

HONEYWELL **GAS RENEWABLES**

Solutions for injection
of renewable gases
into gas grids

Honeywell

RELIABLE RENEWABLES. REMARKABLY SIMPLE.

Create a greener future with Honeywell's simple, sustainable and efficient gas renewables solutions.

We offer pre-assembled, proven and cost-effective grid injection to accelerate moves to a carbon-neutral future.

The shift from conventional energy to renewables is gathering pace. Renewable energy is now the fastest-growing source of energy. International ambitions to reach net zero by the second half of the century has seen even more ambitious national commitments.

On the journey there, though, natural gas continues to play a major role, providing abundant and reliable energy, with much lower emissions than oil or coal. For a greener future, we need solutions to bring these sources together.

INJECT CONFIDENCE INTO YOUR GRID

Honeywell's turnkey renewables solutions provide grid operators, hydrogen and biomethane producers, and integrators with reliable, safe and compliant solutions for injecting renewables into the gas network.

We offer complete, standardized solutions that significantly lower the cost of biomethane and hydrogen injection facilities when compared with bespoke solutions.

Honeywell provides simple solutions that nevertheless answer the complex challenges involved in renewables injection:

- Custody transfer flow metering
- Gas quality analysis, including measurement of impurities such as oxygen and hydrogen sulphide contaminants not always quantified in natural gas, but common in biomethane
- Pressure control and compression, as required
- Conditioning: propane injection and mixing, where needed to increase heating values
- Protection against unacceptable blend ratio's
- Recycling of off-spec gas
- Full compliance with all relevant national and international regulations

Our pre-built systems are fully customizable to include all components required, including integrated controls, flow meters, gas chromatographs, odorization stations, particle filters, valves, network telemetry equipment, and anything else required to meet industry standards, local regulations, and the needs of the gas grid operators

PROVEN SOLUTIONS

Honeywell was a pioneer in Germany and in the UK biogas industry, providing one of the first commercially built Biomethane grid entry unit (GEU) in the country. Today, more than 300 Honeywell renewable injection systems operate across Europe. That includes more than 200 of our compact biomethane injection systems supplied to one of the largest distributors of natural gas in Europe.

Our established renewables solutions are built on decades of experience across Europe, Asia and the US in gas metering, quality analysis, pressure control and custody transfer. We draw on one of the most comprehensive portfolios in the natural gas industry, with industry-leading flow meters, gas chromatographs, flow computers, pressure regulators, PLCs, and odorization systems.

Honeywell's worldwide network of engineers also has extensive experience working closely with local system integrators and, where required suppliers of third-party devices. We have the portfolio, expertise and flexibility to be your pipeline to carbon-neutral success.

BIOMETHANE INJECTION: GREENING THE GRID

Honeywell is the world's largest supplier of biogas injection stations. We help power the equivalent of over one million homes, with renewable energy delivered through the gas grid but produced from domestic garbage and agricultural, farm and industrial waste.

Our biomethane stations provide proven, reliable technology for injecting upgraded biogas into the natural gas grid in compliance with all local regulations. We offer high availability and maximum security for both biogas suppliers and grid operators in a compact and cost-effective package.

Offering tight control of the pressure, quality and flow, our solutions can also include conditioning, blending the renewable gas with LPG to match pipeline gas heating value.

The Honeywell biogas grid injection systems are prefabricated and available in several versions like a three- or five-compartment solution.



HYDROGEN INJECTION: UNLOCKING GREEN ENERGY

Moves to add hydrogen to natural gas pipelines can significantly accelerate the move to sustainable energy. Power to gas technology can convert excess electricity from renewable sources or resulting from grid limitations into hydrogen. It can also harness wind or solar energy to produce hydrogen from water using electrolysis – green hydrogen that can be captured, stored, transported and reused. But also hydrogen produced from fossil sources combined with Carbon Capture Storage can be used to replace fossil fuels and is a contribution to carbon emissions reduction.

The move to hydrogen poses challenges for gas measurement technology. Traditional natural gas chromatographs cannot detect hydrogen. For the low concentrations normally found in natural gas pipelines that's not a problem, but, with injection of hydrogen into the grid, it's a critical failing point. Our EnCal 3000 E-Gas Honeywell offers a solution and will accurately measure Hydrogen in combination with the normal natural gas component.

Honeywell is leading the way in helping unlock this green energy for use in the grid. We're ensuring our portfolio is hydrogen-ready, with meters that can measure natural gas with up to 30% hydrogen. With our experience in blending biomethane in the grid we have expanded our offerings to hydrogen blending and grid injection systems to help our customers in the industry as well as grid operators to decarbonize their operations and reduce their global footprint.



