

# Profiles

3/2011

The Elster-Instromet customer magazine



## Q.Sonic<sup>plus</sup> – the next generation

EnCal 3000: 1 + 1 = Quad

Protection profiles: effects of the new German Energy Industry Act

Elster in Lotte: Factory of the Year

Customer magazine online:  
[www.elster-instromet.com](http://www.elster-instromet.com)



# Patent or risk of fake?

Many of you will have read about the patent and design patent disputes currently pending at many courts in the sector of IT and mobile telephony and will have wondered at the contentious issues, some of which appear to be bizarre. But, in most cases, what is at issue is the fair right of the inventor to protect his work and intellectual property against brand or product piracy.

In the past, Elster took the position that a development that was patent-pending must have a very strong position in the event of a patent dispute owing to its degree of inventive ingenuity. Examples in the Elster Profiles magazine are the patented path configuration of the new ultrasonic gas meter Q.Sonic<sup>plus</sup> (see page 3), the patent-pending rotary sensors and the connection-free, fire-resistant cable gland in the diaphragm gas meters with electronic index (see Elster Profiles 2/2011). On the contrary, designs and product names have usually not been registered for patent.

Whoever thinks that fakes only exist in the consumer-goods industry would be wrong, however. To an increasing extent, we find out that terms coined positively by Elster such as the "ENCODER", known design elements such as our S1 index or even entire products such as the Axial Flow Valve including the product name, the brand name and tool faults which have long been eliminated have been copied right down to the very last detail.

When a pulse-based, battery-operated add-on device is embellished with the name "ENCODER", that might still be funny. When a competitor talks down the patented Elster-Instromet path configuration simply because he is not willing to take out a licence, that is OK. The price is "only" a higher measurement uncertainty of your metering system. But the fun stops when copying gas appliances with safety functions. In this case, this can even put safety of personnel and users at risk, because the copier frequently does not really know what he is doing.

In cases of doubt, Elster will, in future, tend towards registering a patent or design patent and will not even shy from any dispute. Not only in order to protect our intellectual property, but in order to protect you against fakes. What sounds and looks like "Elster" should continue to incorporate the technology and quality which you are entitled to expect.

I wish you a happy festive season and all the best and every success in the New Year.

With very best wishes,



Peter Hampel



#### Publisher:

Elster GmbH  
55252 Mainz-Kastel, Germany  
www.elster-instromet.com

#### Editorial staff:

Gudrun Biedermann, Elster Germany  
Paul Webster, Elster Instromet UK  
K. C. Tan, Elster-Instromet Singapore  
Nick Williams, Elster Instromet UK

#### Please write to:

Europe/Africa/America/Australia:  
Elster GmbH  
Gudrun Biedermann  
Steinern Strasse 19-21  
55252 Mainz-Kastel, Germany  
T +49 6134 605218  
E gudrun.biedermann@elster.com

#### Asia:

Elster-Instromet Sdn. Bhd. (Singapore Branch)  
K. C. Tan  
29 Tai Seng Avenue,  
#06-05A Natural Cool Lifestyle Hub  
Singapore 534119  
T +65 62477728  
E kctan@elster-instromet.com.sg

#### England:

Elster Metering Ltd.  
Steve Case  
Tollgate Business Park  
Beaconside, Stafford  
Staffordshire ST16 3HS, England  
T +44 1785 275306  
E steve.case@gb.elster.com

#### Authors:

Addy Baksteen, Elster-Instromet NL  
TC Chuah, EISB Malaysia  
Kelvin Chee, Elster Singapore  
Sebastian Hintz, Elster Germany  
Dr. Joachim Kastner, Elster Germany  
Patrick Keiffer, Elster Germany  
Paul Ladage, Elster Germany  
Klaus Landwehr, Elster Germany  
Carsten Lorenz, Elster Germany  
Dr. Daniela Lücke-Janssen, Elster Germany  
Gerd Markert, Elster Germany  
Martin Novak, Elster Belgium  
Rüdiger Pfeil, Elster Germany  
Frank Schlingmann, Elster Germany  
Jürgen Wolff, Elster Germany

Articles signed by the author reflect his/her personal opinion.

Page 5: ©iStockphoto.com/pagadesign  
Page 17: ©iStockphoto.com/aleksandarvelasevic

#### Publishing dates:

Three editions for the year 2011

# High tech from Elster protected by patent: Q.Sonic<sup>®</sup>plus – the next generation

For over 15 years, the name Q.Sonic has been synonymous with high-precision ultrasonic gas meters which are used for the calibrated measurement of natural gas. More than 6000 of these high-tech gas meters are now in use around the world.

Q.Sonic is also intrinsically linked to a unique arrangement of ultrasonic measurement paths, a combination of two double reflection paths (swirl paths) and one to three single reflection paths (axial paths) which only Elster-Instromet is able to provide in this form.

The new Q.Sonic<sup>plus</sup> now continues this tradition. Based on the long-term positive experience with reflection path technology, we have once again chosen a clever path arrangement which works with four double and two single reflection paths. A thorough analysis of the previous Q.Sonic model showed that there were several areas with potential for improvement, for example by making the arrangement symmetrical. This made it necessary to use two additional double reflection paths, whereby the paths are now arranged in pairs, each pair on one level, creating a

completely symmetrical structure. Elster-Instromet has once again been awarded a patent for this path configuration and is therefore the only supplier in the world that provides this path arrangement.

Despite these additional paths, the aim was to achieve an optimum housing length. For this reason, the designers redeveloped the ultrasonic transducers and their mounting plate. All nominal meter sizes up to ANSI 600 can now be supplied with a design length of  $3 \times D$ . The new transducers with the type designation NG are much smaller and also feature an intrinsically safe design. As before, the new mounting plate allows the transducers to be replaced without depressurizing the whole system. We can also supply a newly developed assembly tool for this purpose.

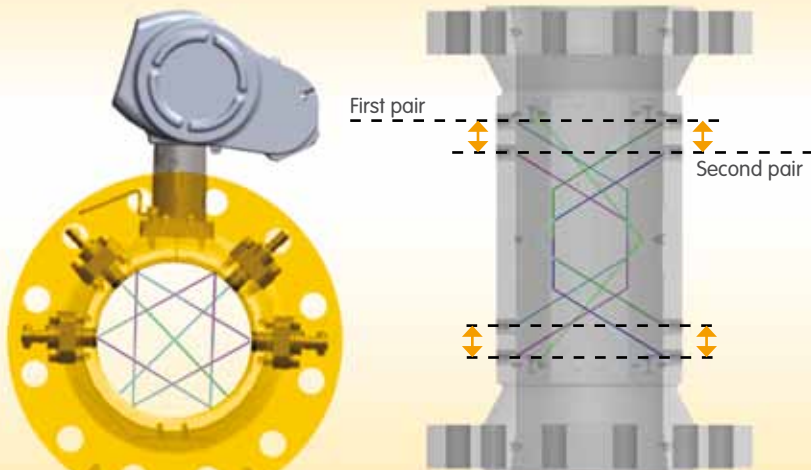


Transducer with mounting plate

Another innovation of the Q.Sonic<sup>plus</sup> is that it can be equipped with a pressure and temperature measurement function. This means that the device measures both the gas pressure and temperature of the measuring tube. On the one hand, these measurements allow for a more accurate calculation of the Reynolds number for a flow profile analysis and on the other, they can be used to correct the housing diameter. This is useful if the process conditions differ massively from the conditions during the calibration process since both high pressure and high temperatures result in an increase in the tube cross-section. This can, in fact, produce an additional measurement error if it is not taken into account.

Probably the biggest change compared to the previous model is the electronics unit. This features a completely redeveloped modular hardware and software platform, which will be used in many Elster-Instromet devices in the future and also provides plenty of reserve to meet future requirements. The operating system used in the device, Integrity from Green Hills, is regarded as one of the most secure systems in the world and for this reason, it is also used in the aircraft industry. The application

### Advantages of the new path arrangement



The mean value of both pairs gives a symmetrically weighted measurement.

software which runs on it allows the strict separation of the fiscal from the operational function and therefore permits the range of functions to be extended without additional approvals being required as long as the fiscal modules are not affected. This means that new customer requirements relating to diagnostics, archiving or data communications, for example, can be satisfied with considerable ease.



Electronics housing with display

The modular hardware design with a free slot is also prepared to tackle future requirements. The first expansion cards, for example for connecting external pressure and temperature sensors so as to integrate a volume correction function in the ultrasonic gas meter, are already being developed.

The electronics are located in a pressure-tight enclosed housing (Ex-d) with a separate connection panel. Despite the selected protection class, it has nevertheless been possible to design the system with a full graphics display with touch screen function. This features contact-sensitive sensors located under a pane of glass which is more than 10 millimetres thick. This means that all the data which the Q.Sonicplus supplies can be retrieved without requiring any other equipment.

For data transfer, the connection panel includes two serial interfaces (RS 232 full duplex/RS 485 half duplex), which can be configured by software, as well as an Ethernet connection. It also contains two frequency outputs and two pairs of terminals, which can be used as digital or analogue outputs.

A VDSL (very high speed digital subscriber line) modem can also be installed on

request. When combined with a VDSL modem at the opposite end, this allows simple two-wire screened cables to be used for high-speed data transfer over distances of up to four kilometres. This option is becoming increasingly important for handling large volumes of data and large distances between the metering point and the control room since an Ethernet connection is restricted to a length of just a few hundred metres while serial connections are not designed for transferring large volumes of data. The internal memory of the Q.Sonicplus can be up to 16 gigabytes in size.

There is a USB port under the side cover for parameterizing and reading the archive data. However, the Ethernet interface in the connection panel

can also be used for this purpose.

Some changes have also been made to the meter housing. The use of intrinsically safe ultrasonic transducers means that there is no longer any need for complicated connection boxes. The cover now consists

of two stainless steel shells which, in addition to design aspects, are mainly provided to protect the cable connections.

In addition, we have standardized the internal diameter of the measuring tubes for nominal sizes up to 16" (DN 400). There are now two diameters to choose from for each nominal size. The diameter is adjusted to the required diameter in the inlet and outlet sections by means of a taper which is designed to ensure that it does not adversely affect the measurement accuracy. For larger nominal sizes, Elster-Instromet will continue to supply the meters on the basis of the required internal diameter.

The development of the Q.Sonicplus has now entered its final stage, production preparation. Once all the required basic licensing procedures for MID, ATEX, IECEx, FM and CSA have been completed, the new ultrasonic gas meters will be available for delivery as from the second quarter of 2012.

If you would like to arrange an appointment with our experts, we will be delighted to demonstrate the finer points of this high-tech ultrasonic gas meter to you. Then you can see for yourself what this modern concept offers and how it can protect your investment for the future.

