

PROFILES GAS CUSTOMER MAGAZINE

1/2021



Service at Your Service

Gas Transmission & Distribution:
A New Solar Calculator for the MiWireless Product Line

Hydrogen Tested in the EnCal 3000 proChain:
Making the Invisible Visible

Honeywell

SERVICES AT YOUR SERVICE



Jean-Paul Piques
Global Gas Product
Line Director

Being the organized, detail-orientated guy that I am, I keep my personal finances up to date. You may have noticed banks want to help you with this chore lately, but I keep my own records, old school style. Anyway, a couple of weeks ago, I was reviewing my 2020 spending, and looking at house maintenance spend, I had a bit of heartburn. Why am I spending so much, I wondered? Certainly, there had to be a way to cut back.

When I purchased my house some years ago, it was equipped with a gas burner. The former owner had set-up a burner maintenance contract with a well-established, respected company, and it never occurred to me to challenge the status quo. A few contract revisions later, I was finding myself paying what I figured was too much for the value.

Animated with my usual cost-cutting instinct, I started researching other companies, which were lesser known, “Mom and Pop” types, which surely would offer cheaper rates. As I was getting ready to call them, my wife came into the office. Soon enough, she was reminding me how prompt our current supplier was to come and perform repairs in case anything went wrong. We never paid extra for those unplanned visits as it was an all-inclusive contract.

What did I do? Nothing. I did not want to be the guy explaining to my wife and kids in the middle of winter why the house was cold. My gas burner is a reputable brand with a stellar quality record, but as risk hedging would have it, I was not ready to take a chance on such a critical asset.

At Honeywell, we understand our customers may be having similar thoughts. We provide products that are rugged and resilient in demanding installation conditions but require periodic maintenance—if only for regulatory compliance reasons. We also understand you are all different, with different objectives and risk profiles.

Honeywell has designed its new service offerings with your specific requirements in mind. From our TotalCare Lite offering with its basic and premium features, to our TotalCare Enhanced a-la-carte selection and the TotalCare A360 outcome-based service contract, we have created a suite of service offerings that adapt to your unique needs. We will be adding more offerings as we learn from you

Jean-Paul Piques

PUBLISHER

Elster GmbH
Steinern Straße 19-21
D-55252 Mainz-Kastel
T +49 (0)6134 605-0
www.honeywellprocess.com
www.elster-instromet.com

EDITORIAL

Shobhit Mehrotra,
Customer Marketing
Catalin Sturza,
Creative Services

CONTACT

customerfirst@honeywell.com

DESIGN

441 Design Studio,
www.441designstudio.com

AUTHORS

Jean-Paul Piques
Bernhard Thomas
Max Gutberlet
Eric Bras
Hans Peter
Pierre Dufour
Addy Baksteen & Irfan Sonal
Maher Kurdi
Alfiero Albasini
Nelson Silva

Articles signed by the author reflect their personal opinion.

Dr. Feix Translation Agency,
www.dr-feix.com

PHOTO CREDITS

Page 1/3: © stock.adobe.com/loremipsum
Page 9: © stock.adobe.com/IgorNormann
Page 10/10/17/18/20: © stock.adobe.com/Gorodenkoff
Page 11: © stock.adobe.com/dusanpetkovic1
Page 13: © stock.adobe.com/Kzenon
Page 16: © stock.adobe.com/industrieblick

Publishing dates:
Three editions for the year 2021

Honeywell customer magazine online:
www.elster-instromet.com/en/index

THE SATISFACTION OF DOING THINGS RIGHT

Your Honeywell Gas team has been dealing with the issue of measurement uncertainty for many years. As we all learned at school, no measurement is perfect – the measuring device itself always has a certain degree of uncertainty. The task for us at Honeywell is to both quantify and minimize this uncertainty.

Not only has Honeywell been dealing with this topic for many years, so too have our customers – from the providers of calibration services to the gas suppliers with their pressure reducing and metering stations. Measurement uncertainty plays a dominant role, as a small shift has a massive influence on the total volume of gas measured – and thus on the accuracy of the billing. Millions of dollars are often at risk here in a very short period of time.

The International Organization for Standardization (ISO) took up the topic a few years ago, and with the active help of a number of Honeywell specialists, adopted a standard – ISO 17089. Along with the pre-existing ISO 5168, which regulates the form of validation, this results for the first time in an overall standard that sets international guidelines for the issues of performance and measurement inaccuracy in measuring devices.

After Honeywell actively contributed to the topic of measurement uncertainty, it was only logical to have our software for monitoring performance and measurement inaccuracy, Measurement IQ for Gas, also certified according to the new criteria.



And so, after six months of intensive joint work by NMI and Honeywell, we can now look forward to presenting you with the first software officially certified according to ISO 17089/ ISO 5168 for live monitoring of the performance and measurement inaccuracy of your metering stations – Measurement IQ for Gas.

This certificate serves two purposes: it makes us feel good about doing things right, and it gives you – our customers – the security that the data you receive from your installation of Measurement IQ is correct and tamper-proof.

Max Gutberlet

max.gutberlet@honeywell.com

In NMI, a certification partner has been found who has dealt with the topic extensively for many years. Thanks to its proximity to the Dutch gas supplier Gasunie, which had already closely examined the topic in the 1990s, NMI has access to a number of top-notch specialists in this field.



A NEW SOLAR CALCULATOR FOR THE MIWIRELESS PRODUCT LINE

The MiWireless 350 provides flexible data communications assemblies for the natural gas industry. The product line includes a comprehensive, platform-based selection of communication hardware and power supply systems, optimized to integrate with the Honeywell Mercury® Instruments volume correctors and pressure monitors.

The MiWireless 350 platform leverages the latest innovations in battery-operated instruments such as the EC 350 and ERX 350, and low-power 4G cellular radios such as Cloud Link R100 or Cloud Link with Cat M1 radio support, or third-party cellular modems like the Sierra Wireless RV50X or RV55.

The MiWireless 350 products can be used for:

- Pressure monitoring in gas transmission and distribution lines
- Electronic volume correction in demanding custody transfer applications
- Communication assemblies in hazardous locations
- Power assemblies for remote equipment

The MiWireless 350 platform can be configured with same MasterLink software that is used to configure other Honeywell Mercury Instruments electronic volume correctors, data loggers and modems. No additional software is required. In addition, MasterLink is now available as an App that can be installed on IOS and Android devices. MiWireless can also be seamlessly integrated with PowerSpring or TDS-based solutions.



Location information

Country : USA
 State : Ohio
 City : Columbus

Application Information

Panel Size : 20 Watts
 Battery type : 21 Ah
 Modem Type : RV50/RV50X

Modem ON 24/7 - SCADA application
 Scada polling every : 5 min

Modem ON 24/7 - Call-in application
 Number of calls per day : 24

Call-in application
 Number of calls per day : 24

Call-out application
 Windows/day : 24
 Windows length/day : 30 min


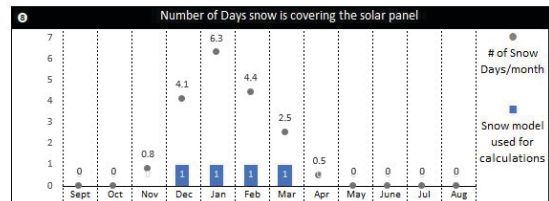
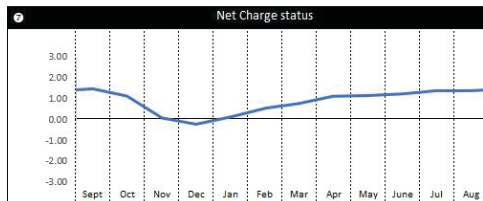
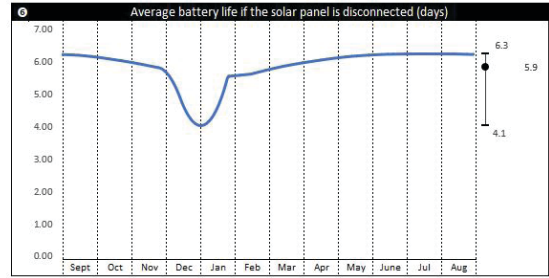
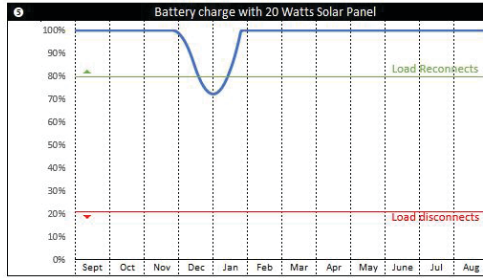
Site Specific

Daily Sun exposure : 100 %
 Cellular Coverage :

Use Enhanced Snow Model
 Lighter < > Harsher [Reset]
 Snow Model : -80% Lighter than Default.

