thanks to its very broad measuring range as well as its significantly larger measuring chambers. The latter result in limited pressure loss as well as reduced piston speed, which guarantee a longer service life of the RABO. The high measuring ranges enable the customers to cover the complete range of flows to be measured with just a few types of devices and therefore

vidual orders alongside the large contract mentioned above.

In America, Honeywell is also the market leader for battery-operated volume conversion devices (e.g. Mercury MiniMax or the EC350). Therefore, the customer now has the benefit of purchasing everything from a single source: Modern rotary gas meters and future-oriented gas volume correctors.

Honeywell will continue to work hard on meeting the remaining market requirements in the United States of America and is already looking forward to participating in the very important "AGA



to make considerable savings on inventory and stocking. The result is a significant contribution to the reduction of operating expenses (total cost of ownership). In comparison to the previous suppliers, the RABO also offers other unique selling propositions which are now greatly appreciated by American customers.

It is therefore a source of great pleasure to generate enthusiasm among new customers for the Honeywell rotary gas meters as well as to have obtained a significant number of indi-

Operations Conference & Biennial Exhibition 2017" from May 2 – 5, 2017 in Orlando, Florida. We look forward to taking the opportunity to present and demonstrate the current Honeywell product range of RABO rotary gas meters and gas volume correctors for North America as well as intensively exchanging experiences with local experts.

Visit our exhibition booth 619, **Gaylord Palms Resort & Convention Center in Orlando, Florida** from **May 2 – 5**. Your opinion is important to us!

Patrick Keiffer

patrick.keiffer@honeywell.com

HON5020 Goes Global

The HON5020, first launched on the North American market, is now ready to go global. This high-pressure pilot-operated regulator is suited for natural gas distribution and commercial utilization applications for inlet pressures up to 100 bar/1450 psi.

HON 5020 in a Monitor/Active Installation

The HON5020 provides excellent accuracy over a wide operational range while featuring a quick response time for the dynamic load changes required in industrial applications. It comes with a unique top-entry design and fewer internal parts that keep maintenance requirements to a minimum, while an internal filter ensures long-term reliable operation and less downtime. To meet safety and reliability standards, the HON5020 holds a CE type examination certificate in accordance with the Pressure Equipment Directive in association with the

EN 334 standard, certified by the DVGW (German Technical and Scientific Association for Gas and Water).

How it Works

In the HON5020, the pressure reduction function is performed by opening and closing a diaphragm made of an elastomer material. The number of parts susceptible to wear and tear in this diaphragm regulator is lower than in regulators that work by any other principle. Together with its top-entry access for servicing, this makes the HON5020 an excellent choice for customers who are looking for a regulator that is easy to maintain and has low operating costs.