H2 GRID INJECTION MADE EASY

The grid injection system is designed to inject hydrogen into distribution as well as transportation gas grids. The system is designed to operate continuously and is packed in standard sea-containers for easy transport and fast deployment into the field. The system exists of the following functional parts:

- Hydrogen pressure reduction (if required)
- Hydrogen flow metering line
- Flow control system controlling the hydrogen flow
- Natural gas metering line

- Fast Gas Quality Measurement system of incoming natural gas
- Static blender for comingling of Hydrogen and Natural gas
- Gas quality measurement of blended gas
- Fire and gas detection
- Flow computer system
- Metering and blending control systems including RTU / Telemetry
- Cyber secure remote monitoring system

Accurate flow measurement of both the Hydrogen stream as well as the natural gas stream is key for an

accurate blending process. Based on flow ratio we control the hydrogen flow into the natural gas stream and using accurate gas quality measurement the result of the blending is validated.

By measuring the heating value of the natural gas stream it is possible to calculate the maximum amount of Hydrogen that may be allowed to be injected while maintaining the allowable Wobbe-index range of the blended gas.

By standardizing the injection system and pre-packing it in a standard sea-container cost savings are realized while delivery times, installation and commissioning duration are shortened, allowing for more rapid project turn around.

A POWERFUL PORTFOLIO

Honeywell's renewables systems are built on our industry-leading devices and decades of experience in the natural gas market. We offer a broad portfolio of products delivering reliable operation, powerful performance and a low cost of ownership. Honeywell Metering: We're a leading provider of Intelligent Metering Solutions. We help customers worldwide improve revenue, reduce operating cost and enhance customer service through a market-leading portfolio that includes ultrasonic flow meters, rotary meters, turbine meters, gas quality analysers, pressure regulators and flow computers.

Our metering solutions minimize uncertainty, maximize reliability and boost efficiency to build better businesses. We combine the most advanced features, flexible options tailored to wide-ranging applications, and a lower cost of ownership – backed by decades of experience.

Offering the best performance in the business, we're constantly pushing the boundaries. Already our meters can measure natural gas with 20% or even 30% hydrogen. Preparing for the future, proven today, our solutions help you keep with the flow.

The EnCal 3000 is Honeywell's state-of-the-art gas chromatograph. Designed for natural gas energy measurements, it's been specially adapted to measure all main components of biomethane, including H₂, O₂ and H₂S, and is approved by the PTB, LNE and OFGEM for use in metrologically approved metering systems. For the optional measurement of hydrogen, the EnCal 3000 uses Argon as a second carrier gas.

EnCal 3000 biogas version uses different analytical columns specifically selected for the application. The oxygen present in the sample must be separated from the nitrogen, which is best handled with a molesieve column. Molesieve columns are particularly sensitive to water and CO₂, which are removed using special filter cartridges inside the gas chromatograph's housing.

EnCal 3000 H₂: To accommodate for hydrogen in the gas network we developed the EnCal 3000 H₂ version. It measures up to 20% of hydrogen in natural gas and can be used to control a blending process of hydrogen and natural gas.



The GasLabQ2 is Honeywell's fast acting gas analyser which is used in Biomethane applications to condition the gas heating value by adding propane. Because of its extremely fast response time of <5 seconds it is an excellent device for control applications that require a faster control loop than any gas chromatograph can offer. In the grid injection systems the GasLab Q2 can be used to give a fast update of the heating value of the measured gas allowing for accurate admixture of propane, calculation of allowable levels of H₂ blending and prevention of injection of off-spec gas to the gas grid.



The TRZ, RABO or Q Sonic

Max are Honeywell's gas flowmeters that are used for measurement of the natural gas or biomethane flows in our injection solutions. Depending on the process condition a turbine-, rotary- or ultrasonic flow meter will be selected.

Important aspects in selecting the right flowmeter type are the requirements for turndown ratio, pressure rating and aspects related to pressure drop and meter robustness. With our extensive meter portfolio there is always the optimal solution available.

Combined with our a volume corrector from our **EK series, Mercury** product line or flow computer **FC series** the gas measured will be converted to standard conditions for custody transfer purposes.

Where applicable metrological approvals like PTB, OFGEM and LNE are available to comply with local regulations.



Stay Connected with Honeywell Connected OEM

With a future ahead of us where an increasing amount of distributed assets will have to be managed, operated and maintained it is crucial to be able to monitor the health and performance of your systems in the field.

Honeywell Connected OEM gives the connectivity and visibility into the grid injections systems to identify the performance and potential issues that may arise from component failures, faulty operation, inadequate maintenance practices, changing conditions or increasing loads. It will enable you to prevent and resolve issues more quickly, cheaply and effectively.