Summary

The optimum tilt angle (α) for best performance is : 36° (optimized for winter operation).
 The numbers of deep cycles the battery will go through in a year is 0.
 If the Solar Panel is damaged/disconnected, the modem will continue to operate between 4.1 and 6.3 days, with 5.9 days as a yearly average before being disconnected by the Low Voltage Disconnect circuit.

As the MiWireless 350 is normally used in demanding applications, power is key. Honeywell adapted this offering years ago to be able to deliver turnkey solutions to our customers. These solutions typically include the MiWireless assembly, a solar panel, a rechargeable battery and an activated SIM card on either a Honeywell or customer data plan. The assembly is pre-staged on our MDM system to ensure a smooth start-up. It is truly plug and play!

One of the remaining challenges left to our customers was the sizing of the different components, more specifically the solar panel and battery sizes. These elements can vary significantly based on environmental parameters. In response, Honeywell developed a user-friendly, Excel-based solar calculator (Mi-Sun), which is fuelled by historical geographical data and power measurement on the instrument.

The Mi-Sun tool just requires a few basic inputs:

- Enter the instrument’s installation location. Typically, this is the country and city. The tool will extract the monthly temperature, sun and snow averages, and latitude from its database.
- Select the solar panel, battery, and modem type you are considering using, and then enter how often you intend to communicate with the instrument.

Once the aforementioned information is provided, the tool will calculate:

- What the ideal angle is to install the panel
- What your battery charge will look like during the year (e.g., are you able to survive winter?)
- How many days you can operate without sun
- What your net charge status will be (e.g., how healthy is your installation?)

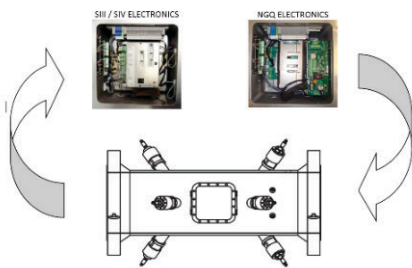
Adjust the solar panel size, battery size, modem type and visually see the impact on your installation health. This tool takes the guesswork out of the equation!

Pierre Dufour
 HPS Global Product Marketing Manager
 pierre.dufour@honeywell.com

NEW FOR OLD

If you have aging meters in your assets, the Series 6 Retrofit Kit could be the best way to reduce financial risks and benefit from the latest technologies.

The Series 6 Retrofit Kit can extend the life of your Q.Sonic meters, fitted with Series IV electronics, by up to 20 years, thus eliminating worries over spare parts and availability, and giving users access to the newest communication and diagnostic features.

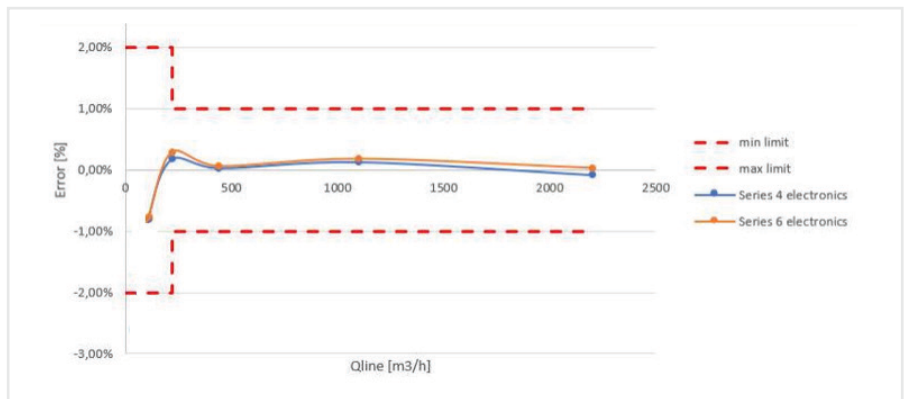


UPGRADE TO THE LATEST TECHNOLOGY

The Retrofit Kit is suitable for Q.Sonic-S3 and S5, and Q.Sonic-C3, C4 and C5 series. It's not only a hardware update, but also includes several significant enhancements:

Ethernet connection and two independent serial communication ports

- Remote front panel to connect to the production LAN, enabling users to monitor the flow meter operation, diagnostics and performance from the control room over networks via a built-in Web server
- Embedded archive that automatically stores fiscal data, periodically measured data, critical maintenance data, and values for audit trails



- Actual signal analysis with multiple pulse collection – an integrated function to directly store the ultrasonic signal for service and maintenance purposes
- Multi-level password protection for functions and settings to protect against unauthorized changes to parameters or set up

SOFTWARE SUPPORT

Upgrading also enables users to benefit from our SonicExplorer® software package, which enables operators, service technicians and engineers to configure, diagnose and monitor the flow meter locally or remotely.

The SonicExplorer software features a variety of tools for increased efficiency and reliability. They provide live health reports for monitoring stability and early detection of faults. The tools also have the ability to create a “customer service package,” which provides a comprehensive log of the entire state of the meter.

Creation of a service package in the event of a warning or alarm will allow for the collection of all relevant information needed for support, including diagnostics, configuration, and spectral noise analysis. The compressed package is automatically sent to a preselected e-mail recipient at Honeywell or another engineer or technician of your choice.

MINIMAL DISRUPTION

The Series 6 Retrofit Kit can be delivered for replacement in the field and deployed without recalibration. Tests such as the one mentioned in OIMLR137 “interchangeable components” shows the influence of the exchange does not exceed 0.11%.

Retrofitting is a simple, cost-effective way to increase uptime, extend the life of your meters, and improve the efficiency of maintenance and operations. To get a customized quote for your application, call your sales office.

Eric Bras

eric.bras@honeywell.com

HYDROGEN TESTED IN THE ENCAL 3000 PROCHAIN:

MAKING THE INVISIBLE VISIBLE

“Water will one day be employed as fuel, that hydrogen and oxygen which constitute it, used singly or together, will furnish an inexhaustible source of heat and light, of an intensity of which coal is not capable.”

From Jules Verne in "Mysterious Island", 1874

Hydrogen was first discovered by the English physicist Henry Cavendish in 1766. Scientists had been producing hydrogen for years before it was recognized as an element. Written records indicate that Robert Boyle produced hydrogen gas as early as 1671 while experimenting with iron and acids.

While the world is advancing in its use of renewable energy and low-carbon energy sources, the production of electricity by wind and solar may periodically exceed the instant demand for electricity. Maximizing the utility of renewable energy requires a means of storing that energy for later use.