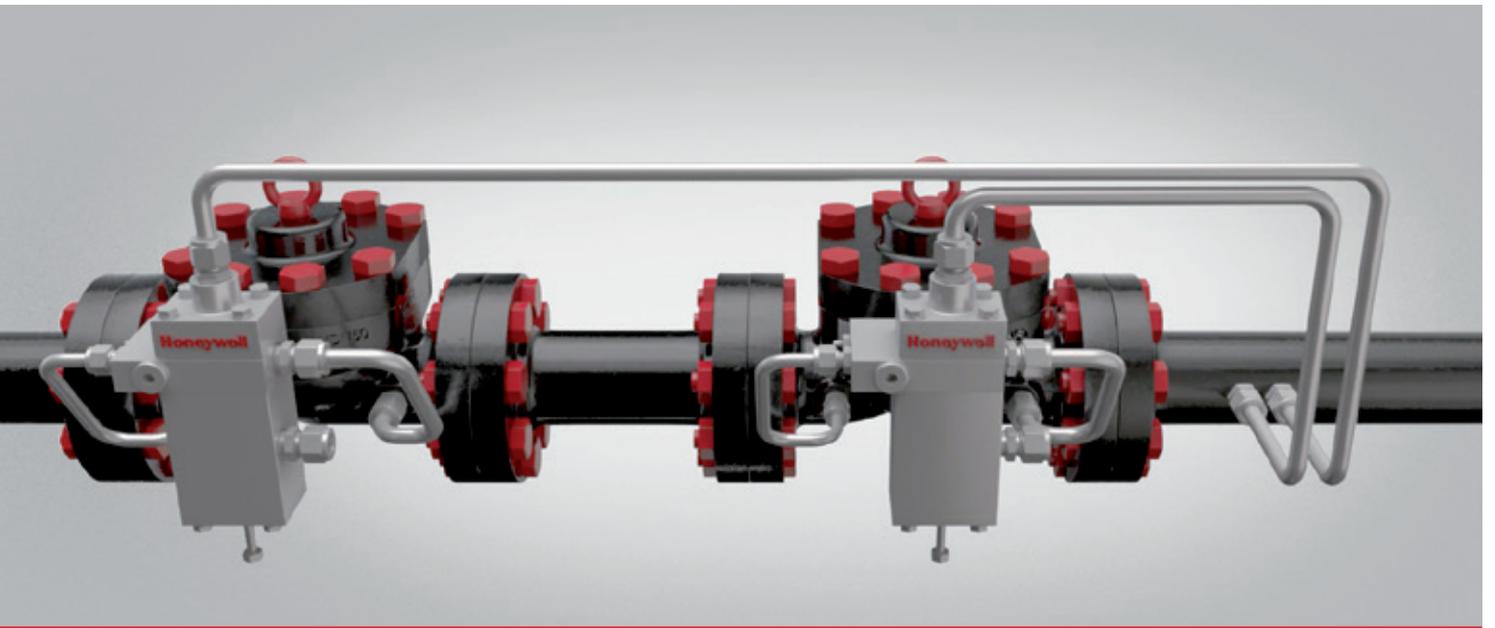
Performance Characteristics

The HON5020 features an accuracy of up to AC1 and a lock-up pressure class of up to SG5 even under the most variable temperature conditions (from -20°C to +60°C). The compact body is designed to ensure that it is optimized for maximum flow capacity. Whenever needed, the user can limit the maximum flow capacity by inserting optional trim plates under the diaphragm.

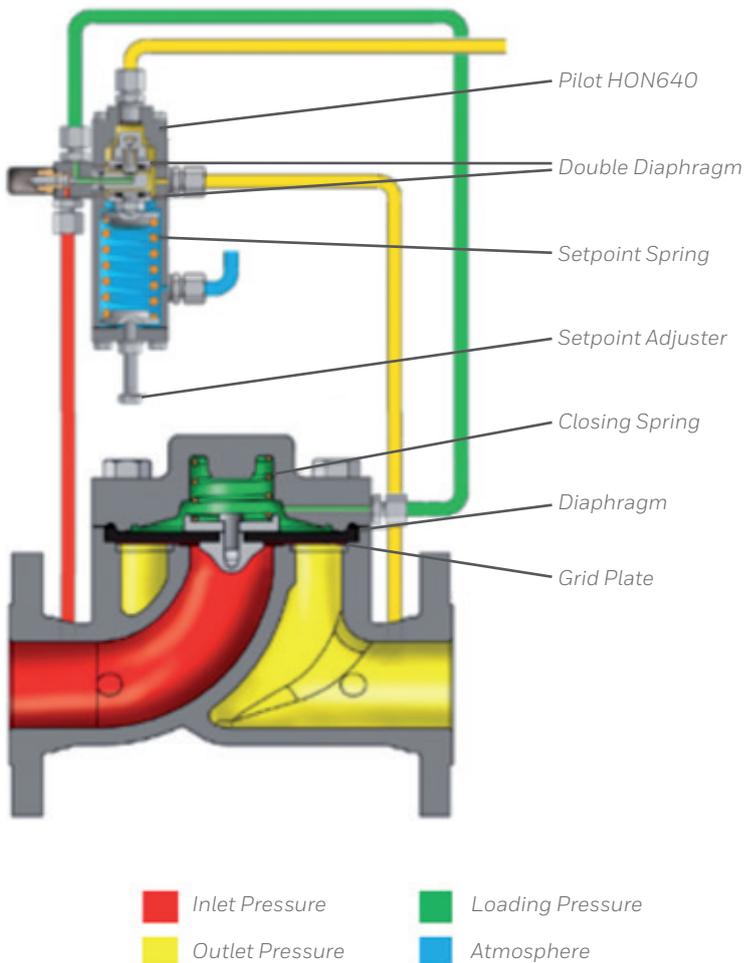
The HON5020 is available with an optional internal noise reduction plate which effectively suppresses noise generation in the pressure reduction zone. This eliminates the need for elaborate extensions of the housing with sound absorption materials and makes the HON5020 an ideal regulator for urban deployments where noise reduction is a requirement.



HON5020



Operating Principle of the HON5020



Key Specifications: HON5020

Info: www.honkassel.de/hon5020



Maximum Allowable Pressure PS:	100 bar
Pressure Classes:	Class 150, Class 300, Class 600, PN16, PN25, PN40
Nominal Sizes:	DN 25 to DN 150
KG in m ³ /(h*bar):	460 to 16,000
Accuracy Class:	Up to AC1
Lock-up Pressure Class	Up to SG5
Flange Connection:	ASME and DIN

The HON5020 comes with standard-compliant face-to-face dimensions which facilitates replacement of any embedded base. It is equipped with our HON600 pilot series – well-known for its high accuracy and versatility. It can be used in standard pressure reducing applications as well as in monitor/active configuration or as a safety relief valve. The regulator is available in 5 different inlet sizes (DN 25 to DN 150) and 3 pressure classes (CL150/CL300/CL600) and with DIN and ASME flanges, all with the same design. This platform principle not only reduces operating costs for the customer, but also reduces the stock of spares needed and supports a diverse base of fielded regulators.

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Shades of Steel

Steel is THE material of industrialization. From wrought iron to reinforced concrete, it has some impressive properties. Transport has made massive progress with ships, cars, trains and aircraft, none of which would have been possible without steel. Iron or simple steel has just one drawback – it corrodes when exposed to oxygen or in simple terms, iron rusts.