Connected OEM gathers data from sensors on equipment across sites using Honeywell's ControlEdge™ PLC and RTU controllers.

It's then securely transferred to the Cloud through an intermediate modem or smart gateway. Leveraging our proven Experion platform,

it offers a secure, scalable and continually improving solution. Once there the data is stored

in the historian and users can draw on a range of Honeywell analysis and visualization tools



KEEPING YOU AND YOUR CUSTOMERS SECURE

Honeywell is a market leader in cybersecurity, bringing you the power of connectivity while mitigating the risks from internal errors and external threats. Using Honeywell's ControlEdge™ PLC and RTU, Connected OEM gives users native Cloud connectivity with the MQTT protocol for easy integration.

Field Instruments & automation portfolio:

Our field instruments and PLCs are designed for reliable operation, ease of use and a low costs. Market-leading SmartLine® transmitters are used worldwide for highly accurate pressure and temperature measurement, including in high-end custody transfer applications.

For measurement in Hydrogen our pressure transmitters make use of gold plated diaphragms.

With MID approvals, the transmitters offer a fast response time, predictable linear stability and features such as advanced diagnostics and tamper alerts.



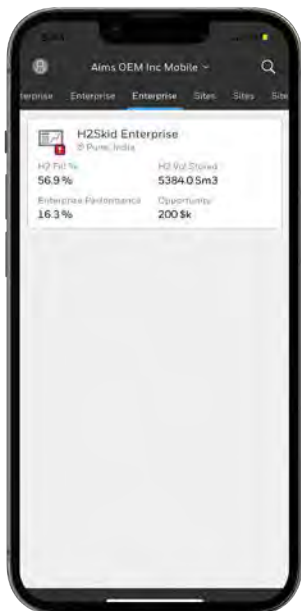
It also comes with embedded cybersecurity certified for ISASecure EDSA Level2. Connectivity to assets can use an independent cellular network without tapping through plant networks to minimize threats. For small machines or large, we offer a solution that's simple, secure and ready to get you connected.

Honeywell's odorizing systems

ensure a constant odorant concentration independent of gas flow rate variations. With options for backup pumps, continuous level measuring, overfill protection and odorizer flow rate measurement, our solutions offer low maintenance and maximum flexibility for a reliable solution.



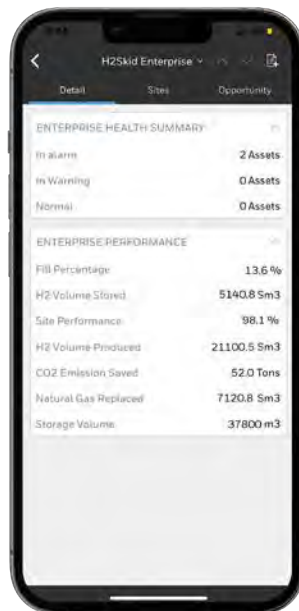
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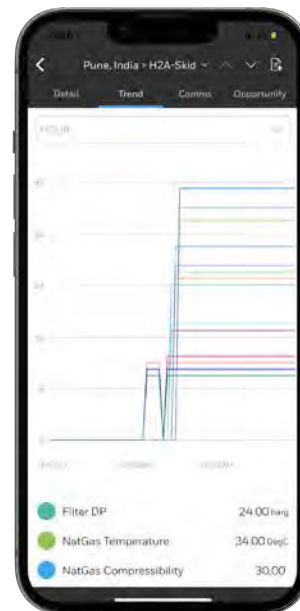
Enterprise view



Site view



Details view



Trend view

Cost savings

- Remote support and troubleshooting to cut travel costs with fewer site visits
- Improved visibility and health monitoring for more efficient servicing and maintenance
- Supports predictive maintenance programs to reduce failures
- Optimize services and workforce allocations

WHY HONEYWELL?

Honeywell brings decades of experience in gas and liquid metering. Our proven solutions are relied on by local gas distributors and grid operators worldwide.

Today, we're the leader in biogas injection stations and offer a seamless, integrated systems for renewables: Turnkey solutions for measurement and control from a single, trusted supplier, using market-leading, proven technology.

Standardized and prefabricated but tailored to your precise requirements, we offer a more cost-effective, compliant and low-risk route to low carbon energy. With worldwide scale and local support, we're the long-term partner and shorter path to a greener future.

For more information

To learn more about our offering, visit
process.honeywell.com or contact
your Honeywell Account Manager.

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**THE
FUTURE
IS
WHAT
WE
MAKE IT**

Honeywell