Today, a technology gaining in acceptance is the storage of renewable energy as hydrogen. Excess electricity is used to produce hydrogen fuel gas via the electrolysis of water. The produced hydrogen can then be stored for later use or used as a blend-stock with natural gas.

When mixed with natural gas, hydrogen creates operational and measurement issues. When mixed in natural gas it is invisible to infrared analyzers or natural gas chromatographs (GCs). Traditional natural gas GCs with helium carrier gas cannot detect hydrogen, since their thermal conductivities are similar. Consequently, should there be 2% hydrogen in the natural gas,



the GC will only detect 98% of the sample, which it will then normalize to 100%—resulting in erroneous heating value, density, and compositional results. To overcome these issues, different detectors should be used or the same detector employed with another carrier gas (normally Argon).

While preparing our newest product, the EnCal 3000 proChain, we received a lot of requests for hydrogen measurements. Therefore, we decided to start ambitiously—0–30% in an EnCal 3000 proChain—with an eye on converting all the way to 100% later on.

With the new EnCal 3000 proChain, Honeywell sets a new standard in cost-effective gas chromatography for natural gas. This solution provides accurate determination of all main natural gas parameters—heating value, Wobbe index, density and CO₂ concentration—while keeping CAPEX and OPEX to a minimum. Reducing the internal size of the measurement device results in the lowest carrier gas usage on the market, as low as 2 milliliters per minute. This means only one bottle of helium (50 liters @ 200 barg) every seven years.

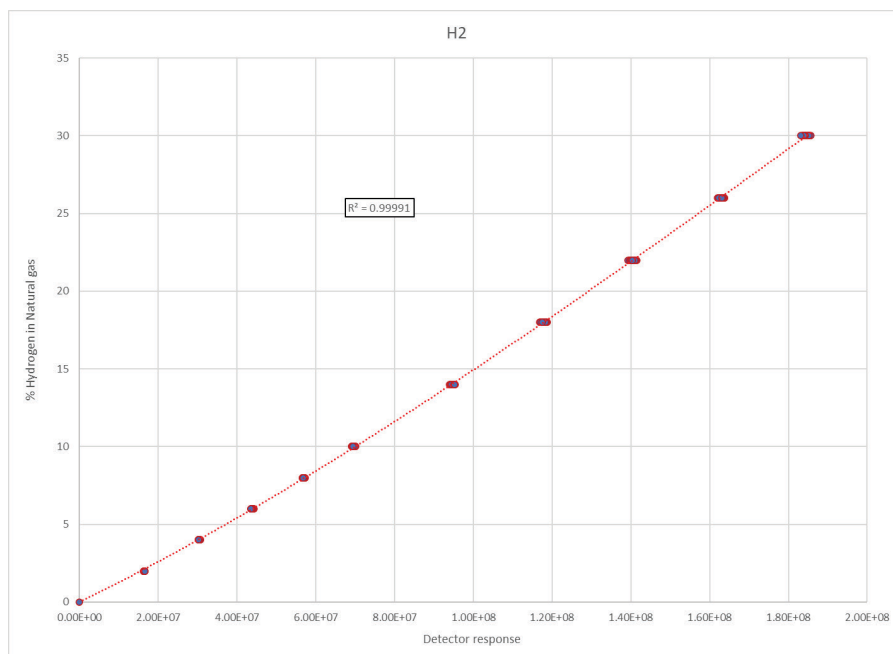


Figure 1: by Jan Homann – Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=6504291> :Although hydrogen as a gas is invisible, the hydrogen atoms can be seen by spectral analysis. For hydrogen these result in the Balmer series. Balmer series (or lines), is one of a set of six named series describing the spectral line emissions of the hydrogen atom. This set is calculated using the Balmer formula, an empirical equation discovered by Johann Balmer in 1885

Honeywell has developed an application on the new platform where we use a helium/nitrogen carrier. The first channel accommodates for normal C6+ analysis, whereas the second module, running on nitrogen carrier gas, measures the hydrogen in the matrix. Choosing nitrogen as carrier gas over argon has two advantages: it is cheaper and allows for detection of oxygen on the second module. N₂ and O₂ normally co-elute, however, when nitrogen is the carrier, it cannot be seen as a peak and therefore O₂ is left as a component.

The results are in and they look very promising. Using a gas mixing station of MCZ-Umwelttechnik, we were able to produce different levels of hydrogen blend with standard gasses, delivering the following analyzer response-line.

As one can see, there is a very well related hydrogen to area correlation. The expected accuracy is well within the current market standards.



CONCLUSION

While hydrogen may be invisible to your current gas chromatograph, with the new EnCal 3000 proChain, Honeywell has made the invisible visible.

Hans-Peter Smid

hans-peter.smid@honeywell.com

WHY DOES IT TAKE SO LONG?

It is obvious that 4G communications modems and routers are now everywhere. The market is hotly contested and many companies want to secure a piece of the big IoT pie. At Honeywell, we don't just want to develop any modem, but a device that is optimally tailored to the requirements of our customers in the gas business. So, please allow us to give you an insight into our design considerations.

ENERGY EFFICIENCY

Currently, 80% of the volume conversion devices sold by Honeywell are battery-powered. Every month or day of operating time that does not require the on-site deployment of service technicians to replace batteries translates into money in the bank.

At the end of 2019, Honeywell carried out a massive technical analysis of all providers of mobile communications chipsets on the market – with surprising results. This was due to the fact that the real measured energy

consumption of many chipsets was sometimes a factor of 200 times higher than promised in the data sheets. Of course, we gave every manufacturer the opportunity to make improvements, but the result was still sobering. The clear winner of this test was the nRF9160 chipset from Nordic Semiconductor, almost 30% ahead of its closest competitor Quectel.

4G AND 5G

A Honeywell director recently asked "Why are you talking about 4G when there is already 5G on the market?" He

was right and wrong at the same time. The fact is that we do not need large bandwidths in the gas sector. The daily data volume of a volume conversion device rarely exceeds the magical 1 MB limit. This means that the additional bandwidth made available in the 5G network is effectively useless. The other extensions in the 5G standard, low latency and mmWave support, are also not relevant for gas customers and, in the case of mmWave, even counterproductive. This stems from the fact that the frequencies used hardly penetrate



walls, causing the signal strengths to drop. This has also been recognized in the international standardization of the 5G standard in the 3GPP, which simply stated: "For low bandwidths and high ranges, we are continuing the measures set out in the 4G standard." This brings us to our next topic.

CAT-M1/LTE-M AND NB-IOT

The LTE standard has two protocols dedicated to our use case – CAT-M1 (also known as LTE-M in some parts of the world) and NB-IoT. Both have a significant advantage over 3G or "normal" 4G LTE – 20 dB extra signal strength. Since dB is a logarithmic scale, this means a doubling or tripling of the signal strength and thus of reliability and range.

The difference between the two protocols lies mainly in the available bandwidth. While CAT-M1 has up to 1 Mbps of bandwidth available, bandwidths in the 64 kbps range are the rule when it comes to NB-IoT – roughly as fast as an old ISDN modem. And that is where the problem lies. Since all common protocols for meter data collection are based on a stable TCP/IP connection, NB-IoT cannot be used for this purpose. Alternatively, all meter data collection systems have to be converted to connectionless protocols such as UDP – a scenario that we do not consider realistic. We have therefore chosen CAT-M1 as the protocol for our device. However, the path to NB-IoT is not blocked.

FUTURE RELIABILITY

As our customer, you expect durable equipment. A service life of 20 years or more is not uncommon. How is this supposed to be ensured in the telecommunications sector, where it feels like new standards are implemented every two years?

The answer can be found in "software-defined configuration." Instead of designing a product for exactly one standard and exactly one application, modern platforms such as the Nordic nRF9160, which we use, work with two software-defined radios (SDR). This means all frequencies between 700 and 2200 MHz can be covered.