Until now, this problem has partly been solved or eased through the use of paint coats. Durable coatings such as hot-galvanizing or electroplating have been developed for more demanding applications. Very good corrosion protection can be achieved by galvanizing plus chromating. This solution has been used for many years for the connection fittings on our diaphragm gas meters with sheet steel housing.

To meet the specifications of the European REACH Regulation, zinc plating and yellow chromating of the connection fittings are being phased out.

We have developed a very good alternative for our diaphragm gas meters. A modern zinc-nickel coating both complies with the REACH Regulation and meets the corrosion protection requirements of EN 1359.



New: Diaphragm Gas Meter with Zinc-nickel Coated Connection Fitting

Below: Diaphragm Gas Meter with Yellow-chromated Connection Fitting

REACH

REACH stands for Registration, Evaluation, Authorization and Restriction of Chemicals.

REACH is a regulation of the European Union which was enacted to improve protection for human health and the environment against risks which may be posed by chemicals and at the same time to improve the competitiveness of the chemical industry in the EU. It also encourages alternative methods to identify the harmful effects of substances to reduce animal testing.

This change will not have any effect in terms of use. Only the colour will change from yellow-gold to silver-grey. Depending on the process, the colour may vary somewhat, but this does not affect the quality of the corrosion protection.

The coating of the connection fittings will be changed in the period from June to August 2017.

If you have any questions about this change, please contact Hans Arp.

Hans Arp

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Reliable, Accurate, Proven

The Titas Gas Transmission & Distribution Company Ltd. was founded in 1964 and is the largest gas distribution company in Bangladesh, operating in the Greater Dhaka and Mymensingh Areas.

In June 2016, the pipeline network operated by Titas Gas amounted to 13,038 km, supplying gas to approx. 17,000 commercial and industrial (C&I) users as well as over 20 million domestic end users*.

Utilization of gas as the primary source for heating, cooking and power generation has risen over the last decades with gas distribution companies like Titas having to cope with the growing need by expanding their networks at mind-blowing speeds. In addition, a large network like this one is constantly evolving due to the fact that old instruments reach the end of their designed lifetimes, units need to be equipped with upgraded technology to connect to new data collection systems and so on.

In collaboration with our long-time local partner Five Feathers, Honeywell successfully took part in the latest tender for the supply of over 1,500 rotary and turbine gas meters with mounted electronic volume converters, being awarded the contract in November 2016. The main reasons for being awarded this contract were high reliability and long-term accuracy of the products supplied in the past, full compliance with specifications, including the presence of a number of unique features, and good after-sales service experience at a competitive price. The meters will be shipped in batches during the first half of this year.

Tim Vogel Tim.Vogel@Honeywell.com

*Source: <https://www.titasgas.org.bd/Pages/titas-at-a-glance/2/>



oneHoneywell on tour

The Honeywell Sales & Marketing Team will once again be on tour in 2017 to provide our customers with special insight into the subject of gas and gas distribution – our complete end-to-end approach from the gas source to the boiler.

This year's trip will start at the **AGA Conference and Exhibition** from May 2 – 5 in Orlando, Florida. At this meeting of the entire gas industry from North America and some parts of Central America, our focus will be on the integration of various product groups to form a complete solution. This means, for example, that for the

first time we will be unveiling the full integration of our Rabo rotary gas meter with the EC350 gas volume corrector which has been specifically developed for the American market. All of this will, of course, be shown together with our new IIoT solutions for GPRS and LTE.



However, we will not simply be attending trade shows, we will also organize our own customer events. This year, our **Honeywell Innovation Days** will be held on May 30 in Cologne and June 1 in Augsburg. In addition to our gas products, these events will also feature our process and automation technology and you will also have an opportunity to talk to many of our major customers such as Bayer and Shell. The focus this year will be on the subject of safety and security – and we are also expecting a presentation from the BSI on this topic.

Finally, at the end of this eventful first six months, we will be returning to the United States to the main event of the year for Honeywell – the **Honeywell User Group Conference (HUG)** – at which we will be welcoming several hundred customers and partners from all over the world and all industries to San Antonio, Texas from June 18 – 23. Your competent Gas Team will, of course, be well represented at this event and will not only be able to give you insights into existing products, but also into our plans for future developments. This year, we are also looking forward to welcoming the first gas customer on the steering committee for this event, an indication of how important the gas business is to Honeywell within the framework of our global activities.

We would be delighted to be able to greet you in person at one of these events.

Your Honeywell Gas Marketing & Event Team

Max Gutberlet max.gutberlet@honeywell.com

Immediately after this, we will be returning to Europe where we will be travelling straight to the Gas and Water Congress organized by the **Austrian Association for Gas and Water (ÖVGW)** from May 10 – 11, 2017 in Vienna. Over the last few years, we have mainly looked at the subject of distribution at this event and so this year, we intend to focus on the presentation of our high-pressure solutions and in particular, of course, on our new ultrasonic product Q.Sonic^{max} with which to date we have managed to deliver a level of accuracy and stability to our customers which has previously been impossible, even in suboptimal installation conditions.