Jürgen Wolff

[juegen.wolff@elster.com](mailto:juegen.wolff@elster.com)

| Housing type                  | Meter size |          | Flanged connection |             | Internal diameter [m] | Flow rate [m³/h] |                  |
|-------------------------------|------------|----------|--------------------|-------------|-----------------------|------------------|------------------|
|                               | inch       | DN       | ANSI schedule      | DIN         |                       | Q <sub>min</sub> | Q <sub>max</sub> |
| Fixed internal diameters      | 4          | 100      | STD - XS           | 2633 - 2635 | 0.097                 | 13               | 1,100            |
|                               |            |          | XS - 100           |             | 0.090                 | 11               | 1,000            |
|                               | 6          | 150      | STD - XS           | 2633 - 2635 | 0.146                 | 18               | 2,200            |
|                               |            |          | XS - 120           |             | 0.139                 | 16               | 2,000            |
|                               | 8          | 200      | STD - XS           | 2632 - 2635 | 0.190                 | 30               | 4,000            |
|                               |            |          | XS - 120           |             | 0.180                 | 27               | 3,500            |
|                               | 10         | 250      | STD - 80           | 2632 - 2635 | 0.240                 | 48               | 6,000            |
| 80 - 120                      |            |          | 0.230              |             | 44                    | 5,500            |                  |
| 12                            | 300        | 30 - 60  | 2632 - 2635        | 0.295       | 73                    | 8,500            |                  |
|                               |            | 60 - 100 |                    | 0.280       | 66                    | 8,000            |                  |
| 14                            | 350        | 30 - 60  | 2632 - 2635        | 0.325       | 85                    | 10,000           |                  |
|                               |            | 60 - 100 |                    | 0.305       | 75                    | 9,000            |                  |
| 16                            | 400        | 30 - 60  | 2632 - 2635        | 0.370       | 115                   | 13,000           |                  |
|                               |            | 60 - 100 |                    | 0.350       | 100                   | 11,500           |                  |
| Selectable internal diameters | 18         | 450      | STD                | N/A         | 0.4413                | 160              | 18,000           |
|                               |            |          | 120                |             | 0.3873                | 120              | 14,000           |
|                               | 20         | 500      | STD                | 2632        | 0.4889                | 200              | 21,000           |
|                               |            |          | 120                |             | 0.4318                | 158              | 16,000           |
|                               | 24         | 600      | STD                | 2632        | 0.5905                | 290              | 29,600           |
|                               |            |          | 120                |             | 0.5318                | 230              | 24,000           |
|                               | 26         | 650      | STD                | N/A         | 0.6223                | 320              | 33,000           |
|                               |            |          | 120                |             | 0.5715                | 277              | 28,000           |
|                               | 30         | 750      | STD                | N/A         | 0.7366                | 460              | 46,000           |
|                               |            |          | 120                |             | 0.6604                | 360              | 37,000           |
|                               | 36         | 900      | STD                | 2632        | 0.8890                | 670              | 67,000           |
| 120                           |            |          | 0.7874             |             | 526                   | 53,000           |                  |
| 42                            | 1050       | STD      | N/A                | 1.0414      | 910                   | 83,000           |                  |
|                               |            | 120      |                    | 0.9398      | 740                   | 68,000           |                  |
| 48                            | 1200       | STD      | 2632               | 1.1938      | 1,200                 | 110,000          |                  |
|                               |            | 120      |                    | 1.0922      | 1,012                 | 92,000           |                  |
| 56                            | 1400       | STD      | 2632               | 1.3970      | 1,650                 | 150,000          |                  |
|                               |            | 120      |                    | 1.3716      | 1,590                 | 144,000          |                  |

A look into the future:

## Sonic Explorer – a smart software assistant for ultrasonic gas meters

As technology marches forward, it is only natural that measurement instrumentation continues to evolve into smarter semiautonomous devices. Who would have thought 20 years ago that a car could advise you to apply the brakes if an obstacle becomes too close when you are drowsy or falling asleep, or even park itself in a tight parking spot. These features are the work of clever software and hardware developers who continue to push the envelope of artificial intelligence.

In today's high-tech world, even an ultrasonic transit time flow meter cannot escape progress. In the gas custody transfer measurement world, the ultimate quest is to know that the measurement device is healthy and is operating within established and acceptable accuracy limits, even under the influence of varying process conditions. Any time the custody of a commodity such as natural gas changes hands, the billing or measurement of it must comply with applicable rules and regulations. To achieve a respected level of measurement accuracy, it is only natural that an ultrasonic custody transfer flow meter is first calibrated at an established and accredited flow calibration facility. The only downside of a calibration facility is that it is not the real world.

In principle, the calibration facility and its equipment enjoy well defined and monitored process conditions. In other words, the calibration facility is as ideal as it can get in the real world. The moment a calibration is finished and the measurement device is transported and installed at a metering facility, slowly but immediately the flow meter begins its inevitable change from the ideal conditions seen at the calibration lab. Even in pipeline-quality natural gas, erroneous foreign materials can be found and are transported with the flow. Over time, some of these materials form deposits on the flow metering device, beginning ever so slightly to compromise its calibration status that was verified at the laboratory.

It is the quest of the user to have tools to be able to assess the health and performance of the flow metering device with the least amount of physical effort. Removing the flow meter for visual inspection, which is time-consuming, costly and non-productive for the business, should no longer be required for instance. Sonic Explorer is just such a tool that allows the user to ascertain the health and performance of their device in situ, enabling them to make informed decisions about maintenance or other tasks related to the ultrasonic flow meter.

Sonic Explorer operates on three levels of man-machine interaction. The Start

window (Fig. 1) is a simple graphic user interface that shows the most vital measurement results and a pictorial of the meter body with a traffic light indication. Even for a non ultrasonic meter expert, the indication is simple and concise. If the traffic light indication is green, all is good and the meter is working within all prescribed limits. If the indication is amber, the meter is entering a warning state, where some



Fig. 1



## Rotary gas meters: the complete product family

# A comprehensive range from a single source – make your choice!

Be it aluminium or cast housing, low-pressure or high-pressure application, complying with standard requirements or master meter requirements – the diversity of our rotary gas meters leaves nothing to be desired.

Nineteen years is a long time, but we love to remember our first consignments of rotary gas meters in 1992.

Starting with just 100 meters in the year in which they were first marketed, the success story ran its course. Since then, demand has increased permanently so that we can now look back on more than one quarter of a million rotary gas meters delivered. The variety of different meter types and their equipment have also increased constantly as the years have gone by, so that the customer can choose from a complete product range from our company.

The product family offers sizes ranging from G16 DN 25 to G1000 DN 200 allowing for requirements related to the market,

starting with the compact RVG-ST G16 (Fig. 1), either threaded or flanged, through to the pulsation-free IRM-3 DUO G1000 with two pairs of pistons (Fig. 2). In-between, there are a number of different meter types, such as the RVG with cast housing (Fig. 3) for complying with the HTB requirements in Germany, or the IRM-HP made of steel for high-pressure applications up to 100 bar (Fig. 4).

Today, 19 years after launching the first rotary gas meters, both purchase price and maintenance costs are increasingly the focus of decisions to buy.

In addition, it is expected more and more frequently that the meter allows for a universal installation position in order to save on meter variants in the material store of utility companies.

Of course, we endeavour to meet these current market and product requirements as well and consequently are working on developing a new, attractive generation of rotary gas meters whose market launch is planned for the second half of 2012.

So the suspense continues with the rotary gas meters from Elster-Instromet. We are already able to tell you this much so far: the new generation will have a far larger measuring chamber volume, for instance, and thus a lower pressure loss.

We will report on this in detail in the next customer magazine.

Patrick Keiffer

[patrick.keiffer@elster.com](mailto:patrick.keiffer@elster.com)

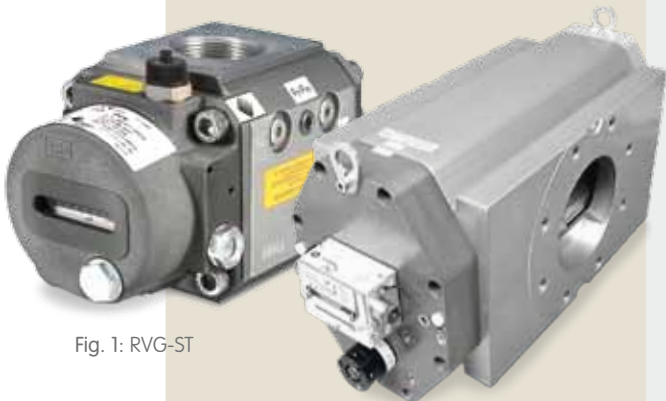


Fig. 1: RVG-ST

Fig. 2: IRM-3 DUO



Fig. 3: RVG GGG

Fig. 4: IRM-HP

## EnCal 3000 with enhanced features:

# 1 + 1 = Quad

The gas industry is undergoing change and thus new requirements are being placed on gas measurement, particularly on gas quality analysis. The new EnCal 3000 Quad from Elster addresses these increased analytical challenges.

The global energy industry is facing growth and change at the same time, driven by economically developing regions and the energy policy to reduce CO<sub>2</sub> emissions. These trends mean challenges, but also chances for the gas industry that is well-prepared for both – the growth and the change.

On the one hand, new natural gas resources have been found over the past few years in the form of unconventional deposits such as shale gas. On the other hand, the gas industry is compatible with new alternative energy sources such as biogas, syngas and so-called e-gas, which is produced by electrolysis using electricity generated from renewable sources of energy and which can be fed back into the gas grid. The gas industry thus presents promising bridge and target technologies. These concepts all require appropriate gas measuring equipment for the management and billing of future energy flows. In this, innovative gas quality analysis solutions are the key to turning the change into a real opportunity for gas measuring technology.

### Standard and extended tasks of gas quality analysis

Gas trading is based on energy billing. Hence the primary task of gas quality analysis is the determination of the calorific value and gas properties to calculate the gas compressibility. These measurements can be provided by gas analysis with a standard gas chromatograph comprising the components N<sub>2</sub>, CO<sub>2</sub> and

the hydrocarbons ranging from methane to C<sub>6+</sub>, which means the sum of hexane and higher hydrocarbons.

Besides these key gas parameters, other measurement tasks are required relating to individual substances and properties such as oxygen (O<sub>2</sub>), hydrogen (H<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), sulphur, particularly H<sub>2</sub>S, odorants and also the dewpoints of water and hydrocarbons which indicate the amount of these substances present in the gas. The water content is critical for the integrity of the whole transportation process, especially in terms of damage to instrumentation and pipeline corrosion. Hydrocarbon condensate is also critical for pipeline instrumentation and especially for various gas utilization processes.

The changes in the gas industry mean new gas types, e.g. shale gas, biogas, e-gas, are now being introduced, with new gas components and properties that need to be analyzed. Growing international gas trade requires standardization of a wide variety of gas quality parameters. One of the institutions dedicated to standardization work is EASEE-gas, the European Association for the Streamlining of Energy Exchange ([www.easee-gas.org/](http://www.easee-gas.org/)). It develops common business practices, e.g. for gas quality (CBP 2005-001-02 Gas Quality Harmonisation). These business practices can be referred to in gas trading contracts. However, there are also national standards for gas quality specification, e.g. DVGW G 260 or G 262 in Germany.



In order to serve the growing demand for extended gas quality analysis, Elster is presenting its new high performance field gas chromatograph EnCal 3000 Quad. This device comprises two standard EnCal 3000 housings with 4 gas chromatography modules in total, hence the attribute "Quad". The EnCal 3000 Quad provides a wide variety of applications ranging from standard C<sub>6+</sub> analysis to C<sub>9</sub> or C<sub>12</sub> analysis with corresponding hydrocarbon dewpoint calculation in addition to the measurement of various individual gas components.