Regardless of whether your cell phone provider is currently changing its network or not, we can address any new frequencies. The same is true for protocol support. Protocols are no longer "fixed" hardware, but can simply be replaced via a remote update. Do you want to switch from CAT-M1 to NB-IoT? No problem, simply switch it over by performing an update.

SERVICE RELIABILITY

Our new 4G/5G modem is the sixth modem that we have developed in the Gas Division at Honeywell. We have learned many lessons from our development projects so far. One of the most important is: Avoid finger-pointing hell. To understand this, you have to know how communication modules are usually designed. A chip manufacturer such as Qualcomm or SONY/Altair produces a communication chip. This chip is then processed by a packager like Sierra Wireless, Telit, u-blox or Quectel into a full-fledged, modem module manufactured with power supplies and input/output components. This modem module is then used in a 4G or 5G modem from a manufacturer.

The problem with this approach is that any issues inevitably create a vacuum of responsibility. The packager passes on any questions or complaints to the chip manufacturer and the chip

manufacturer passes them on to the packager – no one wants to assume responsibility. And, in the end, you – our customer – are dissatisfied with the product you receive from us. That goes against our quality philosophy. This was another reason we chose Nordic as the solution, since they design and produce the chips themselves and thus take full responsibility for their functionality.

ATEX AND EX

It is important that we don't lose sight of our gas-specific requirements. ATEX Zone 0 is a must for an integrated modem, and even an external modem should have at least Zone 2 or, even better, Zone 1 approval. Most modems available on the market currently do not offer this capability. Some chip manufacturers go as far as to categorically exclude ATEX certification for their chipsets.

The subject of ATEX and EX is, of course, a particular strength of the Honeywell development department. Therefore, we can proudly say that we will soon be able to offer an internal ATEX Zone 0-certified modem.



GOOD THINGS TAKE TIME

As you can see, a lot of consideration and experience went into the design of Honeywell's new 4G/5G modem. We firmly believe that you will appreciate this approach more than a quick, messy solution that you have to replace two years down the line.

Based on the current progress of the project, we expect the 4G/5G modem to be launched in late summer of this year. The first pre-series devices have already made available to selected customers.

Max Gutberlet

max.gutberlet@honeywell.com

HONEYWELL CCM-4G-NRF9160

- Internal modem for EK280/FE260
- ATEX Zone 0 / Zone 1 certified
- 4G CAT-M1 and NB-IoT
- 2xi SDR for frequency range 700 – 2000 MHz
- Support of all common LTE bands in this sector
- Based on the Nordic nRF9160 chipset
- Compatible with existing AMR systems

SSGC (PAKISTAN) SELECTS EC350 FOR ITS METERING APPLICATION

The natural gas industry presents complex challenges. Companies must find ways to operate safer, make better decisions and act faster by more efficiently delivering crucial asset data from operations to enterprise. At the same time, gas distribution companies are required to control their capital expenditures and reduce operating expenses to increase profitability.

Sui Southern Gas Company (SSGC) selected the EC350 Volume Corrector for a major revamp of its gas meters, replacing a mixed installation of Honeywell and competitor electronic volume correctors.

Key factors in the success of the EC350 for SSGC included:

- Integrated UMB mounting
- Higher measurement accuracy through a digital plug-and-play pressure transducer, allowing for a decrease in the calibration cycle and a reduction in inventory
- Extended 5-7 year battery life with off-the-shelf alkaline batteries minimizing the need for site visits, simplifying the supply chain and reducing the cost of ownership
- Backwards compatibility with legacy Mini-Max
- Infrared port for easy configuration
- Ease of configuration through the new MasterLink software

The market-leading EC350 Volume Corrector and Pressure Monitor brings important benefits to our customers through its scalability, versatility and support of the 4G and Cat M1 cellular modem technologies.



The EC350 is fully integrated in Honeywell's metering ecosystem, which includes MasterLink as a configuration tool and PowerSpring as a meter data management solution.

Honeywell continues to drive the success of the EC350 by continuously improving and adding new functionalities. For example, virtual P4 functionality and enhanced cellular diagnostics were recently added to the unit. Virtual P4 enables users to calculate the differential pressure

across a rotary meter or a filter and alarm on condition. Enhanced cellular diagnostics allows them to add to the audit trail the tower the modem is connected to, enhancing signal strength, quality and other cellular parameters for better troubleshooting.

Pierre Dufour
HPS Global Product Marketing Manager
pierre.dufour@honeywell.com

HYDROGEN:

SLOWLY BLENDING INTO THE NATURAL GAS LANDSCAPE...

The energy transition is undoubtedly one of the biggest challenges the world is facing in the decades ahead. Across the globe, governments and industries are increasingly aware of the need for change in the way we consume and produce energy. Without question, hydrogen is the latest kid on the block. What is it that makes hydrogen draw so much attention? And what challenges is the natural gas industry facing to include this renewable gas in its day-to-day operation?

NOT AN ENERGY SOURCE

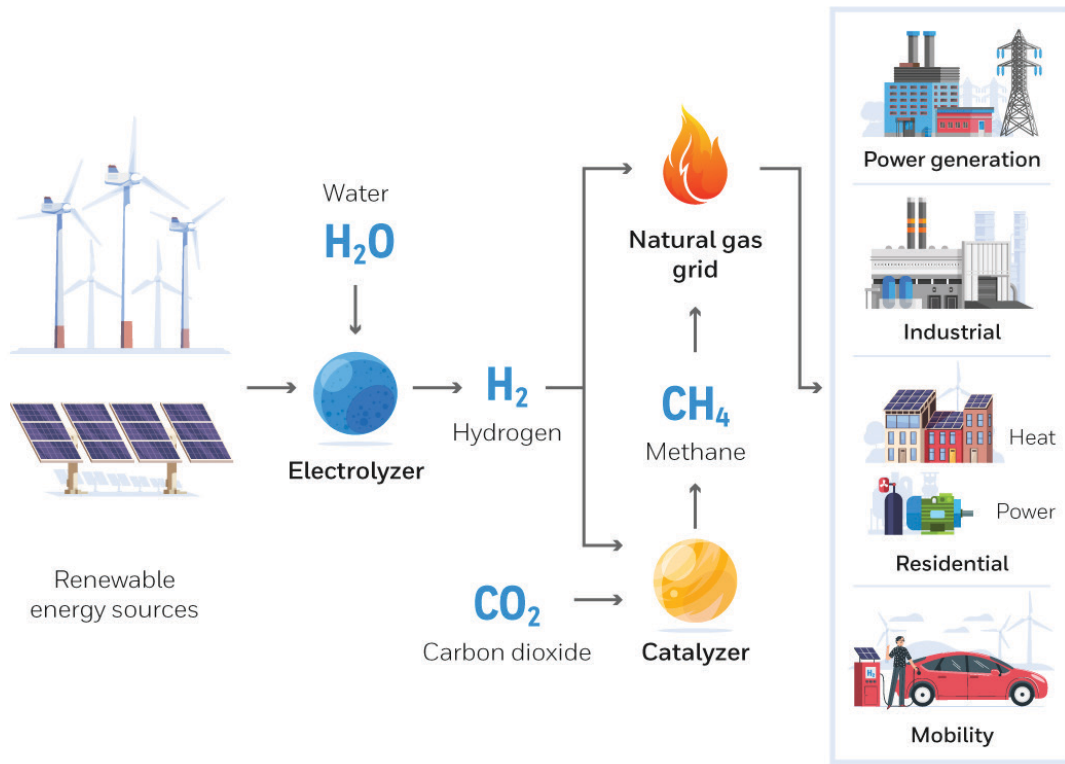
Hydrogen is the number one element in the periodic table of elements. It is the most abundant chemical substance in the universe. At standard conditions, it is colorless, tasteless and odorless but far from useless!