High Precision is the Key to Success

“We are delighted to be able to notify you that innogy Metering can issue the technical approval of Elster as a supplier for the above product groups until December 31, 2018. This means that Elster may participate in the tendering procedure of RWE or innogy carried out under the responsibility of RWE Group Business Service GmbH.”



innogy

These pleasing words reached us a few weeks ago and represent the successful conclusion of a time-consuming qualification procedure by both parties to achieve a product approval for turbine gas meters TR22 and SM-RI-X and also for rotary gas meters RABO® and IRM-3 DUO.

innogy Metering GmbH has around 500 experienced staff providing meter and meter reading management, metering point operations and metering services. According to the company, only technologically sophisticated products are used.

The issue of the license was preceded by extensive product testing on certified gas meter test rigs by Honeywell Elster and innogy, test rig comparisons, endurance tests and supplier audits at the Honeywell manufacturing plants to ensure high product quality in mass production.

Honeywell Elster meets this high demand with its turbine gas meters and rotary gas meters which means that we are looking forward to continuing our excellent working relationship over the next few years. At the same time, we would like to take this opportunity to thank innogy Metering GmbH for the trust it has placed in us and for its certification work.

Patrick Keiffer patrick.keiffer@honeywell.com



RWE Product Approval for the IRM-3 DUO (left) as well as the TR22 and SM-RI-X (right)

Understanding Your Cyber Security Profile

The cyber security of today's industrial control systems (ICS) has attracted a lot of attention since the first targeted attack on such systems occurred in Iran in 2010. Since then, there have been numerous attacks focused on automation assets around the world – including those in the downstream oil and gas sector.

Refinery and petrochemical plant owners now recognize the serious risk posed by cyber threats to both their company's business and the community in general. Many initiatives have been launched to help safeguard control system platforms.

This article describes an effective methodology based on international standards to quickly identify the level of security needed to protect them. This approach takes into account the threat profile of potential attackers, existing security governance procedures, and the design of the control system. It makes cyber protection measurable, and therefore allows for benchmarking the results to compare plants and industries.

Threats to Downstream Operators

In the downstream oil and gas sector, plants have a growing concern for cyber security. At many sites, operations are digitally driven. The era of skilled control room personnel operating from panel boards has given way to networks of computers, automated machines and ubiquitous sensors. Plants are driven by a "digital thread" of technical data – product and process information – that can be shared throughout the enterprise and must be protected (see Fig. 1).

Much attention has been given to protecting technical information in information technology (IT) systems and networks. But protecting the operational systems of an industrial enterprise presents a new and different set of

challenges. Not only must technical data be shielded from theft, it must also be protected from alteration that could impair the proper functioning of a process operation or affect the safety and availability of the production system. These concerns are especially challenging for small and midsize companies.

Today, there is a myriad of cyber threats facing operators of ICSs around the world, which have necessitated protection for supervisory control and data acquisition (SCADA) systems, plant control systems, engineering workstations, substation equipment, programmable logic controllers (PLCs), and other field control devices. Attacks on an ICS may involve only the cyber components and their operation, but those impacts can extend into the physical, business, human, and environmental systems to which they are connected. A cyber event, whether initiated externally, internally or due to inadequate policies and procedures, can lead to a loss of system control and the corresponding negative consequences.

All of this leads to the most important question: Are plant owners prepared to handle a coordinated cyber-attack?

What is Security Profiling?

The cyber security aspects of an ICS are broad, ranging from security for hardware/firmware to system concerns such as secure architectures and vulnerability screening as well as human aspects like behavior modeling and training.



Fig. 1: In the downstream oil and gas sector, plants have a growing concern for cyber security.



Critical industries like oil and gas require a new, effective cyber security strategy that builds upon existing technical frameworks, maturity models, and procedural guidelines. This methodology is then used to benchmark the current state of any asset owner's ICS security program, the target state, and how to layout a roadmap to achieve it.

Security profiling is a technique that captures the characteristics of the potential attacker, and the security capabilities of the network design and governance organization so as to establish a target level for protection of the plant. This target level defines the prerequisite security capabilities of the system in order to counter an attack. Comparing target security requirements with the capabilities of the ICS design and organization identifies the actual level of protection.

Security profiling methodologies do not take the security configuration (settings) into account. Instead, they focus on the design level. Identifying security gaps resulting from faulty implementation requires a security assessment, an activity that collects data from ICS equipment and analyzes the system's security settings.

When it comes to ICS infrastructure, the protection level is a function of design and operational effectiveness. It is a measure of the system's cyber security controls on the one hand, and organizational governance on the

other in order to counter cyber-attacks. The IEC 62443 standard is used for evaluating design effectiveness. This de-facto international standard defines the security controls required to counter an attacker with specific characteristics (e.g. strength, motivation, etc.). The C2M2 standard is used to evaluate operational effectiveness, providing the means to appraise organizational maturity (see Fig. 2).