### EnCal 3000 Quad: device and applications

The standard version of the EnCal 3000 is a gas chromatograph that uses so-called "parallel injection". This means that the GC contains two injectors, two analytical columns and two detectors. At the start of

The EnCal 3000 Quad consists of two coupled Ex-d housings with a maximum of 4 analytical GC channels.



each analysis run, the sample gas is injected simultaneously into the two columns, each of which is optimized and configured to measure different components of the sample gas. The information from both measurements is then combined to give a single analysis result.

Technically, the EnCal 3000 Quad is a combination of two EnCal 3000 gas chromatographs. GC A is considered to be the main GC and is the intelligent one of the

Furthermore, the complexity of the whole measurement system is reduced as compared to two individual units because connection to the measuring periphery is provided by a single interface.

The days when the heating value of natural gas was the only parameter of interest when it comes to gas quality are a thing of the past. More and more parameters such as oxygen, hydrogen, H<sub>2</sub>S, odorants, as well as the water and hydrocarbon

not be neglected in the calculation. To increase the accuracy of the hydrocarbon dewpoint calculation, these components must be measured as well. The EnCal 3000 Quad enables analyses all the way up to C12 within just 4 minutes. As with the hydrocarbon dewpoint analysis up to C9, the calculation is performed by the EnCal 3000 control unit.

The main GC of the EnCal 3000 Quad will measure hydrocarbons up to C8. A third

**EnCal3000 Quad in a biogas grid injection plant**

**Fiscal gas quality analysis**

- C1-C4 (methane up to butanes)
- N<sub>2</sub>
- CO<sub>2</sub>
- O<sub>2</sub>
- H<sub>2</sub>S
- H<sub>2</sub>
- THT

**Odorization**

Fully automated, flow controlled THT odorization

**Fiscal flow metering**

- Rotary meter
- Recirculation of off-spec gas
- Pressure reduction
- Entry point for odorization
- Entry point for propane blending

**Control system**

- Flow computer
- Panel PC for displaying process parameters
- Gas quality checking
- Remote reading/operation

two. It serves as the interface for communication and performs all the internal calculations. GC B contains one or two analytical channels and the corresponding power supply unit. The data of the channels from GC B are transferred to the processor board in unit A where all measurement results are compiled into one.

By developing the EnCal 3000 Quad, we are offering more than just the sum of two EnCal 3000 units. The analytical results of up to 4 different GC channels (1 channel = injector + column + detector) are combined in a single evaluation, which results in higher accuracy and better repeatability.

dewpoints must be determined. The increasing gas quality variations due to global trade and injection of new gas types, e.g. biogas, mean that gas quality analysis must supply a great deal more analytical information. The EnCal 3000 Quad offers analytical solutions for these new applications.

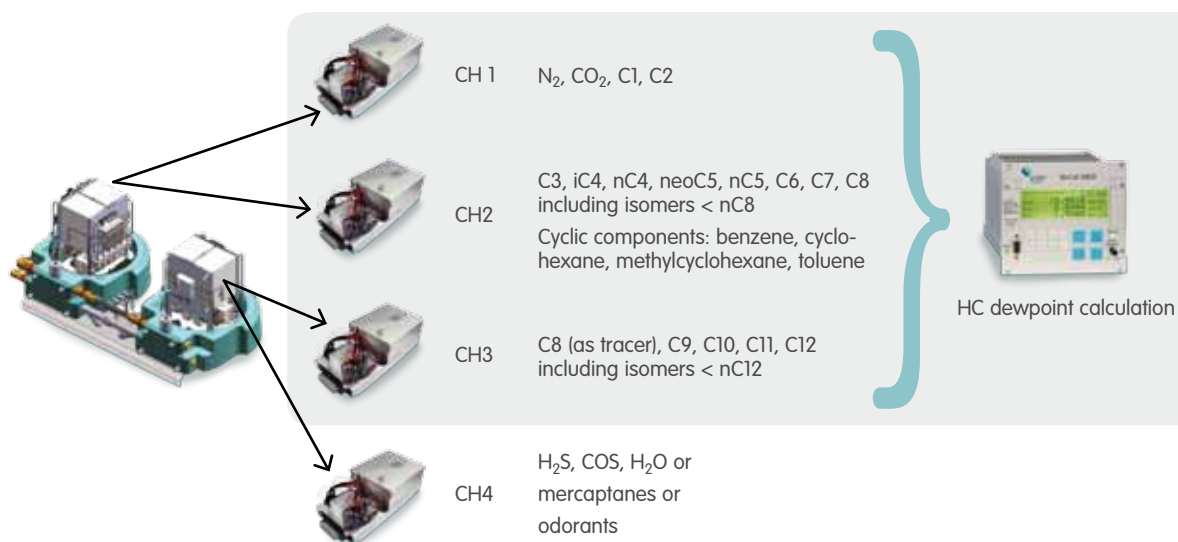
**C12 analysis + hydrocarbon dewpoint calculation**

With the standard EnCal 3000 that analyzes up to C9, it has already been possible to calculate the hydrocarbon dewpoint for some years now. Some gases, however, contain concentrations of higher hydrocarbons such as C10 to C12 that should

channel in the second housing of the Quad is dedicated to the measurement of C9 up to C12. Thanks to the highly sensitive thermal conductivity detector (TCD), it is possible to measure concentrations down to 1 ppm! These are levels that are completely out of reach on the traditional miniature TCDs used in most field-mounted gas chromatographs for fiscal measurement.

The hydrocarbon dewpoint is calculated with an accuracy of approx. 3 degrees, which is similar to the accuracy offered by measuring principles such as manual or automatic cooled-mirror measurement. By using a gas chromatograph, however, much more information can be obtained

### Example of a GC application with C12 analysis, hydrocarbon dewpoint calculation and sulphur measurement



than just the dewpoint. Thanks to the full analysis up to C12, the cause of a change in dewpoint can be determined. If, for example, an increase in the benzene concentration caused the dewpoint to increase, this would be clear from the gas composition report.

In addition, it is possible to calculate the hydrocarbon dewpoint at any desired pressure or at line pressure, provided this pressure is available as an input to the control unit.

Since a fourth channel position in the second housing is still free, this channel can be used for measurement of one or more additional parameters such as H<sub>2</sub>S with a detection limit of 1 ppm.

#### Biogas + H<sub>2</sub>S and odorants

Another application made possible by the EnCal 3000 Quad is the analysis of biogas combined with H<sub>2</sub>S and THT measurement using a highly sensitive detector. One of the components measured by our standard biogas GC based on the EnCal 3000 is hydrogen.

Since the heat conductivity of hydrogen is close to the heat conductivity of helium, hydrogen cannot be measured with the standard carrier gas, helium. By using argon as a second carrier gas, it is possible to quantify low hydrogen concentrations in biogas. H<sub>2</sub>S measurement is required to allow biogas to be injected into the gas grid. Pipeline integrity can be compromised by H<sub>2</sub>S levels exceeding the allowed maximum. Concentrations down to 2 ppm can be detected on the standard biogas GC. For lower concentrations down to 1 ppm, a separate channel in the second GC housing of the EnCal 3000 Quad offers a solution.

The fourth available position can be used for analysis of the odorant THT. Biogas often requires odorization before it can be injected into gas distribution grids. In many cases, it is accepted to base the injected amount on the volume of gas passing the gas flow meter. However, some customers require continuous monitoring of the odorant concentration in order to make sure that it lies within the correct concentration bandwidth. With a dedicated analytical channel, the EnCal 3000 Quad can measure levels of THT down to 2 ppm in natural gas or green gas.

With the EnCal 3000 Quad, chromatography applications that seem too complex to be performed on a single device are now within reach.

Be creative ... and let us know what kind of application you can think of that would solve your analysis problem – it may well be that we can come up with a solution.

Addy Baksteen      addy.baksteen@elster.com  
Dr. Joachim Kastner      joachim.kastner@elster.com

## New: Elster's commercial diaphragm meter measures the standard volume

# Themis<sup>plus</sup> – the Swiss army knife of gas measurement

In the first edition of Profiles this year, we reported on Smart Metering activities in Italy. The final instruction from the regulatory authority has now stated that all gas meters must be read remotely by 2016. Directive ARG155/08 issued for this purpose classifies the gas meters to be converted. Work started on all meters in classes A and B which cover all gas meters from size G65. These meters will be fitted with classical volume conversion devices with a separate or integral communications module.

Work is now starting on the conversion of meter class A1 which covers size G10 to G40 meters. In addition to the gas temperature, the gas pressure must also be measured for these meters. Thus the classic function of a volume conversion device is required to supplement the volume recording function. From a technical point of view, this is not a problem – but from a commercial point of view, this has not yet been feasible.

But Elster has now come up with a solution to this, namely Themis<sup>plus</sup> – the first industrial and commercial diaphragm gas meter in the world which directly measures and displays the standard volume and sends the data for billing every day using an integral GPRS modem.

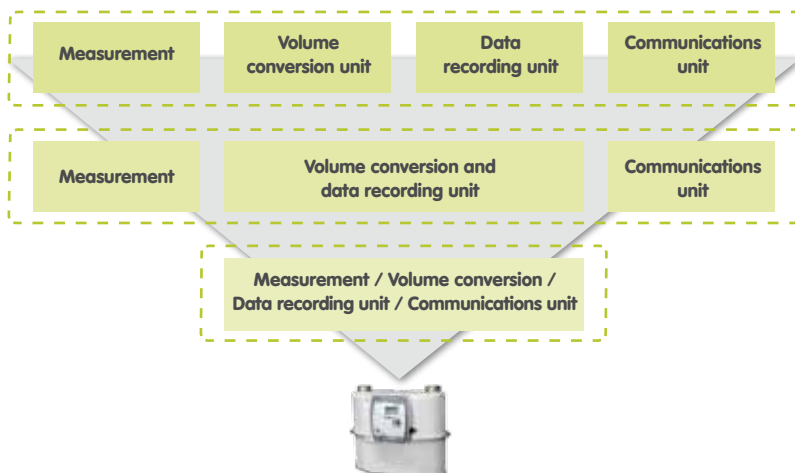
Directive ARG155/08 defines a measurement system which comprises the components of a volume meter, volume conversion device, data logger and communications unit. At the same time, the Directive deliberately allows for the possibility of combining individual or all components and functions in one or several devices. The Themis<sup>plus</sup> gas meter makes full use of this design freedom and also integrates the communications unit into the meter (Fig. 2). This means that the device measures the standard volume, saves the data according to various tariffs and supplies the data to an MDMS once per day. This transfer is done using a GPRS modem.

Directive ARG155/08 defines a measurement system which comprises the components of a volume meter, volume conversion device, data logger and communications unit.