If we list a number of energy sources, we could start with the most important fossil-based fuels such as coal, oil and natural gas, followed by more renewable forms of energy like geothermal, solar, and wind energy. We would be tempted to add hydrogen to the list as a potential future “source” of energy. However, by doing so, we would make a fundamental mistake. Hydrogen is not a source of energy, and it is not a gas that can be harvested like we can do with all the others mentioned above. Hydrogen is an energy carrier. Having said that, one could claim that solar energy is, in fact, hydrogen-generated energy. The sun is one giant container of hydrogen and the energy it generates is the result of fusion of hydrogen into helium, so, indirectly, the importance of hydrogen to our electricity generation is already much higher than what we thought.



Here on Earth, hydrogen is not a natural resource that we can find in its pure form. The most common forms of hydrogen are in combination with other elements like oxygen in the form of water (H₂O) or with carbon in the form of methane (CH₄). It is, therefore, not a surprise that the most common ways to produce hydrogen are to use natural gas or water, and split hydrogen from these molecules. Using natural gas, the process is called steam methane reforming (SMR) and it is the most common way that

hydrogen is currently produced. The downside of this process is that carbon dioxide is formed in conjunction with hydrogen. This is something we want to prevent in the future energy production chain. Using water as the second option, the process is called electrolysis. This process involves immersing positive and negative electrodes in water. An electric potential is placed over the water molecules, which results in splitting the water into oxygen and hydrogen.



HYDROGEN IS COLORLESS... RIGHT?

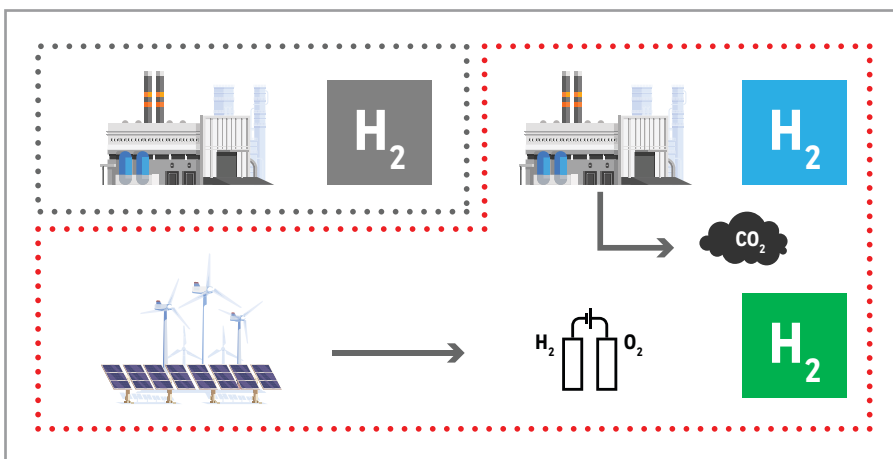
Hydrogen production is obviously not new. The different processes used in its production result in different “colors” of hydrogen. It is popular to refer to grey hydrogen when it is produced by steam methane reforming. In this process, carbon dioxide is generated and mostly emitted into atmosphere. There is also blue hydrogen, which is the same as grey but employs carbon capture storage to prevent CO₂ emissions into atmosphere. And there is the holy grail of hydrogen—green hydrogen—whereby no CO₂ is produced via electrolysis using green electricity from solar and/or wind.

Decarbonization of the energy value chain is on the agenda of many of our customers. Because of the existing gas infrastructure in large parts of the world, and especially in Europe, it is obvious that renewable gases have significant potential as an alternative to fossil fuels. However, electrification has its limitations. Certain energy-intensive industries, as well as heavy transport, are difficult or impossible to decarbonize by electrification. Hydrogen is one of the few options, if not the only alternative.

Storage of surplus electricity is another problem that can be solved with hydrogen. Wind- and solar-generated electricity that can't be used at the time it is produced is currently lost.

The electricity network has no buffer capacity like a gas grid. By using this excess energy for producing hydrogen via electrolysis, it is possible to store the renewable electricity in the form of a gas molecule in the natural gas grid.

As described here, there are good reasons why the industry is betting on hydrogen. But there are also clear drawbacks: The efficiency of producing hydrogen is relatively low (~60%) and the price for green hydrogen is not competitive with fossil fuels. This is likely to remain a challenge for the next 10-15 years. In addition, there are concerns about the impact of hydrogen on pipeline integrity; under certain conditions, hydrogen embrittlement of metals can occur. Another concern is safety; hydrogen molecules are the smallest gas molecules, and as a result, hydrogen leakage is more likely to occur than leakages of natural gas. Explosion protection is one more aspect that requires specific attention. Hydrogen in air has a much higher explosion risk than natural gas. Any concentration of hydrogen in air from 4-75% forms a combustible mixture. For natural gas in air, there is a much smaller range of about 5-15%.



Nevertheless, the industry is moving forward, and blue and green hydrogen production is expected to increase in the coming years. An important part of this is hydrogen finding its way into the gas grids or gas supply for energy-intensive industrial processes. The current thinking is that up to 10% or even 20% hydrogen could be blended into the natural gas grid without compromising safety and pipeline integrity. For this to happen, existing metering equipment has to be prepared in a way that is similar to the development of the biomethane market, where there will be dedicated systems to inject hydrogen into the receiving gas networks.

Currently, industrial users employing natural gas for their processes may want to switch over to hydrogen or, more likely, to a mixture of natural gas and hydrogen. This will require gas blending systems that blend in hydrogen directly into the natural gas supply to the processes. In this case, the percentage of hydrogen that can be used is totally dependent upon the type of application and may well exceed the 20%.



As Honeywell, we are committed to supporting developments around hydrogen. We are preparing our product portfolio to be suitable for natural gases blended with hydrogen. All of our gas metering and control products are now suitable for at least blends with up to 10% hydrogen. We plan to be ready for blends with 20% hydrogen by the end of this year. Apart from the hydrogen readiness of our individual products, we will support the industry with both hydrogen blending and grid injection systems.

With our product portfolio and experience injecting other renewable gases such as biomethane into the gas grid, Honeywell is confidently entering this new field of opportunity and can support your hydrogen blending and injection applications. There are many new aspects to blending hydrogen with natural gas, and we don't claim to have all the answers, but we are committed to helping you find them.

Addy Baksteen

addy.baksteen@honeywell.com

THE GLASSLAB

Q2

Forehearth, doghouse, checkers, oxy-combustion, crown heaters and batch-hoppers. Do you know what I'm talking about when I mention these words? All these terms come from a glass-melting furnace. Glass manufacturing is one of the most energy-consuming operations in the world, and as such, each megajoule that can be saved on melting glass can have a major impact on the annual energy bill and end quality of the manufacturing batch.

Glass manufacturing starts with sand and other ingredients that are melted at temperatures as high as 1,600 degrees Celsius. Natural gas is easy to handle and burns cleanly to achieve this temperature, thereby creating less emissions than heater fuel or bunker oil fired plant.

Accurate temperature control during the glass-melting process is critical for production quality. Failure to control the temperature within a tight range can result in batch wastage. With a feedback control loop, it is essential to measure oxygen amounts in the melting furnace and make adjustments to the gasses coming in to the furnace. But as the name indicates, feedback is done at the back and is naturally slower by nature.