Design effectiveness can be thought of as the wall of protection to stop attacks, whereas organizational maturity is the foundation upon which the wall rests. Both factors are equally important, although they don't always receive the same amount of attention. It is not uncommon for new security controls to be introduced without considering their operational impact. Organizations benefit from the ability to compare different plants and identify the path between target and actual protection levels using a graphic representation.

The addition of security controls normally leads to a host of new requirements for organizations intent on managing their cyber security posture. While the implementation of enhanced technical controls can be done quickly, it takes far more time to prepare the organization to manage controls effectively. A plan is needed to prioritize and show the relationship between required processes and controls when creating a cyber security program.

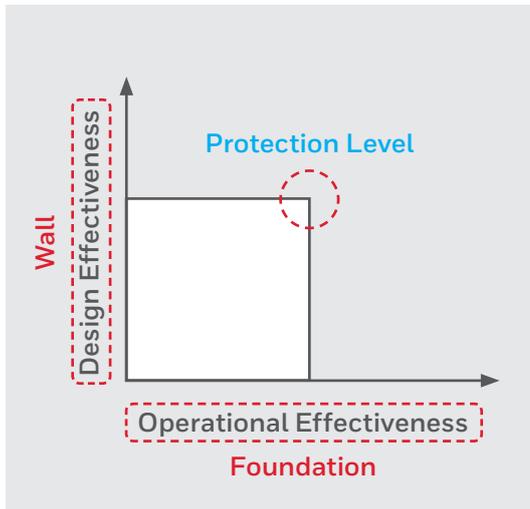


Fig. 2: When it comes to ICS infrastructure, the protection level is a function of design and operational effectiveness.



Fig. 3: As part of a cyber security risk assessment, maturity level requirements have a direct relationship with design effectiveness requirements.

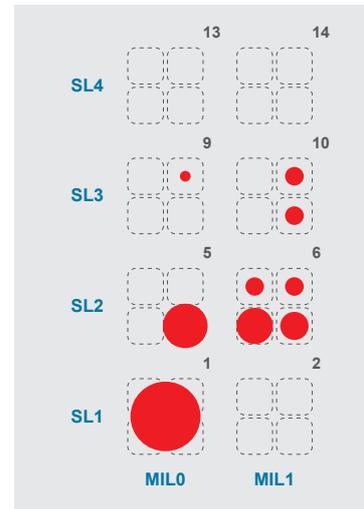


Fig. 4: Based on the results of numerous assessments over time, an organization

Putting the Methodology to Work

ICS security professionals and experts have a large number of security standards and guidance to reference in the development of their ICS security program. The challenge is selecting a standard and applying it to a control systems environment at a single site or across a fleet of facilities.

IEC 62443 is a series of standards, technical reports, and related information that define procedures for implementing an electronically secure ICS. This guidance applies to end users (i.e. asset owners), system integrators, security practitioners, and control systems manufacturers responsible for manufacturing, designing, implementing, or managing industrial automation and control systems.

In particular, IEC 62443 identifies the relationship between the security capabilities required to protect an ICS and the attacker profile. Security levels within the standard describe the attacker profile (SL 1 to SL 4), while the “SL_{CAPABLE}” definition characterizes the capabilities required to stop an attacker with certain strengths or capabilities. IEC 62443 also outlines the creation of a zone and conduit diagram of the ICS design, assessing risks for each zone, and then converting this information to the SL_{CAPABLE} of the standard.

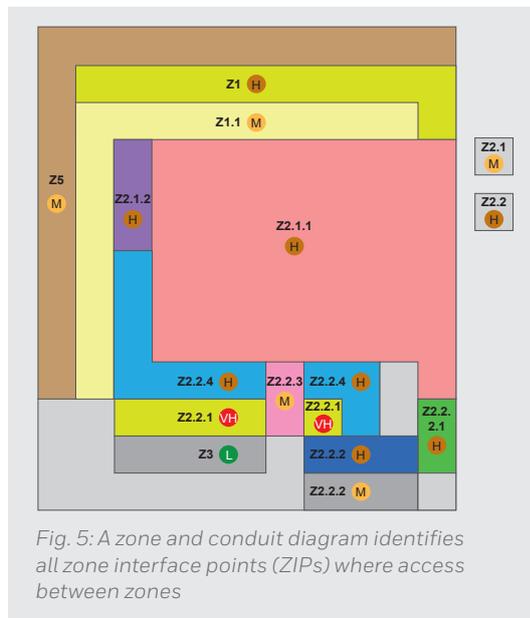
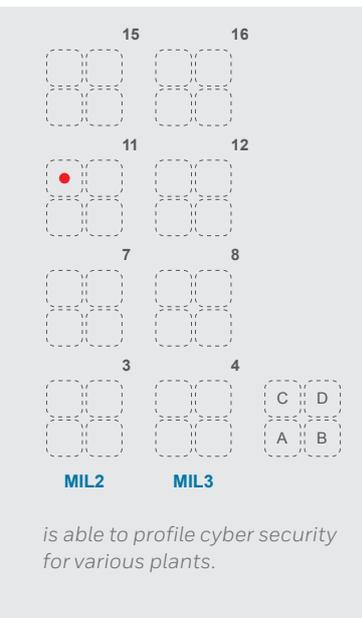
A multi-attribute risk assessment is an essential step in assigning a risk level to each security zone based on factors such as consequence,

exposure, accessibility, and the attacker profile. The risk level is subsequently converted, using IEC 62443.3.2 guidelines, into a security level itemizing all the capabilities needed to address the risk. This methodology provides the information needed for design effectiveness and allows the user to score non-compliance with the standard based upon the technology requirements of the security zone, coupled with the absence of capabilities specified by the IEC guidelines.

