



## BIOGAS

# Make optimal use of renewable energy with the right process instrumentation and analytics

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### Process instrumentation and analytics – solutions for biogas plants

Biogas plays a significant role within the renewable energy sector, with the particular emphasis being on the economy of biogas plants. By using tried and tested technologies, the efficiency of biogas production can be optimized. The automation and design of the measurement and analysis systems make a long-term contribution to optimum gas production in biogas plants.

Whether in small installations with the simplest measurement equipment, or large plants with gas purification and feed-in to the natural gas network, it is always indispensable to have key information directly from the process.

For this reason, particularly in the field of instrumentation and analysis, a practical design should be prepared at an early stage that

will make a lasting contribution to the economic success.

A host of measurement solutions are necessary when operating a biogas plant: the delivery of the silage, the supply of the electrical current and heat by the CHP and the feed-in to the natural gas network. In order to determine the process states in the plant, there is a continuous need for information about temperatures, flows, levels, pressures and gas composition.

The correct choice of instrumentation and analytical systems has a great influence on the efficiency of the plant. These systems must offer reliability, longevity and ease of operation, as well as the guarantee of a fast and efficient spare parts service.



# SIEMENS

## Talk to the right supplier from the start

As a variety of approaches to the solution can all produce good results, the selection of the ideal measurement procedure is particularly important – not only to achieve reliable measurement, but also to keep operating costs as low as possible.

The planning phase therefore has to consider questions such as: radar more economical than ultrasound? How reliable are the measured values obtained in this way? What are the advantages of each procedure? These and many other questions demonstrate the importance of a reliable partner and of early planning with the aid of appropriate process and instrumentation expertise.

## Level meters

With the SITRANS L series of devices for continuous level measurement, Siemens offers a perfectly coordinated product portfolio of level meters for applications in biogas plants. Various different measurement procedures are available for the widest range of applications: ultrasonic, radar, capacitive and hydrostatic.

### Radar SITRANS LR 200



- 80 GHz operating frequency with Bluetooth technology
- Patented Sonic Intelligence® Signal processing
- Automatic false-echo suppression for built-in components
- Measurement range up to 30 m
- Custom radar microchip to handle difficult conditions
- Zero blanking zone to measure right up to the sensor

### Ultrasonic SITRANS LU240



- Contactless measurement procedure
- For liquids and sludges
- For storage tanks

### Ultrasonic MultiRanger



- Single or dual-channel level monitoring
- Automatic false-echo suppression for built-in components
- Digital input for back-up level override from point level device
- Wall and panel mounting options

### XPS ultrasonic sensors for MultiRanger



- Measurement range up to 14 meters
- Integrated temperature compensation
- Self-cleaning and low maintenance
- Resistant to chemicals
- Hermetically sealed

## Point level switch

Whether used to protect pumps from running dry or to prevent overflows according to the Federal Water Act – our Pointek sensors for recording point levels deliver the ideal solution for every application – and the wide range of diagnostics options help to determine maintenance requirements at an early stage.

### Pointek CLS 100



- Easy installation with verification by integral LEDs
- Low maintenance with no moving parts
- Sensitivity adjustment
- Integrated cable or PBT enclosure versions available

### Pointek CLS 200



- Capacitive function
- Insensitive to product deposits
- For liquids, powders, granules, foams, viscous media etc.
- Overfill protection

## Approvals

Various regulations apply in a plant.

These describe the defined approvals of the process instruments. Around the fermenter, for example, there are defined hazardous zones in which only devices suitable for this purpose may be used. Siemens process instruments are therefore supplied with all the necessary approvals.

## Communication

The process instruments in a biogas plant supply their measurement data to the higher-level controller. The data is transmitted either in the classic manner via a 4 to 20 mA connection with superimposed HART protocol or via intelligent bus connections such as PROFIBUS. Our process instruments are all available for HART, PROFIBUS and other buses.



## Temperature measuring instruments

At various locations in a biogas plant the temperature must be monitored, whether in the fermenter or in the heat flow volume produced by the CHP plant. Siemens offers an extensive range of sensors, transmitters and indicator instruments for the combined temperature measurement: high-precision, intrinsically safe and with current approvals.