A feed-forward process control loop strategy, used in combination with the feedback control loop, measures gas levels coming into the furnace and enables control systems to make predictive and active adjustments. A gas chromatograph (GC) is normally employed to measure the gas quality. The parameters measured by the GC (density/heating value and wobble-index) are then used to optimize the flows for mixing air or oxygen to the used fuel gas. This mixing of gasses



is a critical factor, since natural gas is fundamentally a mixture of gases whose composition changes over time, impacting the total calorific value. Because the GC is somewhat slow, having a faster and more accurate device would help make glass-oven control even better.

THE SOLUTION

Honeywell's Elster® GasLab Q2 Gas Quality Analyzer can determine the calorific value, density, Wobbe index, and other factors of natural gas fuel before it reaches the combustion control system. This compact, comprehensive natural gas analyzer continuously monitors the quality of the natural gas, updating its digital and analog outputs every second. With a built-in, user-adjustable, speed-loop bypass and a T90 or two seconds, the Gaslab Q2 can provide accurate feed-forward fuel quality signals to your combustion control system.

THE VALUE

Feed-forward control is faster than feedback control. And the GasLab Q2 is faster than any gas chromatograph. The combination of the two provides a crystal-clear answer: No matter your gas inlet composition, the GasLab Q2 provides a looking-glass into your plant optimization.



Hans-Peter Smid

hans-peter.smid@honeywell.com

A SUCCESS STORY MADE POSSIBLE BY HONEYWELL

Last year, the GASAG Group invested around 100 million euros in the construction, maintenance and servicing its rework and systems. With a pipe network length of over 14,000 kilometers, almost 800,000 customers are supplied, mostly in Berlin and Brandenburg.

HISTORY OF THE BUCKOW TRANSFER STATION PROJECT

The year 2020 was special for many reasons, but also exciting – for us, as well as for our customers. One of them, NBB Netzgesellschaft Berlin-Brandenburg mbH & Co. KG, invested millions at the end of 2020 to secure the natural gas supply of the German capital for the next few decades. The western part of the city (formerly known as West Berlin) has been supplied with Siberian natural gas via a separate pipeline from Russia via the Czech Republic since 1984. The Buckow Transfer Station is now the most important entry point into the inner-city natural gas transport pipeline (DP 40) to the Vattenfall power plants and the two pressure reducing and distribution stations in Berlin-Mariendorf and Berlin-Charlottenburg.

At the transfer station in Buckow, the gas supplied by the transport grid operator ONTRAS Gastransport GmbH is cleaned using filters, the volume is measured using an ultrasonic gas meter, and the quality is analyzed using a process gas chromatograph. The gas pressure is then reduced and fed into the regional Berlin grid, which is operated by NBB. In addition to four other network interconnection points, the Buckow Transfer Station represents the most modern and efficient entry point (450,000 m³(st)/h) for supplying gas to the capital city of Berlin.

NBB invested 22.5 million euros in the new building in just 18 months.

NBB NETZGESELLSCHAFT BERLIN-BRANDENBURG MBH & CO KG – KEY FIGURES AT A GLANCE

TECHNOLOGY		
Transport volume	GWh	43,575
Pipe network length	km	14,116
High pressure	km	2,970.5
Supply grid	km	11,145.2
Mains connections	Units	351,946
Installed gas meters	Units	774,039
PERSONNEL		
Employees	Total number	739



HONEYWELL'S SCOPE OF DELIVERY:

- 8 safety shut-off valves of the HON790 series, DN 150, ANSI 600
- 8 safety shut-off valves of the HON711 series, DN 200, ANSI 600
- 2 HON512 gas pressure regulators with pilots, DN 200, ANSI 600
- Flow control valves of the HON530 series, DN 200, ANSI 600
- Small pressure regulators of the HON200 series
- Double safety shut-off valves of the HON703 series
- Safety relief valves of the HON873 series
- Monitoring device of the HON917 series

INTERVIEW WITH MR. OLAF DERLIN, LICENSED ENGINEER (DIPL.-ING. FH), HEAD OF SYSTEMS OPERATIONS AT NBB

Why did the station have to be remodeled/renovated?

The reconstruction of the transfer station had become necessary because it was not possible to accommodate modern technical systems such as those for quantity and quality measurement in the existing structures. The design of the old station no longer corresponded to the need for state-of-the-art capabilities, and maintenance and repairs were becoming increasingly difficult.

How many people worked on this project?

Approximately 150 to 200 people were involved in the reconstruction of the station. This included the areas of planning, structural engineering, civil engineering, building technology, plant engineering, welding technology, electrical engineering, telecontrol technology and specialist trades such as emergency power system,

control technology, heating construction, horticulture, water supply, power supply, etc.

What were the biggest challenges in carrying out the construction work?

The project was a major technical challenge. The station was built in the same place as its predecessor. During the construction work in the winter months of 2019/2020, the uninterrupted operation of the station had to be maintained via provisional measures in order to guarantee the supply of gas to Berlin's power plants and other customers. As such, the major part of the work was carried out outside of the heating season.

Were there any unexpected situations when carrying out the project?

No, there were no unexpected or critical situations. Everyone involved worked very professionally. The collaboration between the NBB project management team (Mr. Thomas Brose/Ms. Marion Schwenk) and FRIEDRICH VORWERK SE & Co. KG (Mr. Thomas Bode and Mr. Paul Neumann) went extremely well. The station was put into operation on time for the 2020/2021 heating season and was able to prove its functionality and reliability in the first few months after commissioning, with outside temperatures down to -15°C (5°F) and feed-in quantities of $300,000 \text{ m}^3(\text{st})/\text{h}$. A particular challenge in connection with the location of the station, in the immediate vicinity of the residential area, was the noise emissions to be expected at full load. Here, the gas pressure regulators and the design (building and plant construction) of the system met all requirements perfectly. The measured sound level complies with all legal requirements, even at night.

What was the economic impact of this reconstruction?

Thanks to this investment, Berlin is well positioned in terms of natural gas supply for the next few decades. Instead of continuing to operate the old station with high environmental, financial, and organizational effort, NBB Netzgesellschaft Berlin-



Brandenburg has laid the groundwork to meet the increasing energy needs of the growing German capital.

Why did you choose Honeywell devices, and what were the most important factors in your selection process?

The collaboration between GASAG/ NBB and Honeywell has a very long history. As early as the 1970s, GASAG employees, along with their colleagues from Kassel, Germany, were analyzing and optimizing procedures for gas pressure regulators and safety controls. For many years, we have been convinced of the reliability of the Honeywell devices, including regulators, safety shut-off valves, and safety relief valves. The advice on the selection of components/assemblies in the event of technical challenges or the service in the case of special features regarding maintenance has been excellent. When the new Waltersdorf Transfer Station (DP 70, $300,000 \text{ m}^3(\text{st})/\text{h}$, 3 streams) was built in 2014, Honeywell devices were used in the main assemblies. Here, too, we were convinced of their reliability.

Honeywell devices meet all the requirements for a modern gas supply system and their pairing with electronic controls works perfectly. We will continue to use this proven technology for future construction projects.

Tim Vogel

tim.vogel@honeywell.com

UNDERSTANDING THE METROLOGY IMPACT

In the energy transition, biogas and “blue hydrogen” will play a significant role, and thus transportation of natural gas mixes with hydrogen (H₂) and carbon dioxide (CO₂) is of economic importance. For billing of such gases, it is important to know which legacy industrial gas meters are suitable and fit-for-purpose.

METROLOGY IMPACT ON OTHER GASES

Legal metrology and standards are documented and traceability is arranged for natural gas. Flow calibration is mainly done using natural gas or air as a medium. Since the injection of hydrogen into the gas grid will increase significantly over the next few years, research is required into the metrological characteristics of industrial gas meters for these mixtures. For this purpose, DNV started a Joint Industry Project (JIP) to determine the metrology impact of transitional sustainable gases. Ten European Transmission System Operator (TSOs) and several flow meter manufacturers are involved. Honeywell is participating in this project.