Maturity level requirements have a direct relationship with design effectiveness requirements. The higher the security level, the higher the maturity level needed to counter the attacker. In Fig. 3, the green areas in blocks 6, 7, 11, 12 and 16 are applicable target combinations. The assignment of MIL 1 maturity denotes that security processes are ad-hoc and only partially defined, while MIL 2 and MIL 3 indicate the organization has progressed to a managed and fully risk-aware environment. A low security level and high maturity level doesn't provide much value, nor does a high security level and a low maturity level.

By analyzing the design requirements of the various industrial markets according to design diagrams and attacker profiles, it is possible to see the differences in levels of protection. The criticality of the industry is an important factor. Sometimes the range is small (e.g. a gas pipeline requiring SL 3 or SL 4) and in other cases it is much wider (e.g. a liquid pipeline requiring





SL 2 – SL 4), depending on the liquid transported and geographical factors.

Based on the results of numerous assessments over time, an organization is able to profile cyber security for various plants. For example, Fig. 4 shows that a large group of facilities had a protection level in box 1 when the initial profiling action was completed. Only a small number of plants reached the desired target levels in boxes 6, 7, 11, 12 and 16. Close examination of the maturity scores reveals that cyber security was commonly addressed in an ad-hoc manner (MIL 1), with MIL 0 indicating no security governance at all.

Experience has demonstrated that security profiling helps ensure a better protected industrial operation and provides a wealth of supporting information for the asset owner if performed by a qualified security team. Best-in-class operations get a clear indicator of their current status, while plants just starting with a security improvement program can discover what protection level is appropriate for them.

Benefits to Plant Owners

As described in this article, cyber security profiling provides essential security information in return for a relatively small investment of effort and resources. This translates into valuable benefits for the typical downstream oil and gas facility faced with growing cyber threats. They include:

- Insight into plant security requirements by identifying required levels of protection
- Information on the actual level of protection that can be achieved based on the security capabilities of the ICS
- Identification of ways to close gaps so organizational and security strength can mature hand-in-hand
- Understanding of how the market at large is performing in the area of cyber security
- Knowledge to help security teams focus on priorities aimed at protecting key assets
- Data enabling network security specialists to determine the most critical security zones and, if appropriate, whether zone segmentation has been applied

Conclusion

Cyber protection takes time and demands continuous attention and should not be limited to ad-hoc technical improvements – it requires a structured lifecycle program embedded in the culture of the organization and the industry must mature and become more risk aware. Savvy plant owners realize that safeguarding an industrial control system is a complex exercise that differs from protection of the corporate network. The ICS consists of various sub-systems with strong interdependencies affecting production continuity and safety. An effective cyber security program includes steps justified by possible risks and in compliance with international standards. Security profiling is a valuable tool to improve this work.

Sinclair Koelemij sinclair.koelemij@honeywell.com



Extended Warranty

As Honeywell Process Solutions continues to move towards a service culture by providing customers with improved performance, reliability, and extended asset lives, we are excited to announce the launch of our extended warranties for electronic volume converters, data loggers and ultrasonic flow meters.

New equipment represents a significant investment for our customers and our comprehensive extended warranty will enable you to easily maintain and protect your assets.



Extended Warranty

No station is immune to the risks of unplanned outages, obsolescence, and possible hardware failures. When these occur, they can result in financial loss, unrecoverable costs, missed opportunities, and customer issues. Honeywell's Extended Warranty is available to help minimize these risks.

Benefits of Extended Warranty

- Covers 100% of covered parts after expiration of basic warranty
- Minimizes troubleshooting delays through on-call expert Honeywell technicians
- Reduces the risk of unplanned downtime and related costs
- Allows you to maintain operations despite any turnover in personnel at a predictable cost
- Allows you to optimize performance, capacity, and availability
- Minimizes unplanned expenses resulting in reduced total cost of ownership

Choose the Option Best for You

Whether you simply wish to extend the length of our original warranty terms, or enhance your coverage to include protection against unplanned labor expenses, Honeywell has an extended warranty that is right for you to help protect your investment.

An Extended Parts Warranty provides targeted coverage of repairable metering solutions. The warranty extends the standard, one-year Honeywell equipment warranty on an annual basis for up to an additional five years. This service can be ordered any time within the original warranty period of the new product.