Fig. 1: Themis<sup>plus</sup> – the new generation of diaphragm gas meters

Fig. 2: ARG155/08 – Definition of a measurement system



### The concept

Themis<sup>plus</sup> is the logical development of the Themis<sup>alpha</sup> diaphragm gas meter which features an electronic index. The electronic index is equipped with a graphics display and a ready-to-activate flexible data logging and tariff function, as well as a communications module. This provided an ideal basis for satisfying the ambitious requirements of the Italian regulatory authority in a single device. Special mention should be made in this respect of the modular design of the electronic index. The communications module

Fig. 3: The modularity of the electronic index



and metrological unit are kept completely separate. Both the communications module and the batteries can be replaced if necessary, even while the meter is in operation (Fig. 3).

**Metrological approval**

The gas meter features a temperature sensor and a pressure sensor to determine the gas pressure and temperature values required for volume conversion. The sensors are connected to the main circuit board of the electronic index via a patented gas-tight grommet, which is naturally fire-resistant (HTB) up to 0.1 bar according to EN 1359. The volume is recorded by Hall sensors. This information allows the meter to determine the standard volume which is then displayed. With reference to the international Measuring Instruments Directive (OIML R137, Parts 1 and 2 – Chapter 5.3.5), the measuring instrument has been submitted for MID approval as a meter which measures and displays the standard volume, whereby the volume measurement and volume conversion functions are metrologically combined and are not assessed separately. Consequently, the meter in the field is regarded as such and the regular inspections normally required for volume conversion devices can be dispensed with. This is a massive advantage which results in drastic reductions both in the purchase and commissioning costs and also the operating costs of the meter over its service life. This is guaranteed by the use of high-precision digital high-resolution sensors which demonstrated the required long-term stability in the tests stipulated by EN 1359 with ease (Fig. 4).

**Explosion-protection approval**

The meter Themis<sup>plus</sup> has ATEX approval for installation and use in Zone 1. There are therefore no restrictions on the use of the meter even in difficult ambient conditions.

**Display and operation**

The meter's user interface is a clearly structured dot matrix graphics display with three user keys. The display is activated by pressing any key and is illuminated. This means that the meter reading and other information can be taken even in poor light conditions. In addition to the current meter reading for the standard volume and the current tariff, consumption during

the various tariff periods under the Italian regulations set out in UNI TS 12191-5 can also be displayed. Operation of the meter using the keys is explained on the display which means that no user manual is required (Fig. 5).

**Data communication**

For local communication (e.g. commissioning or maintenance), the meter index provides an optical interface in accordance with IEC 62056-21. Data communication to a headend system is ensured by a battery-operated GPRS modem. The antenna is fully integrated in the housing. If the reception level at the metering site is not sufficient, an external antenna can be used.

The readout session is initiated by the device which logs on to the GPRS network and then connects to a head end. After reading the requested data, the modem is set back to low-power mode immediately. This is the most energy-efficient communications mode. The device may also be parameterized by the headend system, allowing for remote configuration of tariff programs and installation settings. Data communication is based on the DLMS/COSEM specification. The possibility of remote firmware upgrade in accordance with WELMEC Guide 7.2 guarantees future-proof functionality following installation.

**Data security and privacy**

The meter Themis<sup>plus</sup> forms part of a system and offers end-to-end security

Fig. 4: Results of the rapid ageing test of the pressure sensor

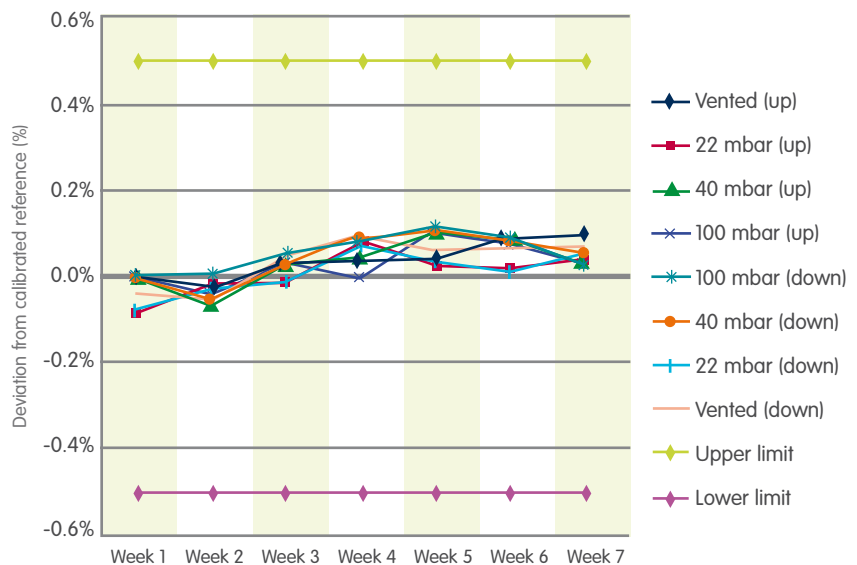
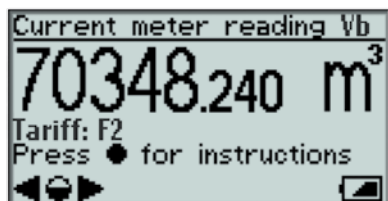
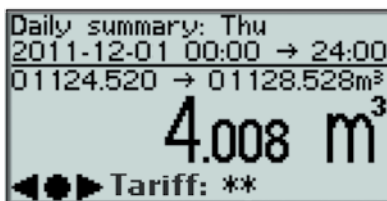


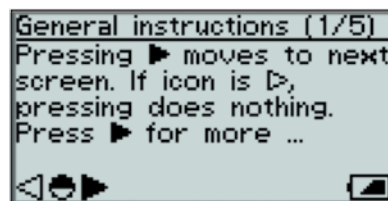
Fig. 5: Display – self-explanatory user interface (examples)



**Basic default display** showing the current meter reading Vb and the active tariff



**Daily summary:** this screen shows the date and time range for a single day



**Instructions** which explain the principles of navigating the user interface

by utilizing the latest industry standards given by the security suite of the DLMS Companion Specification to DLMS/COSEM. Data encryption is based on the Advanced Encryption Standard (AES-128) using the Galois/Counter Mode (GCM). In addition, Themis<sup>plus</sup> supports message authentication and key wrapping. This method also ensures that there is a suitable level of privacy and thus offers excellent protection against fraud or tampering.

#### Power supply

In the electronic index, the metering electronics (including data archiving) and the GPRS modem are powered by separate batteries. This guarantees functioning of the meter at all times, with or without modem operation. The host battery ensures a service life of at least 15 years. The service life of the battery for operating

the GPRS modem depends on the mode of operation, the frequency of data transmission and the reception field strength at the metering point. Assuming daily readout and a standard reception level, a battery life of at least 5 years is possible.

#### Future-proof investment

Elster diaphragm gas meters stand for measurement accuracy, reliability and long-term stability. With the modular electronic index, the well established and proven measuring principle will be supplemented by these functionalities which comply with today's and tomorrow's requirements.

The possibility of remote firmware upgrade and the exchangeable communications module ensure the meter can be upgraded in the event of new regulations or when

new technologies for data communication become available or necessary.

Whenever new developments are made, planning does not stop at local requirements. In view of this, we are quite sure that the Themis<sup>plus</sup> and other developments based on the electronic index will also prove very interesting for other markets.

All in all, Themis<sup>plus</sup> is a new generation of gas meters, which guarantees a future-proof investment and reduces the total cost of ownership ... and in our point of view, these benefits are not limited to Italy alone.

Rüdiger Pfeil  
Carsten Lorenz

ruediger.pfeil@elster.com  
carsten.lorenz@elster.com

Events not to be missed:

**E-world, Essen, Germany, 7 – 9 February 2012**

International trade fair on Smart Metering,  
[www.e-world-2012.com](http://www.e-world-2012.com)

**IFAT Entsorga, international trade fair, Munich, 7 – 11 May 2012**

World's leading trade fair for water, sewage,  
waste and raw materials management, [www.ifat.de](http://www.ifat.de)

We would be very happy to see you there!

# Elster and the project

## International cooperation

Smart Metering has generally been somewhat disregarded by the gas sector in contrast to the electricity sector. However, as gas consumes more primary energy than electricity, the potential savings, both in terms of energy and finances, are considerably higher in the gas sector.

The development of Smart Metering solutions for the gas sector is being spurred on by both this situation and the fact that throughout Europe, certain gas grid operators are affected by national plans to install smart gas meters.

In this context, the so-called ME<sup>3</sup>GAS project was one of the winners of the ARTEMIS Joint Undertaking (JU) Call 2009.

In general, the European Union has recognized the importance of "Embedded Systems" in almost all areas of life. Through the ARTEMIS JU, important strategic research projects are being implemented in the field of "Embedded Systems" and are being financially supported by industry, research organizations, participating Member States and the European Commission. The aim of ARTEMIS is to develop Europe's leading market position in the field of "Embedded Systems". In this regard, worthwhile projects are supported.

The duration of the ME<sup>3</sup>GAS project is to be 3 years in total and its final goal is to integrate gas meters with extended functions in a communications network based on home automation. The energy efficiency of households should thus be improved in accordance with European Directives. Thanks to the availability of real-time information on their energy consumption, the end users should be able to efficiently save energy on their own.

The project team is composed of a consortium of 15 partners including grid operators, research institutes and manufacturers such as Elster (Fig. 1). This combination has been chosen deliberately to ensure the quality of results and to develop products which are tailored to meet market requirements. The members of this consortium are from different European countries and can make use of a broad knowledge base in their field of expertise.

At the same time, the European Union has been pushing for the deployment of Smart Metering systems within the framework of the Internal Energy Market Package, including systems for gas. This Directive requests that the Member States prepare a study of costs and benefits, and put forward a proposal for the implementation of Automated Meter Management (AMM) in the residential sector. This analysis should be finished before September 2012.

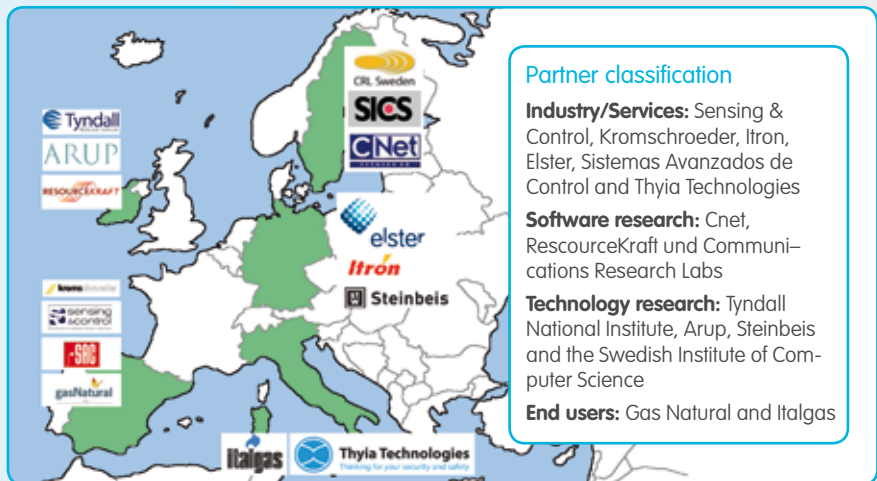


Fig. 1: ME<sup>3</sup>GAS consortium

Over the last few years, the European Union (and therefore the Member States) have been promoting and regulating the introduction of energy-efficient systems. One of the main objectives of the EU regulations is to provide accurate information to the customers in order to make them aware of their energy consumption. A key Directive in this context is 2006/32/EC on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.