TRACEABILITY TO NATURAL GAS WITH THE HIGHEST STANDARD FOR FLOW REFERENCE

The DNV facility MPFLG was designed in 2012 for multi-phase flow mixtures of gas, water, and oil. To reach the highest level of traceability, a new and highly accurate sonic nozzle system was developed as part of the JIP together with the German metrology authority PTB. This nozzle system has a mass flow uncertainty of about 0.12% on pure gases and 0.15% on gas mixes. Transferability from one gas to another gas is easily obtained, as the test setup and instrumentation does not change from one gas to another.

Honeywell participated in the JIP with a turbine gas meter (TRZ2) and an



ultrasonic gas meter (Q.Sonic^{max}). In addition, two legacy meters (Q.Sonic-3S and TRZ) from Honeywell were made available for this test by a TSO. At the end of January, the test program was carried out using the MPFLG test facility in Groningen to determine the behavior of 13 meters in series (nine ultrasonic and four turbine meters) towards pure gases like methane and nitrogen and towards natural gas mixes up to 30% hydrogen and 20% CO₂. The complete test results are currently being compiled and evaluated. We will report on the results in an upcoming issue of Profiles.

Eric Bras

eric.bras@honeywell.com

SCHLESWIG-HOLSTEIN NETZ RELIES ON INNOVATION IN GAS PRESSURE CONTROL TECHNOLOGY

Schleswig-Holstein Netz has been using Honeywell (formerly RMG) products in the area of control technology for many years and has had consistently positive experiences with them. As such, Honeywell's introduction of the new gas pressure regulator, HON5020, in June 2019 at Schleswig-Holstein Netz's technical center in Rendsburg was eagerly awaited.

The innovative thing about the new HON5020 is that this regulator can be used at the pressure levels DP 16 to ANSI 600. Schleswig-Holstein Netz operates a high-pressure natural gas network at pressure levels from DP 5 to DP 84. In the past, HON402/ HON330 regulators were used at pressure levels of up to DP 16, while the HON503 type was used at higher pressure levels. The new HON5020 regulator is meant to combine these two types of regulators into one.

The great advantage for Schleswig-Holstein Netz would be that employees no longer had to be trained on different devices. In addition, the flow restrictor used with this solution was impressive. It could reduce the output in steps of 25%, 50% and 75% or increase the output again in these steps when the flow restrictor is removed.

Schleswig-Holstein Netz quickly found pilot projects for use of the new HON5020 regulator in order to gain experience for the future. Three projects within the company's Planning and Construction of Gas Pressure Reducing and Metering Stations Department, which were being prepared for the tendering process, were adapted for this purpose.

THE CONSTRUCTION OF THREE NEW GAS PRESSURE REDUCING STATIONS INCLUDED:

- Wittenborn gas pressure reducing station: PN 16 system with two output pressure levels of DP 5 and PN 1 with a standard volume (V_n) of 5,000 m³/h; start-up in April 2020
- Büsum gas pressure reducing station: PN 80 system with two output pressure levels of DP 5 and PN 1 with a standard volume (V_n) of 5,000 m³/h; start-up in September 2020
- Witzwort gas pressure reducing station: PN 80 system with an output of DP 1 and a standard volume (V_n) of 1,500 m³/h; start-up in October 2020



Gas pressure reducing station "Witzwort"



Gas pressure reducing station "Wittenborn"

Since gas pressure regulators from Honeywell have a high "recognition value," the technicians from Schleswig-Holstein Netz were able to put the regulators and the safety devices they were already familiar with into operation without any further training.

According to DVGW Code of Practice G 495, newly installed gas pressure reducing stations are subject to a two-year maintenance period. After this period, Schleswig-Holstein Netz can make statements about possible signs of wear and tear on the components. Until then, the employees will regularly carry out visual inspections and function tests of the devices in order to gain experience.

We can't wait!

**FRANK OHM
SCHLESWIG-HOLSTEIN NETZ AG
NETWORK SERVICES – GAS PLANNING /
CONSTRUCTION**

Maher Kurdi

maher.kurdi@honeywell.com

HOW TO SECURE THE BEST QUALITY SUPPORT – TODAY AND TOMORROW

Getting the right service level at the right time is a crucial aspect of the gas world.

In changing environments, where the gas expertise is concentrated in a decreasing number of employees with long-term experience, and the pressure on economies of scale remains high, a streamlined and focused service offering is key for successful future business.

As a customer, you need cost-efficient, fast response time. You have the clear expectation that you pay for just what you need. The payment



terms should be transparent and enable a plannable outlook.

At Honeywell, we listened to customers in establishing a totally integrated service organization. We offer a comprehensive Technical Assistance Center, Field Service Engineers and a Global Engineering Team to deliver support that meets your expectations.

Recently, we placed stronger emphasis on the remote and training needs

of your business. Our key question was: How can we best address your needs today and in the future?

Honeywell’s local Technical Support and the Global Technical Assistance Center (GTAC) deliver hotline support whenever you need it. They also cover individual remote projects (system support) such as remote commissioning, Modbus connection, special programming, integration of third-party devices

	Remote Deliverables	No contract	Total Care Lite
HOTLINE	Hotline support (8x5) – S (up to 6 Cases)	<ul style="list-style-type: none"> Written response according to incoming order 	<ul style="list-style-type: none"> Personal response within 1 working day Commissioning hints (15-20min) Documentation service
	Hotline support (8x5) – M (up to 12 Cases)		
	Hotline support (8x5) – L (Unlimited)		
SYSTEM SUPPORT	Remote Commissioning	@ Cost	 20% discount on all System Support offerings
	Communication interface to 3rd party system e.g., Modbus connection to a customer PLC		
	Special programming of devices e.g., Plant control / Special events / Customized archives		
	Test read outs and archive analysis		
	Connection of 3rd party devices e.g., Link into central remote reading, 3rd party GC on FC1, etc.		
	Plant modernization e.g., All-IP conversion, Product Migrations		
TRAININGS	Trainings (Onsite and Webinars)	@ List price	 20% discount on all Trainings



into flow computer systems and migration support to help you build up required product know-how.

Transparency is important to Honeywell. When we created our remote contract model, we used the existing hotline case analysis as reference for a model consisting of three main clusters. We started with a small package for one case contact every two months, and then added a medium package with up to 12 case contacts per year. Finally, we included a Large offer with unlimited case contacts per year so you are served according to your level of need.

Speed is another crucial requirement. When you choose a TotalCare Lite Contract, you are assisted in a special way, as we use premium e-mail addresses and phone numbers to receive your requests. This guarantees that you are always top of the list with your topics.

But we did not stop there. We included all system support services and training in the packages, too. Purchasing a TotalCare Lite contract means you receive discounted pricing on these offerings.

At the end of the day, you can take advantage of a holistic service solution that minimizes the need for expensive onsite visits, avoids trial and error approaches and saves time on inefficient searches in manuals or online.

TotalCare Lite is THE Remote offering for your business!

Do not hesitate — contact us to inquire about a package that's right for you.

Nelson Silva

nelson.silva@honeywell.com

GAS SKID MIGRATION:

MAINTAINING YOUR GAS STATIONS PERMANENTLY WITH A STATE-OF-THE-ART SOLUTION

Today, plant operators are under constant pressure to achieve greater cost efficiency, improve asset integrity, increase uptime, and reduce risks.

To enable operational excellence, a lot of effort has to be made to optimize the entire value chain, respond to increased digitization of operations, and yet remain agile enough to keep pace with rising global demand and constantly changing market conditions.