You can purchase an Extended Warranty as a stand-alone offering, or bundle it with any offering from Honeywell Services & Support. An extended warranty can become an integral part of your maintenance strategy, providing valuable protection and peace of mind.

Take Control of Your Maintenance Budget

In a business environment where station operations are constantly tasked to do more with less, take control of your maintenance budget – drive down unplanned repair and reduce the duration of unscheduled downtime events. Enjoy having the peace of mind, knowing your investment is protected with a Honeywell Extended Warranty.

For More Information

Contact your local authorized Honeywell distributor or Honeywell Process Measurement and Control sales office.

Louis Oquendo louis.oquendo@honeywell.com

Lease to Buy or Rent to Try?

Just like with any car, bike or let's say watch, high quality comes with a corresponding price. Leasing a vehicle is very common – it sets you free from worrying about its servicing and maintenance. So why not lease an EnCal 3000?

Our EnCal 3000 gas chromatograph has the best accuracy in the world. It is a very high-quality analyzer for determination of heating value, density, and compressibility of natural gas and biogas, i.e. all the things that you need for billing purposes with the lowest uncertainty. The EnCal 3000 Quad received its PTB approval in January of this year, thus completing the range of approved analyzers (natural gas/biogas/E-gas).

What if your company is not ready to purchase an EnCal 3000 analyzer? If your company has a short-term or one-time project, why not take advantage of our rental program and experience for yourself how our Honeywell Elster EnCal 3000 analyzers can help increase your productivity while keeping costs to a minimum? The EnCal 3000 gas chromatograph can be rented at discounted rates for longer periods. Rental fees may be offset against the purchase price of a gas quality analyzer. Why not request more information on terms and conditions?

Financing/Leasing

Get the equipment that your plant needs now without a large capital expenditure. For projects lasting more than six months, Honeywell can offer flexible, competitive leasing and financing programs that provide you with low, fixed payments as well as tax and accounting benefits. This will thus allow you to conserve capital budgets and preserve credit. Programs can include options to trade up to new technology or to purchase the equipment at the end of the lease.

So whether you need the equipment for shorter or longer periods, we are ready to help you out with any solution. We will provide you with care-free fiscal metering.

Hans-Peter Smid hans-peter.smid@honeywell.com



Andy Smith: New Field Service Leader for UK & Ireland

The newly created position of field service leader for the UK was filled by Andy in August 2016 after he had spent the year prior to this working as an after sales engineer, growing and developing the biogas service market in the UK.

Following the acquisition of Elster by Honeywell, Andy was promoted to lead the service team which then expanded to include the legacy Honeywell Enraf team, servicing and maintaining tank gauging and fuel additive systems.



Andy Smith,
Field Service Leader

Andy had had a successful 12-year career in the Royal Air Force as an aircraft technician/engineer, picking up not just technical skills, but strong team leadership and first line management skills. Following this, he joined a company working in the oil and gas industry on integrated control and safety systems both onshore and offshore. During this period, he worked as a service engineer, learning about the importance of customer interfacing and the commercial aspects of such roles.

Until recently, Elster UK didn't have an after sales team. It first formed one in Q3 2015 which is when Andy joined. This team was primarily created to satisfy the demand in the new biogas industry which grew rapidly in the UK, and is still growing. The UK after sales team is now looking at offerings outside of the biogas industry in order to expand its footprint.

Andy is looking forward to the future challenges and opportunities to extend the range and quality of service offerings for Honeywell's customers in the oil and gas industry. He aims to create a larger PMC service team to ensure customers are provided with the very best service, every single day.

Joachim Emrich joachim.emrich@honeywell.com

Please visit us on our upcoming events and fairs:

AGA Conference and Exhibition

May 2 – 5 in Orlando, Florida

Austrian Association for Gas and Water (ÖVGW)

May 10 – 11 in Vienna

Honeywell Innovation Days

May 30 in Cologne and June 1 in Augsburg

Honeywell User Group Conference

June 18 – 23 in San Antonio, Texas

Elster Turbine Gas Meters – Looking Back at almost 90 Years of Success

Turbine gas meters are considered the workhorses of the gas industry, being used in several applications spanning from high-pressure custody transfer metering in transmission and border stations to precise measurement under high-temperature in gas-fired power plants and small-size allocation metering in industrial and commercial applications.

The Honeywell turbine gas meter portfolio consists of products originating from the Instromet, Elster and American Meter brands. Almost one century of experience in designing and manufacturing this type of gas flow meter has led to a strong portfolio that excels in accuracy and

reliability. We are proud that most high-pressure calibration facilities use Honeywell turbine master meters proving that our fiscal meters are rightfully considered the best in the world with an unmatched long-term stability.