Beyond this, some countries like Italy and the UK have already regulated the deployment of Smart Metering systems for residential gas meters. Many other countries are already on their way to following this example.

Nevertheless, there is a lack of standards for Smart Metering systems that is slowing down the roll-out of these systems. The EU is also investing important efforts in this respect through Mandate 441 that

requires the European Standards Organizations (ESOs), CEN, CENELEC and ETSI, to develop a European standard to enable interoperability of utility meters (water, gas, electricity and heat). The development of new meters with open architectures is thus to be promoted and standardized, enabling efficient roll-out. The ME<sup>3</sup>GAS project will take all of these measures into account.

- viewing the actual consumption
- remote disconnection of the gas supply
- detecting malfunctions
- alarms
- tariff systems

The system comprises the following components: smart gas meters, data concentrators, in-home displays, a meter data management system and the corporate

the specification and development of both hardware and software components as well as of corresponding communications protocols. Timely gas consumption information at every level – from the end customer to the service provider – is to be recorded, forwarded and processed.

ME<sup>3</sup>GAS is an ambitious project aiming to make energy efficiency possible for private and commercial consumers and is thus the answer to the demands imposed by the existing European regulations since it provides:

- precise and safe gas distribution
- improvement of the overall energy efficiency
- availability of energy-oriented services to customers

In this context, it is important to point out the contribution of the ME<sup>3</sup>GAS partners to the standardization work currently being carried out in Europe. This standardization process is crucial to facilitating the deployment of Smart Metering systems across Europe as a key tool for improving energy efficiency.

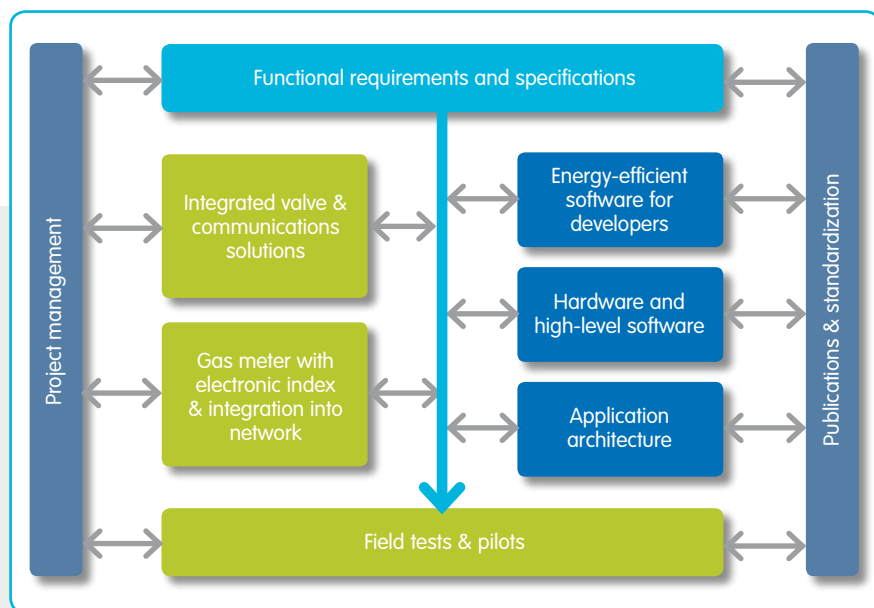


Fig. 2: ME<sup>3</sup>GAS work packages

The ME<sup>3</sup>GAS project aims to rationalize and optimize gas consumption in households and commercial buildings without compromising comfort or convenience. The ME<sup>3</sup>GAS work plan is divided into nine different work packages with a total project duration of three years. In addition to large energy utilities such as Italgas and Gas Natural, the ME<sup>3</sup>GAS consortium includes partners from technology research companies like the Steinbeis Innovation Centre, software developers e.g. Resource-Kraft, and leading metering technology companies such as Elster and Itron (Fig. 1). The individual work packages (Fig. 2) are headed by different consortium partners. Here, Elster is responsible for the development and integration of gas meters with electronic index and enhanced functions.

The desired results of the ME<sup>3</sup>GAS project consist in the specification, development, validation and roll-out of a Smart Gas Metering System. This will be responsible for managing and controlling the "smart" meters, allowing for remote meter reading and new functions such as:

information system of the utility company (Fig. 3). The aim is to develop a new generation of gas meters for smart gas metering, based on embedded electronics, communications and the remote control of an integrated valve. This includes

Further information can be found at: [www.me3gas.eu](http://www.me3gas.eu)

Klaus Landwehr klaus.landwehr@elster.com

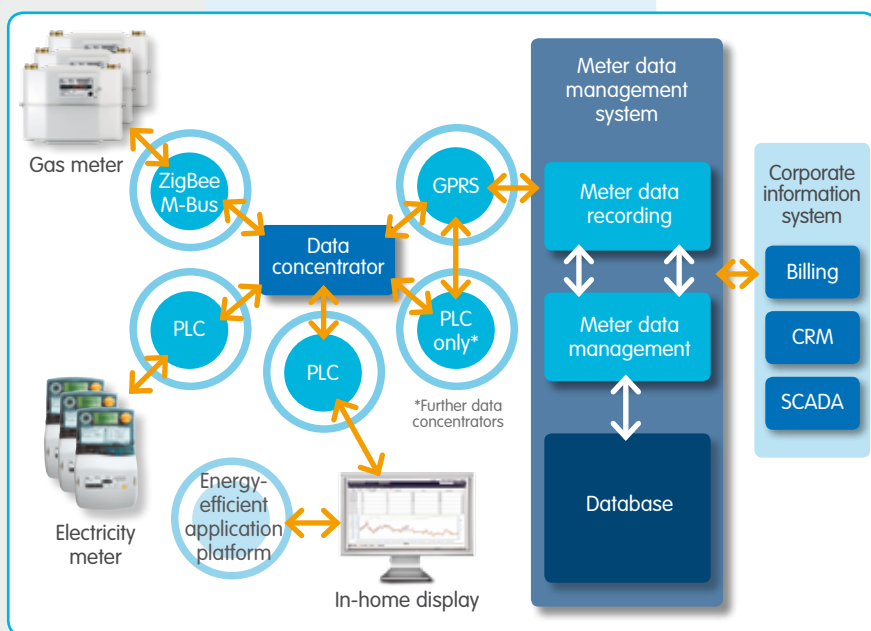


Fig. 3: Smart Metering system architecture

MR goes high pressure:

# MR HP20 high-pressure regulators – the sequel

The high-pressure regulator MR HP20 was launched at the beginning of this year. The MR HP20 is supplied with measuring unit MW 400 in the nominal size of DN 50. Early 2012 will see the introduction of nominal sizes DN 80 and DN 100 with the measuring units MW 300 and MW 500.

The device series will thus be considerably extended in the higher capacity range and the outlet pressure range will be increased to up to 2 bar. The Accuracy Class varies between AC 10 and AC 2.5, depending on the outlet pressure (Fig. 1).

In addition, within the scope of an expansion of approval, the trip pressure range of the safety shut-off valve has been increased. Thanks to different measuring unit sizes – L100, L50 and H50 – the upper trip pressure range is extended to 50 mbar – 5000 mbar and the lower trip pressure range to 10 – 2500 mbar.



Fig. 1: Accuracy Classes

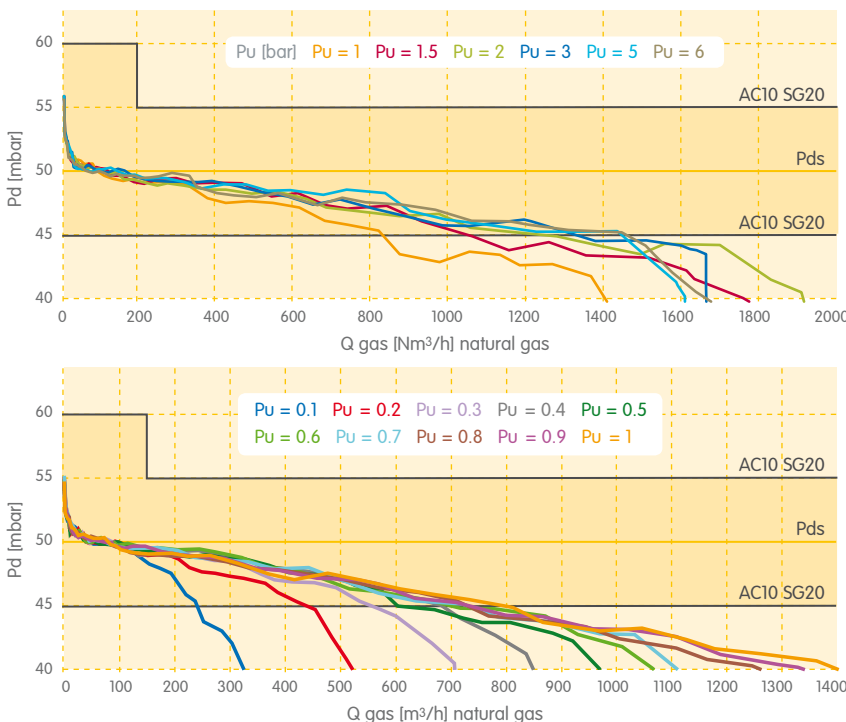
| DN      | Measuring unit | Outlet pressure range (Wd) | Accuracy Class    | Lock-up pressure class |
|---------|----------------|----------------------------|-------------------|------------------------|
| 50      | MW 400         | 20 – 700                   | AC 10/AC 5/AC 2.5 | SG 20/SG 10/SG 5       |
|         | MW 300         | 300 – 2000                 | AC 2.5            | SG 5                   |
| 80, 100 | MW 500         | 20 – 400                   | AC 10/AC 5/AC 2.5 | SG 20/SG 10/SG 5       |
|         | MW 400         | 200 – 700                  | AC 10/AC 5        | SG 20/SG 10            |
|         | MW 300         | 600 – 2000                 | AC 2.5            | SG 5                   |

| Pd          | AC  | SG |
|-------------|-----|----|
| 20 – 100    | 10  | 20 |
| >100 – 300  | 5   | 10 |
| >300 – 2000 | 2.5 | 5  |

All specifications in mbar

Fig. 2: Characteristic curves of the MR HP20-50



All of the devices are available with connection flanges of pressure ratings PN 16, PN 25, PN 40 and ANSI 150. Further installation lengths are available on request, making the series an attractive option as replacement units for existing systems.

Thanks to the additional nominal diameters, the maximum capacity of the system is increased to a flow rate coefficient of 4500 for nominal size DN 100.

### MR HP20 for medium pressure

The MR HP series features a large valve cross-section and excellent inlet pressure compensation, whereby high capacities are available even at the lower end of the inlet pressure range. The DN 50 device thus reaches capacities of around 1000 Nm³/h of natural gas at inlet pressures between 1 and 2 bar. The MR HP series is thus also an extremely suitable way of extending the capacity of the existing MR series (Fig. 2).