Offering a broad portfolio for gas stations, Honeywell can help you meet your critical operational and business objectives. Keeping your installed base in optimal condition requires continuous observation of conditions with the devices themselves.

Honeywell is committed to freeing up your time to focus on the changing market environment and strive for a competitive advantage. We have created an initiative that addresses your complete plant as a target.

No matter the gas products in your pipeline, we want to address them in a holistic manner and minimize the “taken by surprise” sensation when troubles arise. Our Gas Skids Migration initiative considers your gas metering equipment, as well as your flow computers and gas chromatograph devices. We also take a close look

at your supervisory control system and device health controlling gas software. Remote and onsite support contracts complete the offering.

Instead of simply recommending an upgrade when a device is broken, we expand your view to a long-term, calculable future. As a result, you gain a clear understanding of your long- and short-term costs and have a complete, state-of-the-art station with reduced risk of costly downtime.

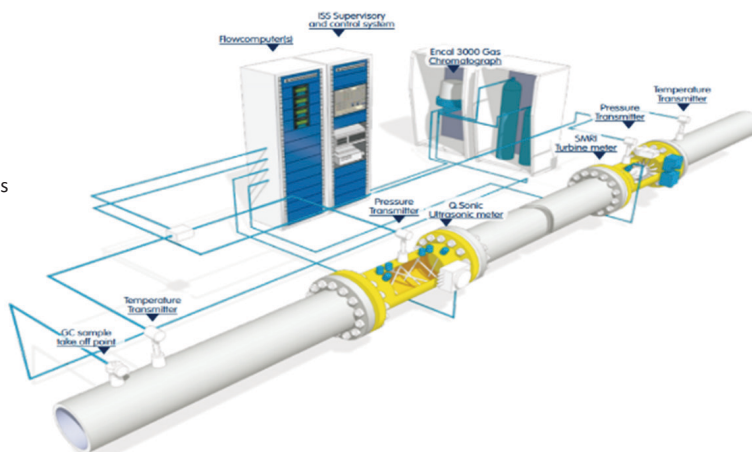
COMPREHENSIVE GAS SOLUTIONS ACROSS THE COMPLETE GAS VALUE CHAIN

Business Management

- Performance monitoring
- Data management
- Gas safety control

- Integrate metering solutions
- Migrations and Upgrades
- Lifecycle Services
- Field Operations Excellence
- Remote Support
- Calibration Services
- Commissioning
- Trainings

Engineering & Services



Safety & Security

- Safety shut-off valves
- Relief valves
- Workforce safety & compliance
- Personal gas safety
- Cyber Security
- Industrial security

- Control Systems ISSplus
- Gas flow measurement
- Gas quality measurement
- Gas regulation
- Cyber Security
- Remote connectivity

Operations

Using the latest software and supervisory solutions also gives you the most reliable protection against cyber-attacks.

Besides taking care of your equipment updates, this visionary approach pays off significantly. Our 10-15% discounts on the total price provides significant cost savings.

Talk to our experts to guide you through a sustainable update plan.

Nelson Silva

nelson.silva@honeywell.com

CATEGORY	PRODUCT	VALUE PROPOSITION
Meter Upgrade	UFM Retrofit kit:Series 4 to Series 6	<ul style="list-style-type: none"> Remote health care allows reduced onsite visits delivering impressive TCO reduction Lifecycle extension reducing CAPEX Risk mitigation of LAUF Gas (significant revenue loss in downtime situation)
	SM-RI-XK-Head to MI-2 Head	<ul style="list-style-type: none"> State-of-the-art index head enables fast response times reducing downtimes
FC Upgrade	FC2000 to FC1	<ul style="list-style-type: none"> State-of-the art security level Highest flexibility through modular hardware approach and loadable software applications (AFB)
GC Upgrade	EnCal3000 C6+ to EnCal3000 C9 (hydrocarbon dewpoint)	<ul style="list-style-type: none"> Lifecycle extension and therefore reduction of OPEX due to material-compatible technology avoiding disadvantages of standard mirror solution
	EnCal3000 CPU 4.03	<ul style="list-style-type: none"> Highest system stability for lowest downtime Best Cyber security protection
SW Upgrade	MIQ	<ul style="list-style-type: none"> Reduce Lost and Unaccounted for Gas and Cut Operating Expenses Reducing OPEX by extending Calibration Periods and Reducing Engineer Site Visits Downtime prevention as Meter or Process Issues are detected and diagnosed quicker
SVC Upgrade	ISS / ISS PlusWindows 7 to Windows 10	<ul style="list-style-type: none"> Vulnerability reduction due to state-of-the-art cyber security level Newest Hardware secures immediate availability of parts
HOLISTIC OFFER		ONE-STOP-SHOP

WHERE APPLICABLE		
GC Upgrade	GasLab Q1 to GasLab Q2	<ul style="list-style-type: none"> Risk mitigation of breakdown and prolonged downtime as no support for running system

INFORMATION IS AVAILABLE QUICKLY AND EASILY

Hydrogen in the natural gas network is currently one of the top topics in gas metering. Honeywell has published a large number of documents on this subject, which are now available for quick and easy download in the Docuthek.

You can find an introduction to the topic "Hydrogen in the Natural Gas Network" on the top navigation level of the Docuthek. To enable an efficient search, the topic is divided into two sections.

In the "Supplier's Declaration" section, you will find declarations according to the Association of the German Gas Pressure Regulator and Gas Meter Industry (grzi) for

the current Honeywell gas metering devices. Since this information is frequently requested, we have provided a separate section for it.

In addition to an overview of the suitability of Elster gas metering devices, the "General Customer Information" section contains presentations and other documents that help you stay up to date on our activities.

But, of course, that is just the beginning. We will continuously expand the section to include information on our standardization activities, participation in external research projects and much more.

Please check back frequently!

Bernhard Thomas

bernhard.thomas@honeywell.com

The screenshot shows the Honeywell Docuthek interface. At the top, there is a navigation bar with 'Honeywell', 'LOGIN', 'EXTENDED SEARCH', and 'HELP'. A search bar is also present. Below the navigation bar is a main menu with categories like 'Thermal Solutions', 'Products', and 'Elster-Instromet'. A sub-menu is open under 'Elster-Instromet', listing various product categories. A blue arrow points to 'Hydrogen in the natural gas network'. Below this, a 'SUPPLIER'S DECLARATION' section is visible, containing text about the supplier's declarations for gas metering devices. At the bottom, a table lists documents with columns for Name, Language, Type of document, Size, Edition, Date, and Details.

Name	Language	Type of document	Size	Edition	Date	Details
EK205 - Herstellererklärung/Supplier's Declaration (DE, EN)	All	Certificate	242kB	2021.01 (201216)	12.01.2021	
EK280 - Herstellererklärung/Supplier's Declaration (DE, EN)	All	Certificate	242kB	01.2021 (201216)	12.01.2021	
EnCat 3000 - Herstellererklärung/Supplier's Declaration (DE, EN)	All	Certificate	246kB	09.2020 (Rev.1)	04.01.2021	

Would you like to receive news?

<https://www.elster-instromet.com/en/profiles>

Subscribe now!



Elster GmbH

Steinern Straße 19-21
55252 Mainz-Kastel, Germany

www.elster-instromet.com
www.hongastec.de

Honeywell Process Solutions

2101 CityWest Blvd
Houston, TX 77042

Honeywell House
Skimped Hill Lane Bracknell
Berkshire, England RG12 1EB UK

Building #1, 555 Huanke Road
Zhangjiang Hi-Tech Industrial Park
Pudong New Area
Shanghai 201203

www.honeywellprocess.com

**THE
FUTURE
IS
WHAT
WE
MAKE IT**

Honeywell