Tim Vogel

tim.vogel@honeywell.com

Long history: The first helical gear meter was launched **90 years** ago

Truly global: Elster turbine meters are sold in **> 70 countries** around the globe

Quantity & quality: More than **200,000** meters supplied within the last decade

Close to the customer: **Manufactured in six countries**
(Germany, the Netherlands, USA, Russia, China, Slovakia)

Large portfolio: **Five active product lines**
(TRZ2, SM-RI, QA, Q, GT)

In need of a reference: **> 10 approved calibration facilities**
equipped with Elster turbine master meters

Enabling power generation: **> 200 gas turbines** receive their
fuel through SM-RI-HT meters

Creating value: **66%** mismeasurement detected by use of
TurbinScope at a customer site



Symbiosis of History and Cutting-edge Technology

Dortmund, Schlosstrasse: Sounds rather feudal, doesn't it? After all, the Schlossallee is the most expensive piece of real estate that can be bought on the German version of Monopoly. But in Dortmund, everything is a little different. In Schlosstrasse, there really is a castle (Schloss); or more precisely, a moated castle, the Wasserschloss Bodelschwingh – and here of all places, the Elster Honeywell Dortmund site is situated. Is such a thing at all possible?

The short answer is: It is, in fact it really is. But let us get everything in the right order.



1984 – FLOW COMP's First Ever Logo

With a castle, it is hard to avoid a little bit of history. According to old documents, the first parts of Schloss Bodelschwingh were built around 1300 by a knight called Giselbert I. A few years later, in 1984 to be precise, a Dr. Beese and a Dr. Stirnberg rented two rooms on the castle grounds and founded the engineering firm called FLOW COMP. A few months later, the author of this article was employed as development manager, the manager of an as-yet non-existent team, which was to be built in the years following and which became very successful.

The name FLOW COMP is derived from FLOW (the flowing of liquids and gases, competence in thermodynamics) and COMP (computer, competence in electronics, especially in micro-electronics). Alongside consultancy in different projects, in times when memory capacity was measured in kilobytes instead of terabytes and the microprocessors were called 8080 or 6502, the first, own-manufactured product was born, made for the many coking plants that still existed back then in the Ruhr area. The recording pyrometer made possible the non-contact measurement and analysis of the temperature of heating flues in coking plants. The results of

such measurement enabled the prediction of the expected quality of the coke which was still in the furnace. In so doing, the employees at the time ruined countless pairs of shoes on the tops of hot coking furnaces; there was no such thing as safety shoes back then...

In 1986, the company, which now had six employees, started to work with the then gas supplier VEW in Dortmund – a stroke of luck as the main focus of the new products shifted to the field of gas transport and gas distribution. In 1989, FLOW COMP was a founder member of the DSfG (Digital Interface for Gas Metering Devices) working group; the DSfG protocol, a well-established data protocol in Germany for connecting gas metering devices, has substantially influenced the company's development and products to this day. As a result, in 1992 the GAS-MAX flow computer, a system volume conversion device with integrated archive data logger and an integrated DSfG interface, was presented to the, by now, numerous customers. As the company's first product, it had a fiscal type approval from the PTB (German National Metrological Institute) and therefore could be used for billing purposes in custody transfer metering stations. In 1997, the company set up its own state-accredited testing laboratory in premises which, according to historical plans, had once housed an egg-counting operation.



1988 – The SBS Temperature Measurement System for Coking Furnaces



1992 – The GAS-MAX Flow Computer



In the face of these successes, it is not surprising that Elster Produktion GmbH acquired a share of FLOW COMP, which was a 14-strong company, in 1992. This fusion made further successes and product developments possible and so it was that in the year 2000, a new series of flow computers called gas-net and in 2003, a gas quality analyzer with continuous measurement, the gas-lab Q1, were presented to the public.

The integration of Elster within the Honeywell Group in 2015 has again resulted in new possibilities and challenges for the Dortmund site. In the meantime, the products developed in Dortmund are known and loved on the international stage and as before, the focal point lies in the fiscal volume measurement and quality analysis of gases, in particular natural gases. The result of the third generation of flow computers developed at the site is the enCore FC1. Its display can be switched to English, French, Spanish, German, Russian and even Chinese. With these possibilities, the measuring device is at home anywhere in the world. The analysis of gas quality has also been further developed. Alongside a process chromatograph (EnCal 3000), there is a follow-up product to the gas-lab Q1, which logically is called Q2.

The employees, who currently number around 40, are split between two buildings on the site. The development department for electronic metrology, which since its genesis in 1984 has shown continuous growth, is housed in the former cavaliers' or guest house. Of particular note: A universally equipped gas laboratory which offers tapping points for inert, flammable and toxic gases of all types at numerous workstations. There is also an intensively used representative seminar area for meetings and customer seminars.

The outbuilding is the former carriage house, still recognizable today by the old iron door hinges of the former doors. This is where the offices of the Projects and Systems department are housed. The job of this department is the project planning and equipping of large gas metering stations (IMS, Integrated Metering Solutions) in which Honeywell products are used to the greatest possible extent. The corresponding Service department is also situated there.

As you can see: Opposites attract. High tech in historic walls is a happy symbiosis of venerable age and the latest cutting-edge technology, which had its origins here over 30 years ago and which has even today not lost its inspirational power. Visit us for a customer seminar – you will not be able to resist the fascination.



2016 – The GasLab Q2

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