For the additional nominal diameters, the user-friendly and maintenance-friendly concept has been continued. Thanks to the uniform design, the effort and expenses for staff training and device maintenance is also reduced due to the range of different nominal sizes.

The corresponding spare parts kits are available for regular maintenance pursuant to G 495. The spare parts kits are composed in a modular way, just like the devices which have a modular design (Fig. 3).

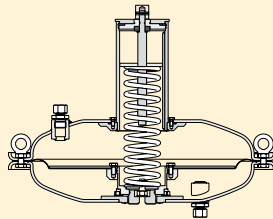
Thus there is one kit each for the various measuring units and the corresponding

**Most important technical data of the MR HP20 series:**

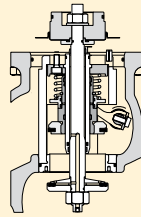
|                        |                     |
|------------------------|---------------------|
| Pressure rating:       | PN 20 IS            |
| Nominal diameter:      | DN 50, 80, 100      |
| Flow rate coefficient  |                     |
| DN 50:                 | 1400                |
| DN 80:                 | 3600                |
| DN 100:                | 4500                |
| Inlet pressure:        | 0.1 – 20 bar        |
| Outlet pressure range: | 20 – 2000 mbar      |
| Accuracy Classes:      | AC 2.5; AC 5; AC 10 |
| SSV set range OPSO:    | 45 – 5000 mbar      |
| SSV set range UPSO:    | 10 – 2500 mbar      |

**Fig. 3: Spare parts kits for measuring units, valves and safety control unit SCU**

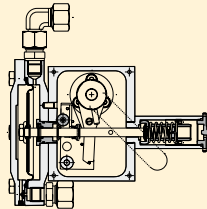
- 73021572** Spare parts kit MR HP, measuring unit 300
- 73020791** Spare parts kit MR HP, measuring unit 400
- 73021573** Spare parts kit MR HP, measuring unit 500



- 73020790** Spare parts kit MR HP, valve DN 50
- 73021574** Spare parts kit MR HP, valve DN 80/100



- 73020789** Spare parts kit MR HP, SCU, L100/L50/H50



valves, and one kit for the SSV. In this way, it is possible to manage with six different spare parts kits instead of 24 kits for the various device configurations. This simplifies spare parts ordering in the warehouse and also reduces the capital commitment. Even if only partial maintenance is to be carried out, e.g. on the valve, it is not necessary to procure the entire parts kit – making it a cost-effective and flexible solution. The kits include all rubber parts and wear parts.

3D CAD models of the devices are, of course, available in various formats for system planning. Just give us a call!

Paul Ladage paul.ladage@elster.com

As 2011 draws to a close, we would like to take this opportunity to thank you for your trust and cooperation over the past year.

We are looking forward to breaking new ground and finding new, ambitious solutions together with you in the forthcoming year 2012.

We wish our customers and business partners a relaxing and enjoyable festive season and a prosperous New Year.



## Another IMS success story in Singapore: Elster-Instromet wins over yet another key account!

Good news from Asia: EISB has successfully commissioned and started up a USM custody transfer metering station at Soxal's new hydrogen plant (J10) in October 2011 at their Jurong Island site. Soxal, a subsidiary of Air Liquide, is the largest industrial gas company in Southeast Asia and the leading supplier of gas and equipment to the Singapore manufacturing industry.

The J10 hydrogen plant was constructed primarily to supply hydrogen to Neste Oil's renewable diesel plant in Tuas, and has a capacity of 100,000 Nm<sup>3</sup>/hour. Over 30 km of pipework were installed to carry the hydrogen gas from the J10 hydrogen plant to Neste Oil's plant – the longest pipeline project in Soxal's history. Thus, an accurate metering system was required to measure the key raw material, natural gas. EISB was selected for Phase 2 of the project which involved supplying a demanding fiscal metering system with an operating pressure of 40 barg due to increased production requirements.

The EISB metering system consists of a 2 x 100% 8" ANSI 600 fiscal metering skid with a Z-configuration for proving, together with an analyzer unit and control panel. We were able to supply the customer with a fully integrated metering solution (IMS) by integrating high-accuracy Elster-Instromet products such as two 8" Q.Sonic 4C ultrasonic meters, two FC 2000 flow



Front view – skid inlet

computers and an EnCal 3000 gas chromatograph. As such, our IMS was able to optimize and improve the overall metering system performance and accuracy. The metering PLC served as a gateway to the customer's DCS/SCADA system and for valve control management.

The compact fiscal metering system was designed, engineered and manufactured by our EISB team based in the Kuala Lumpur factory. Together with the EISB Singapore team, we worked in exceptionally close collaboration with the customer in order to meet the tight project schedule. One of the key challenges was to design a system with a small skid footprint to accommodate ESDV, filter, analyzer shed, valves, etc. without sacrificing performance, reliability or ease of operation and maintenance. The customer greatly appreciated Elster-Instromet's efforts and looks forward to working with us again in the near future.

Kelvin Chee [kelvinchee@elster-instromet.com.sg](mailto:kelvinchee@elster-instromet.com.sg)



Back view – skid outlet

## Metering Europe 2011 in Amsterdam: Interoperable by design

This year, the most important annual industry meeting of metering companies and experts was held from 3 – 6 October in Amsterdam. The core topic of the congress and trade fair was the discussion on how utility companies can meet the target to provide every private EU household with smart meters by 2020.

Throughout the entire event, technical lectures were given on widely differing topics from the field of Smart Metering, ranging from initial installation and commissioning problems to network topologies and safety regulations. Data protection and data security were two topics which attracted particular interest from the delegates. In the exhibition section of the event, lots of companies unveiled their latest products and services related to Smart Metering, Smart Grid and Smart Homes. This demonstrated quite clearly that the industry now has the solutions to meet the EU targets, but whether they are successful is heavily dependent on the level of acceptance of the end user.

Elster demonstrated its competence at the congress by giving several lectures on the subject of data protection and data security. The company's exhibition stand is crowned by the new Elster logo motto "Vital Connections" and features a new, fresh design with this year's trade fair slogan "Interoperable by design". Visitors to the Elster stand were able to find out more about the very latest and even future solutions and technologies for all areas of gas, electricity, water and data management, all of which meet the most recent measurement and communications requirements. Among other things, Elster exhibited a new solution for data protection and data security in the form of the electricity meter AS300 which attracted a great deal of interest. With this solution, both electricity and gas consumption data can be made available to the suppliers in anonymous and aggregated form. Elster's developments demonstrate that its focus is on interoperability and compatibility with all product groups, and even with products from other suppliers, which ensures that customers can be offered flexible, future-proof solutions.



The statutory requirements and outline conditions imposed by various countries are one of the main points of interoperability. In some countries, such as Great Britain, Italy and the Netherlands, for example, these are already in place or are well underway. In Germany, on the other hand, a great deal of change to existing technical solutions and specifications is still expected due to the new Energy Industry Act (EnWG) with the requirements it makes relating to data security by protection profiles for smart meters and other technical directives. More information on

this subject is provided in the article written by Dr. Daniela Lücke-Janssen on page 26.

In talks between the lectures, but also in intensive discussions with our customers, suppliers and other market participants, we have once again discovered how important it is to exchange views on the wide range of problems, ideas, possible solutions and products in this segment to enable us to work jointly on creating solutions for the future.

Although the subject of Smart Metering leaves plenty of scope for new developments, it is important to include the requirements of the market in the process so as to implement a reasonable and fair cost structure.

We are in close dialogue with our customers and the interest groups involved and will be delighted to help you in any way we can if you have any questions

# Elster Gas Meter Segment wins competition

## Elster in Lotte: Factory of the Year

Elster GmbH's Gas Meter Segment at the Lotte site (near Osnabrück, Germany) took part in the "Factory of the Year" competition this year. With overwhelming success: it was awarded the German Global Excellence in Operations (GEO) Award in the category for outstanding improvements over the entire value chain.



This Factory of the Year/GEO Award is considered to be THE benchmarking test for all manufacturing companies. This competition has been organized since 1992 by A.T. Kearney company consultants and "Produktion" business periodical.

While the Factory of the Year Award focuses on peak performance in production, the GEO Award conferred since 1999 honours excellent performance in the entire value chain.

The multi-stage application process for the competition starts with a questionnaire which deals with general information, strategies, success factors, innovative



approaches and improvement initiatives covering every aspect of the nominated area. After the questionnaire had been sifted through and evaluated, there was an on-site appointment on 23 August 2011, attended by Dr. Jordan, partner and member of the board of A.T. Kearney business consultants, and Dr. Lakner, also from A.T. Kearney. The focal points of this audit were assessment of the value chain in the sector of residential gas meter production in general and the innovative approaches and improvement initiatives of the production and assembly processes in particular.

This was where the Osnabrück site impressed the judges with an exemplary automation system for measuring unit V2 production and the process of focussing on eliminating wastage along the entire value chain. This results in minimal stocks and short throughput times.

**The winners of this year's "Factory of the Year/GEO AWARD 2011"**

|                     |                                   |
|---------------------|-----------------------------------|
| Factory of the Year | Volkswagen engine plant, Chemnitz |
| GEO                 | Elster Gas Meter Segment, Lotte   |
| Site Development    | Bahlsen plant, Barsinghausen      |
| Excellent Assembly  | Wolf Heiztechnik, Mainburg        |

In the category of innovative production methods, the housing deep-drawing process in one go without the use of liquid lubricants (anti-friction coating technology) was just as much a highlight for the audit team as the 100% online tightness test after closing the meters. Both processes were recognized specifically in the summary assessment.

The cornerstone of the success story is integration of all staff along the entire development and production process. The successful result of a process forms the basis of further improvements. In the words of Ulrich Clasemann, Plant Manager and Division Director Residential Metering in the Elster Gas International Business Unit: "This relates to both production units at the site, Gas Distribution and Gas Utilization."

With the new assembly techniques currently to be implemented in the sectors of residential and commercial gas meters, Elster is taking innovative approaches in production and assembly engineering, and is thus confirming its worldwide market



Some of the award-winners since 1992 (source: www.geo-award.de)

leadership for diaphragm gas meters. With the investments, "... we have created an excellent starting situation for the pending challenges in the sector of smart meters", as Ulrich Clasemann goes on to say.

The Gas Meter Segment was then announced as the winner of the Global Excellence in Operations 2011 Award in

September. Ralf Geiger, Executive Vice President Gas International, informed all staff in a company meeting convened at very short notice and thanked all of them for their excellent commitment to the company and the entire Elster Group.

The Anniversary Congress on the 20<sup>th</sup> "Factory of the Year/GEO" competition on 21 and 22 March 2012 in Dresden forms the concluding event of this year's competition. At this congress, the award-winners will be honoured for their achievements. We would be very happy to see you there.

By winning the Global Excellence in Operations (GEO) Award, the Gas Meter Segment at the Osnabrück site now numbers among the award-winners which include many of the most renowned German companies.

We are proud to belong to this illustrious group. The innovative production and assembly engineering and ongoing systematic improvement of processes allow us to implement our high quality and safety standards for the benefit of our customers.

