

HY-OPTIMA™ 2700 Series

Explosion Proof Inline Hydrogen Process Analyzer

Applications

The HY-OPTIMA™ 2700 Series inline hydrogen process analyzer is ideal for gas streams where real-time, hydrogen-specific measurements can enhance process plant efficiencies, improve yields, and reduce maintenance costs:

Refinery

- Catalytic reforming
- Hydrodesulphurization
- Fuel gas
- Tail gas treating units

Natural Gas

H₂ in natural gas or biomethane

Industrial Gas Supply

- Air separation
- Steam methane reforming
- Electrolysis process streams

Petrochemical

H₂ measurement in polymer feeds and flare gas process streams

Manufacturing

- Metals annealing
- Semiconductors
- Oil hydrogenation



Advantages

- Highly reliable
- Low life cycle cost
- Easy to install and operate
- Minimal maintenance required
- No cross sensitivity to combustible gases
- Real time, continuous hydrogen measurement
- Tolerant of many harsh background contaminants
- No reference or carrier gases required
- Non-consumable solid state technology
- Field configurable settings



The HY-OPTIMA™ 2700 Series analyzer provides the most accurate, tolerant and affordable hydrogen process gas measurement solution for industrial markets. The explosion proof analyzer uses a solid-state, non-consumable sensor for direct hydrogen measurement with no cross sensitivity to most gases present in process gas streams.

How it Works A thin film palladium-nickel alloy-based lattice absorbs and desorbs hydrogen as it comes in contact with the sensor. The palladium catalyzes the hydrogen molecule into atomic hydrogen, which gets absorbed into the metal lattice and changes the bulk resistivity. This change in resistance is output in real time as the partial pressure of the hydrogen in the process stream, which varies linearly with changes in pressure. The analyzer is hydrogen specific because even though palladium can catalyze several molecules, only the reaction with hydrogen can occur at a rate that is meaningful to the measurement. As a result the measurement is unaffected by any other gases. Proprietary coatings protect the sensor and special conditioning enables certain models to operate continuously in environments with high levels of CO and H2S. Since it is a solid state device, the sensor does not degrade over time. An optional pressure transducer can be incorporated to reduce the impact of pressure fluctuations.

Ease of Use With no moving parts, the analyzer is extremely reliable and easy to use. Once installed and field calibrated, it typically only requires calibration every three months, using readily available primary standard gases that span the expected operating range. No other maintenance is necessary. The unit can be controlled using the included intrinsically safe remote control, and communication is either via an analog 4-20mA output or serial communication using RS232 or RS422.

Performance and Safety The model 2710, 2730, and 2740 analyzers are intended for use in dry gas streams where hydrogen is always present. They can be safely exposed to hydrogen continuously. The model 2720 is designed for processes where hydrogen is only occasionally present for short periods, as may occur if there is a leak or an upset condition. The 2720 may be used in an air background. For optimal performance, it is recommended to ensure that the pressure of the stream at the analyzer is between 0.95 to 1.1 atm (absolute). A conditioning system is available from H2scan. The explosion proof 2700 series analyzers are ATEX / IEC certified and UL / CSA approved for safe operation in hazardous Class I Division 1 environments.

HY-OPTIMA 2700 Series Specifications

Performance

Operating Pressure at Analyzer

Recommended: 0.95 – 1.1 atm absolute (14.0 – 16.1 psia)
Maximum: 2 atm absolute (29.4 psia)

Note: Analyzers are factory calibrated at 1 atm. For operation at higher pressure special factory calibration may be required.

Process Gas Temperature -20 to 60°C
Flow Rate 0.1 to 10 slpm

Operating Humidity: < 95% RH (non-condensing)

Calibration Interval: 90 days

Output Signals

Analog: 4-20 mA
Serial: RS232 or RS422

Relays: 5A/240 VAC or 5A/30 VDC
Two programmable relays and one fault relay

Power

Input Voltage 90 – 240 VAC, 50 – 60 Hz
Input Power 15 W

Physical

Dimensions 7.5in (L) x 5.4in (W) x 5.7in (D)
Weight 5.9 lbs
Adapter Fitting: 3/8 Inch Union Compression Tee

Environmental

Operating temp: -20 to 55°C
Storage temp: -30 to 80°C
Ingress Protection: IP67

Safety Certifications

| | 2700 Series Analyzer | Remote Control | |
|--------|--|---|----------|
| UL | Class I, Div 1, Groups B, C, D UL 508, 1203 | Class I, Div 1, Groups A, B, C, D UL 913 | |
| ATEX* | Ex II 2 G Ex d IIB + H2 T4 Gb | Ex II 1 G Ex ia IIC T4 | |
| CSA | CSA-22.2 No. 30-M1986 (R2012) | CAN/CSA C22.2 No 157-92 | |
| IECEx* | Ex db IIB + H2 T4 Gb | Ex ia IIC T4 Ga | |

* Max pressure 1.1 atm absolute and max ambient temperature 55° at the analyzer

Product Selection

| MODEL | Hydrogen Range | | Hydrogen MUST be present | CO Limit | H2S Limit | T90 Response Time (sec) | Accuracy | | Drift/Week | | Repeatability | | Linearity | | Calibration Background Gas |
|-------|----------------|------|--------------------------|----------|-----------|-------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------------------|
| | Min | Max | | | | | Min to 10% H2 | 10 to Max% H2 | Min to 10% H2 | 10 to Max% H2 | Min to 10% H2 | 10 to Max% H2 | Min to 10% H2 | 10 to Max% H2 | |
| 2710 | 0.1% | 10% | Yes | <100 ppm | <20 ppm | < 90 | 0.15% | N/A | 0.15% | N/A | 0.15% | N/A | 0.15% | N/A | N2 |
| 2730 | 0.5% | 100% | Yes | <100 ppm | <1000 ppm | < 60 | 0.3% | 1.0% | 0.2% | 0.4% | 0.2% | 0.4% | 0.2% | 0.4% | N2 |
| 2740 | 0.5% | 100% | Yes | 20% | 3% | < 90 | 0.3% | 1.0% | 0.2% | 0.4% | 0.2% | 0.4% | 0.2% | 0.4% | N2 |
| 2720 | 0.4% | 5% | No | 0 | 0 | < 60 | 0.3% | N/A | 0.3% | N/A | 0.3% | N/A | 0.3% | N/A | O2, N2 |

Note: Sensor performance specifications are absolute and assume a dry process stream, an ambient temperature of 25°C, pressure compensation, and are in addition to any errors in the calibration gases used.