### SITRANS TH320/420 head transmitters



- HART
- For DIN Type B connection head
- Galvanically isolated
- Diagnostic LEDs (green/red/flashing)
- Test sockets for multimeters
- Dual sensor input

### TS500



- Huge variety of thermoelements or resistance thermometers
- Versatile attachment options
- Customized designs

## Weighing technology

Our SIWAREX weighing and batching systems enable weighing tasks to be integrated across the system – simply and accurately. SIWAREX weighing portfolio includes a wide range for weighing electronics for virtually any industrial weighing application.

### SIWAREX load cells



- Six load cell styles for a wide range of applications
- Nominal loads range from 0.3kg to 500t
- Aluminum, steel, and stainless steel available
- Mounting units available for easy installation

### SIWAREX weighing electronics



- Weighing electronics for bin weighing, belt scales, batching scales, and filling scales
- Seamless integration in the Siemens control systems
- Extensive diagnostic functions
- High resolution

## Pressure measuring instruments

Regardless of the location in a biogas plant at which the pressure is to be measured – whether it is the gas cavity in the fermenter or the flow quantity of the produced gas in the pipeline with the aid of an orifice flowmeter – Siemens offers the appropriate solution for the widest range of applications and conditions. Measurement precision, ruggedness, user-friendly operation and intelligent diagnostic and safety functions: SITRANS P contributes to economic and extremely efficient plant operation.

### SITRANS P320 pressure transmitter



- 3-key operation
- Extensive diagnostic functions
- HART, PROFIBUS, Foundation Fieldbus
- High accuracy
- Measuring cells for critical media

### SITRANS P300 pressure transmitter



- Stainless steel housing as standard
- Flush-mounted diaphragm
- 3-key operation
- Extensive diagnostic functions
- HART, PROFIBUS, Foundation Fieldbus
- High accuracy

### SITRANS LH100 pressure transmitter



- For level measurements in tanks, containers and channels
- Compact design
- Easy installation
- Low measurement error (0,3%)
- IP68 degree of protection

### Belt scales



- Easy installation and low maintenance overhead
- High accuracy and repeatability
- Robust design without moving parts

## Flow meters

Electromagnetic flowmeters are suitable for measuring the substrate in pipelines. Primarily where there are high solids contents, extremely accurate measurements are achieved by means of synchronized alternating field circuits. The SITRANS F series of measuring instruments enable all current flow measurements in the biogas plant to be designed accordingly. A heat flow measurement system, complying with mandatory calibration requirements, is available for measuring the supply of heat from a CHP plant.

### Electromagnetic SITRANS FM



- For liquids, sludge, paste and pulp
- Extensive diagnostic functions
- HART and PROFIBUS
- NOVOLAK cladding for extreme requirements

### SITRANS FUE950 thermal energy metering



- OIML R75, EN 1434 and PTB approved
- Instantaneous values for energy and volume flow
- 24 month memory
- Error logging with date and time
- Battery back up of real time clock in the event of power failure
- Tariff functions

## Gas analysis

To ensure that the fermentation process runs without any faults, some parameters must be monitored cyclically. The continuous measurement of the composition of gaseous components permits the monitoring and control of the fermentation process and thus permits quality monitoring of the biogas produced. In order to be able to feed the purified biogas (biomethane) into the natural gas network, not only the gas composition but also the quality parameters, such as calorific value and density, must correspond to published guidelines and must be known. Our portfolio for gas analysis offers just the right solutions for this.

### Continuous gas analysis – Ultramat 23



- Extremely economical as it measures CH<sub>4</sub>, CO<sub>2</sub>, O<sub>2</sub> and H<sub>2</sub>S in one device
- High selectivity and stability
- Calibration by means of ambient air; no storage of calibration gases by the operator is required
- Low maintenance requirements
- Easy to integrate into automated plants by means of standard interfaces

### Determination of calorific values – MAXUM Modular



- Determination of calorific value and density for feeding into the natural gas network, approved by Bureau of Standards
- Low operating and installation costs
- Simple operation and low maintenance costs
- Maximum precision due to innovative technology
- Minimum cabling expense

#### Legal Manufacturer

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