Frank Schlingmann frank.schlingmann@elster.com

# Elster Gaselectronica: Fledgling company comes of age

It has been just about 15 years since Elster set about more extensively developing the Russian market in partnership with the measuring instruments factory in Arzamas. With the foundation of OOO Elster Gaselectronica and the gradual development of a varied product portfolio from the Elster gas measuring equipment product range, an extremely successful collaborative partnership has developed.

Although the main shareholders invested only a small amount of seed money in a test rig, commercial credit and production and administrative premises, the new company quickly stood on its own two feet. Finally, the state-of-the-art gas measuring equipment, which was provided by Elster and offered the necessary development potential, was a deciding factor.

sold on the Russian market. In view of this extraordinarily positive result, the 15<sup>th</sup> anniversary is an excellent occasion to honour Gaselectronica and to thank the staff.

From the once small company, an independent, innovative company has evolved.

Important milestones have been set with the resolutions approved this year by the shareholders for further licensing contracts for diaphragm gas meters with mechanical temperature compensation, turbine gas meters and rotary gas meters and the continuation of the new correction technology. Thus, the development of Elster Gaselectronica will take place at a new level of quality in the future.

We wish Elster Gaselectronica much innovative strength and success in the years to come!

Gerd Markert [gerd.markert@elster.com](mailto:gerd.markert@elster.com)



Participants in the technical customer seminar

The product range was extended product by product through the issuing of licenses and internal developments. By localizing the parts manufacturing, a level of flexibility was ultimately reached which contributed to gaining a top position in the Russian market. The size of the Russian domestic market for gas measuring equipment accounts for a large share of the Elster Group's results.

Over the years, large quantities of high-quality Elster gas measuring products, in particular electronic volume correctors, rotary gas meters and diaphragm gas meters, have been manufactured for and

Numerous guests from the gas industry – sales and service partners – came to congratulate the company and to take part in a specially prepared technical seminar. It was very moving when the performance of the company's workforce, management and, in particular, of the CEO V.A. Levandovsky was highly praised by shareholders, municipal government and business partners during the impressive commemorative event.

Elster Gaselectronica has developed from a fledgling company into a mature, independent business.



Ralf Schuler and Gerd Markert hand over the congratulations certificate and a TRZ2 miniature model to CEO V.A. Levandovsky.

# How Elster defines its repair management for gas meters: High service quality is our passion

To ensure we achieve a high level of customer satisfaction with our products, it is our target to provide a well-structured repair management service. In cooperation with our sales agents and distributors in specific market areas, we try to support our customers with quick and customized solutions either on site or in our own production plants.

We have qualified employees and associate partners all over the world who are entirely integrated in our business processes and information management systems. All technical knowledge from R&D and production departments is transferred to the repair departments. Customer needs and feedback are, however, also considered and where necessary, this information can be used to update our production and service portfolio in order to implement continuous improvement. Elster provides durable, reliable and sophisticated measurement systems, which can be upgraded to the latest versions, even after many years in service, thanks to corresponding maintenance. Elster products thus ensure that customers are able to realize optimal cost-benefit effects.

### Spare parts management – improving the quality of enquiry and quotation management

The management of enquiries and quotations can be made more efficient if all relevant information is directly available. That is why we endeavour to improve the flow and quality of information hand in hand with our customers.

Having meter-relevant data at our disposal is essential in order to improve the repair process for gas meters. This data includes:

- serial number
- year of manufacture
- pictures for older meters to help identify the parts concerned

Elster's gas meters are highly customized products, available in different versions. For this reason, in-depth analysis is necessary in almost all cases.

An overview of local agents can be found on the Internet:

[www.elster-instromet.com/en/sales\\_contacts\\_international.html?changelang=1](http://www.elster-instromet.com/en/sales_contacts_international.html?changelang=1)

### Efficiency as parameters for success

Please contact our sales organization in your country to get further information.

Sebastian Hintz [sebastian.hintz@elster.com](mailto:sebastian.hintz@elster.com)

### Customer Return Delivery Note

In order to ensure our repair management processes run smoothly, it is essential to have meter-relevant data at our disposal. To this end, customers can download our "Customer Return Delivery Note template" to provide all the necessary information. It can be found at [Elster-Instromet.com](http://Elster-Instromet.com) via the link:

[www.elster-instromet.com/en/downloads/EI\\_Customer\\_return\\_delivery\\_note\\_meters\\_regulators\\_a.pdf](http://www.elster-instromet.com/en/downloads/EI_Customer_return_delivery_note_meters_regulators_a.pdf)

For questions or helpful suggestions regarding the repair management process, do not hesitate to contact our local sales agents.



**ELSTER – Customer Return Delivery Note  
Meters / Regulators**

For questions, please contact your local sales organization!  
Sebastian Hintz or Lukas Oelger who are responsible for repairs in Mainz  
T: 0446 (0)134 605 400 or 136  
F: 0446 (0)134 605 310

**Customer:**

Name: \_\_\_\_\_ Telephone number: \_\_\_\_\_ Date: \_\_\_\_\_  
Company: \_\_\_\_\_ Metering point: \_\_\_\_\_

**Competent contact person at Elster:**

Name: \_\_\_\_\_ Ticket No.: \_\_\_\_\_ Date: \_\_\_\_\_  
Note: \_\_\_\_\_

**Quantity of devices (please enclose one return delivery note for each device)**

Total quantity: \_\_\_\_\_ Page: \_\_\_\_\_ of \_\_\_\_\_

**Repair data**  Complaint  Repair 1)  Check-up  Upgrade

Device: \_\_\_\_\_ Serial No.: \_\_\_\_\_ Year: \_\_\_\_\_  
Operating pressure: \_\_\_\_\_  
Is a high-pressure meter required? (only for turbine meters) \_\_\_\_\_  
Upgrade required \_\_\_\_\_  
Full complaint description \_\_\_\_\_  
Note \_\_\_\_\_

1) Elster has checked and you will receive a detailed estimation of costs for the proposed repair. We will then request a written approval on how to proceed.

**German delivery address**  
Please clarify where to send the devices with your local sales organization. In case of a German delivery destination, please return the device including the return delivery note to:  
**Elster GmbH, Reparatur, Steinernstraße 19-21, D-52522 Mainz-Kastel, Germany**

**Series:** Introducing you to a company with tradition and future – Elster

## EISB, Malaysia – your partner for gas in the Far East

As a responsible metering product manufacturer, the Elster-Instromet Group responded to its customers' increasing demand for swift technical services by setting up the Southeast Asia (SEA) Regional Office in Kuala Lumpur in late 1999.

Sealing the deal with Hyundai/Talisman in 2001 at the tender age of two, presented the company with great challenges. The young company was awarded the contract for a turn-key offshore gas metering station with a value of USD 2 million which involved supplying a dual-stream ultrasonic metering skid with a rating of DN 300 1500# RTJ.

Staff were put to the test when they were required to include a spare metering run in the station design despite the limited space on the platform. This was the first time a Q.Sonic-5S ultrasonic meter had been installed in Malaysia using only a 10 DN upstream straight pipe, thus marking a new industry standard. The total solution comprised all field instruments, motor-operated valves (MOV), gas chromatographs and flow computers with cabinets as well as the redundant supervisory suite ISS.

In this project, the company was supported by the Essen office (Belgium) which supplied all key components. The Malaysia team took full responsibility for the skid manufacture and managed the integration of the complete system.

Nothing came easy, especially due to the fact that this was the first offshore UFM station in Malaysia operating at such a high design pressure (150 barg). One of the crucial factors for the successful implementation of this project was the unique patented design of the Q.Sonic matrix path.



Shanghai LNG Peak Shaving Project

It was this very first offshore EPCC metering project that transformed the company from a minimal-scale operation to a broad-range company offering enhanced services in the field of design, engineering, procurement and construction of complete system solutions. The experience gained from this project then set the direction of the company. Since then, and in line with the expansion of the gas utilization market in Southeast Asia, the local organization has grown over the years – both in terms of revenue and staff size.

The track records of the company are proof of the confidence shown by major oil and gas field operators in the region such as Shell, Petronas, PetroVietnam, etc.

Following the merger of the Elster Group and the Instromet Group of Companies in 2005, the company changed its corporate name.



EISB (Elster-Instromet Sdn. Bhd.) successfully secured its first Middle East project and built its first big metering station with DN 750 ultrasonic gas meters. For this, the project & engineering team came up with

an innovative approach and introduced the "modular" concept into skid design.

In 2006, a branch office of Elster-Instromet Sdn. Bhd. was set up in the Republic of Singapore to take over and manage the former Sales Representative Office of the Elster Group. With this consolidation, the wide range of products from Instromet and Elster covering all areas of measurement, regulation and control continued to be made available to EISB's customers.

is to link the Northwest border of China's Xinjiang province to Shanghai and most of China's coastal cities. EISB was proud to be selected as one of the main metering technology vendors of the RMB 142.2 billion mega project for a pipeline with an overall length of more than 8700 km, making it the longest natural gas pipeline in the world, with an estimated annual gas transportation volume of 30 billion m<sup>3</sup>/year for up to 30 years. Between 2008 and 2010, more than 150 high-cube containers (40 ft) with more than 90 metering stations

Thus, EISB has invested in a training programme and offers a professional training course on integrated metering systems to both its customers and staff. This provides high-grade added value to Elster's range of products which has a positive impact on customers' loyalty towards the brand.

Company information:

- 50 employees of which 80% technicians
- Total surface area of company: 890 m<sup>2</sup>

TC Chuah t.c.chuah@elster-instromet.com.my



Western part of WEPP II



Metering station ready for shipment



Pre-shipment inspection



EISB team

During the same year, EISB forayed into the Chinese market, thanks to the joint efforts of the Beijing and Shanghai sales teams, and won the contract for a 6-stream skid metering station with DN 300 ultrasonic gas meters. This represented a first foothold in China. Continued cross-regional collaboration (Essen/Mainz/Silvolde/Dortmund/Beijing/Kuala Lumpur) helped EISB to secure many more metering station orders in China. In addition, the company succeeded in winning contracts from PetroChina for Phase II of its West-East Gas Pipeline Project (WEPP II). This pipeline

were shipped, making Elster a brand name to be reckoned with in China's ultrasonic metering solution market.

Today, EISB directly covers countries such as Malaysia, Singapore, Indonesia, Vietnam, Brunei, Pakistan, Bangladesh, Japan, Hong Kong, Korea and Taiwan.

The capability to provide sound engineering for integrated metering solutions coupled with excellent after-sales support is considered the key to continuing corporate success.

EISB (Elster-Instromet Sdn. Bhd.)  
Malaysia/Singapore



# Protection profiles: effects of the new German Energy Industry Act

## Data privacy & data security in German smart grids and smart meters

Germany has started the process of ensuring data privacy and data security in the smart grid and in smart meters by means of acts, regulations and technical directives. The work currently being carried out is being watched with interest by our European neighbours. For example, it was one of the topics discussed at the Metering Europe fair in Amsterdam in October.



The new Energy Industry Act and the protection profiles and technical directives anchored within it have a massive effect on the existing technical solutions and specifications in Germany. However, the challenges which are approaching us will also provide an opportunity to introduce smart grids and smart meters in Germany and beyond in a controlled manner. The requirements of the protection profiles are very high but are ultimately designed to secure and protect consumer data.

The Act amending Energy Industry Regulations in Germany dated 26 July 2011, the so-called Amended Energy Industry Act 2011, came into force on 4 August 2011. One of the main changes in the Energy Industry Act is the amended Article 21 which for the first time makes a clear distinction between a metering system ("the metering equipment integrated in a communications network for recording electrical energy", in other words electricity meters) and metering equipment for gas (gas meters). Metering systems should be installed in the following:

- new buildings or after major renovation work,
- for end consumers with an annual consumption of over 6000 kWh,
- for system operators under the German Renewable Energy Act and the Heat and Power Cogeneration Act, for new systems with an installed power of over 7 kW,
- in all other buildings where technically feasible and financially viable.

According to the Energy Industry Act, the technical feasibility will arise as soon as appropriate products are available on the market. Whether their installation is financially viable will be assessed by the

German Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie, BMWi).

As far as gas metering equipment is concerned, only metering equipment that can be safely connected to a metering system may be installed as from 1 January 2013. This means that no separate smart metering infrastructure for gas is to be created. In fact, the gas meter will be read, for example, through an electricity meter.

Both gas metering equipment and metering systems must comply with the requirements for guaranteeing data privacy, data security and interoperability. And this is where the protection profile comes into play. The German Federal Office for Information Security (Bundesamt für Sicherheit in der Informationstechnik, BSI) was commissioned in September 2010 by the BMWi with the development of a "protection profile for smart metering systems (smart meters)". Protection profiles have already been established in information technology to ensure data privacy and have proven that they are capable of doing so. Their use is now to be extended to smart grids and smart meters. The BSI has already developed protection profiles for smartcards, USB data media and electronic health cards, for instance.

Protection profiles are based on the so-called "Common Criteria (CC) for Information Technology Security Evaluation" (ISO/IEC 15408) and are widely recognized in many regions around the world. Protection profiles describe and evaluate risks, define security targets and establish requirements for functions of and the scope of testing for products.

As far as our sector is concerned, this means that smart grids and smart meters have been identified in Germany as critical infrastructure and critical components. The security of the energy supply and the private sphere of customers must be protected. The communications unit of a metering system or a smart meter (also known as a gateway) has been identified as the component which must be protected from wide area network (WAN) attacks. These gateways (in other words devices with an interface to the WAN) include multi utility controllers (MUC) and electricity meters. The relevant associations (DVGW, FIGAWA) are currently discussing whether industrial and commercial gas meters, data loggers and volume correctors are also to be considered as gateways as defined by the BSI protection profile.

In cooperation with the Federal Network Agency, the PTB and TÜV-IT as well as various other organizations, the BSI has already established the protection profile for the gateway. The final draft was published at the end of August 2011 (see [https://www.bsi.bund.de/DE/Themen/SmartMeter/smartmeter\\_node.html](https://www.bsi.bund.de/DE/Themen/SmartMeter/smartmeter_node.html)).

The protection profile for the gateway's security module and the Technical Directive which defines the minimum requirements relating to data security (e.g. encryption) and interoperability (e.g. communications protocols) for the interfaces to the WAN and to the local metrological network (LMN) are still in the drafting and coordination phase.

No further protection profiles or technical directives are being planned by the BSI for meters which are in the LMN (e.g. residen-

tial gas meters) or the head end. However, meters and head ends must comply with the requirements of the technical directive for the gateway as regards the LMN or WAN interface so that they can communicate with the gateway in the first place.

According to the protection profile, the gateway is defined as follows: "The gate- way...

... is the only device which is directly connected to the WAN; it is not accessible from the WAN and shall provide a wake-up service.

- In addition to a national metrological approval, gateways will also require certification or licensing under the BSI protection profile (even the MUC will require a metrological approval).
- Gateways must include a security module.
- The development process of the gate- way must be certified according to CC.
- Battery-powered residential gas meters in the LMN must at least support wire- less M-Bus communication according to the Open Metering System (OMS) with extended encryption and authentication mechanisms.

to be installed in Germany until 31 December 2012 and may continue to be used until the next expiry date of their current cali- bration.

The BSI project plan as it currently stands is to complete the outstanding protection profile for the gateway's security module and the Technical Directive by February 2012. The certification criteria for the prod- ucts and the development processes must then be completed by August 2012. The BSI's objective is to meet the requirements of the Energy Industry Act promptly so that



... constitutes a firewall between the WAN and LMN and the home area network (HAN); the meters are in the LMN, the HAN may include photovoltaic systems, an electric car, smart white goods or a private PC for example.

... records, processes (e.g. cumulates, pseudonymizes and assigns tariffs) and stores the data from the connected meters.

... only gives access to authorized entities.

... checks the recorded data in terms of their integrity and authenticity; signs/ verifies and encrypts/decrypts informa- tion.

... uses the services of a security module (hardware security module) which con- tains the main security mechanisms such as the encryption/decryption of messages, verification/generation of signatures and the generation and storing of keys.

... provides a user interface (e.g. for display purposes)."

- The M-Bus specification of the OMS must be adjusted accordingly.
- The Energy Services Specification (the so-called "EDL-Lastenheft") is no longer relevant for gas meters.
- The head end must be capable of proc- essing encrypted and signed meter data.

As far as the effects of the new Energy Industry Act on smart gas metering are concerned, we must wait for the completion of the Technical Directive and statutory regulations. This Directive defines the minimum encryption algorithms and com- munications protocols which must be supported by the gateway and therefore also by the meters in the LMN (e.g. resi- dential gas meters) and the head end. The statutory regulations are likely to define whether industrial and commercial gas meters, data loggers and volume cor- rectors with a WAN interface must comply with the BSI protection profile or not.

According to the Energy Industry Act, metering systems and metering equip- ment for gas which do not satisfy the requirements of the protection profiles and the Technical Directive may continue

manufacturers can launch certified prod- ucts which comply with Article 21 of the Energy Industry Act as from January 2013.

Over the last few months, Elster has played an active role in the process to develop the protection profile through various organizations and the company plans to continue this work until the pro- tection profiles and the Technical Directive have been officially adopted. Elster will also work through these organizations to address the unanswered points which must be controlled by the forthcoming statutory regulations, e.g. for smart gas metering, such as the form in which the protection profile can be used in industrial gas metering and what the implementation concepts are for pure gas suppliers. In addition, we will be available for any questions you may have on the subject of protection profiles. And we will, of course, inform you as soon as possible when we have products or retrofit solutions available for modular systems such as diaphragm gas meters which comply with the require- ments of the protection profile.

The new Energy Industry Act will therefore have an enormous effect on existing tech- nical solutions and German specifications, some of which are listed below:

# Profiles in the year 2011

## Group

|   |             |
|---|-------------|
| Series: Introducing you to a company:<br>Elster S.A.S. – your partner for gas in France                         | 1/11, p. 15 |
| Series: Introducing you to a company:<br>Elster Dortmund: high technology in historical surroundings            | 2/11, p. 14 |
| Gas Quality Division:<br>Acquisition of high-tech company SLS Micro Technology GmbH                             | 2/11, p. 16 |
| Series: Introducing you to a company:<br>Elster-Instromet EISB, Malaysia – your partner for gas in the Far East | 3/11, p. 24 |

## Applications

|  |             |
|--|-------------|
| Gas meter calibration technology:<br>Be the master of the master                               | 1/11, p. 8  |
| Fast productive solutions for smart metering:<br>Elster Rapid Deployment Solution              | 1/11, p. 10 |
| New requirements – New products – New services:<br>Italy takes the lead in smart metering      | 1/11, p. 12 |
| Another IMS success story in Singapore:<br>Elster-Instromet wins over yet another key account! | 3/11, p. 18 |

## Standards

|  |             |
|--|-------------|
| First NMI EuroLoop certificate issued:<br>Elster-Instromet master meters for calibration   | 1/11, p. 16 |
| Farecogaz: Pooling technical expertise for gas infrastructure products   | 2/11, p. 20 |
| Protection profiles: effects of the new German Energy Industry Act:<br>Data privacy & data security in German smart grids and smart meters | 3/11, p. 26 |

## Events

|  |             |
|--|-------------|
| E-World: focus on smart metering:<br>Simple – clear – smart?                         | 1/11, p. 14 |
| Facts and fun at the AGA Conference<br>Happy birthday Elster American Meter!         | 2/11, p. 12 |
| MIOGE 2011: Trend towards complex solutions for the oil and gas industries           | 2/11, p. 13 |
| International Technical Training Course 2011:<br>Further training takes centre stage | 2/11, p. 18 |
| Metering Europe 2011 in Amsterdam:<br>Interoperable by design                        | 3/11, p. 19 |
| Elster Gas Meter Segment wins competition<br>Elster in Lotte: Factory of the Year    | 3/11, p. 20 |
| Elster Gaselectronica:<br>Fledgling company comes of age                             | 3/11, p. 22 |

## Products

|   |             |
|---|-------------|
| The MR goes high-pressure:<br>Launch of the MR HP20 regulator series  | 1/11, p. 3  |
| Gas quality analysis:<br>More than heating value measurement alone  | 1/11, p. 5  |
| Automatic oil lubrication of turbine gas meters for applications down to -25°C:   | 1/11, p. 6  |
| Turbine gas meter TRZ2 with measuring ranges up to 1:200:<br>Unmatched measuring ranges   | 1/11, p. 7  |
| UK smart deployment gathers pace – and Elster is in the driving seat  | 2/11, p. 3  |
| M2R application in Denmark:<br>The success story continues  | 2/11, p. 5  |
| The solution: New index SIV for industrial diaphragm meters BK-G100   | 2/11, p. 6  |
| Elster-Instromet supplies mobile calibration truck to Sinopec:  | 2/11, p. 8  |
| A smart index – flexible and modular<br>Slotted or cross-head screw?  | 2/11, p. 10 |
| Quick detection of tripped valves<br>S100 gets new remote switch  | 2/11, p. 11 |
| The 040 Series – a leader in its field  | 2/11, p. 12 |
| The turbine gas meter – the “VW Beetle” of industrial gas metering!   | 2/11, p. 19 |
| Q.Sonic <sup>plus</sup> – the next generation:<br>High tech from Elster protected by patent   | 3/11, p. 3  |
| A look into the future: Sonic Explorer – a smart software assistant for ultrasonic gas meters   | 3/11, p. 5  |
| Rotary gas meters: the complete product family<br>A comprehensive range from a single source  | 3/11, p. 7  |
| EnCal 3000 with enhanced features:<br>1 + 1 = Quad  | 3/11, p. 8  |
| New: Elster’s commercial diaphragm meter measures the standard volume: Themis <sup>plus</sup> , the Swiss army knife of gas measurement | 3/11, p. 11 |
| Elster and the ME <sup>3</sup> GAS project:<br>International cooperation  | 3/11, p. 14 |
| MR HP20 high-pressure regulators as an extension to the series  | 3/11, p. 16 |

## Service

|  |             |
|--|-------------|
| How Elster defines its repair management for gas meters: High service quality is our passion | 3/11, p. 23 |
|--|-------------|