

**Prevent catastrophic failures  
and lengthy downtime . . .**



**monitor generator purity with the**

**EXA GD402/GD40  
Hydrogen Purity Monitor**

Bulletin 11T3E1-E-A

# EXA **GD402/GD40** Hydrogen Purity Monitor

The Yokogawa vibrating element type Hydrogen Purity Monitor has experienced worldwide acceptance as the new hydrogen purity measurement for electric power generators.

The **GD402/GD40** hydrogen purity monitor's low maintenance design, self-diagnostic capabilities, and easy-to-use YES/NO programming provide a broad range of control options to meet the demanding environments of power producers.

It's versatility allows easy replacement of existing "old" hydrogen measurement installations. It consists of a gas detector (GD40) and a signal converter (GD402) that fit directly into most generator installations.

**“The installations used the existing generator gas sample ports and the similarity to other Yokogawa equipment already within the plant made the operation nearly plug and play which greatly reduced installation and startup time.”**

*Senior Instrument Mechanical Foreman, TVA Kingston power plant USA comments on the installation of 9 GD402 systems.*

## WHICH MONITOR TO CHOOSE?

The Yokogawa **GD402/GD40** Hydrogen **P**urity **M**onitor (**HPM**) helps ensure that power generators are running with pure hydrogen. It is a fast, accurate and reliable process gas measurement and control device that is unaffected by ambient temperature or vibration and does not require reference gases or a controlled temperature environment.

The heart of the **GD40** is a unique, vibrating cylinder, sensor technology that measures hydrogen purity. Multi-frequency cylinder oscillation makes the **GD40's** measurement highly resistant to errors caused by dust, oil, vibration, and temperature changes. The Yokogawa **HPM** maintains  $\pm 1\%$  FS accuracy and a response time (T90) of less than 5 seconds.

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***Simple operation, rock-solid performance, and low maintenance define the Yokogawa Hydrogen Purity Monitor.***

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# HPM

Power generators use pure hydrogen to cool and insulate power generator electrical windings. Inexpensive and readily available, hydrogen is the choice insulator because its low density and high thermal conductivity provide the best environment for generator operation. Contaminated hydrogen reduces generator efficiency. Air is the most common contaminate, originating from leaking rotor shaft seals. Knowing the purity level of the generator hydrogen helps plant operators avoid conditions that place human life and expensive

# Effects of Hydrogen Purity

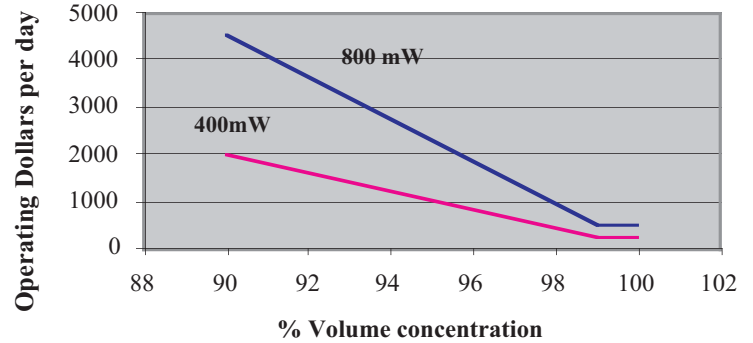
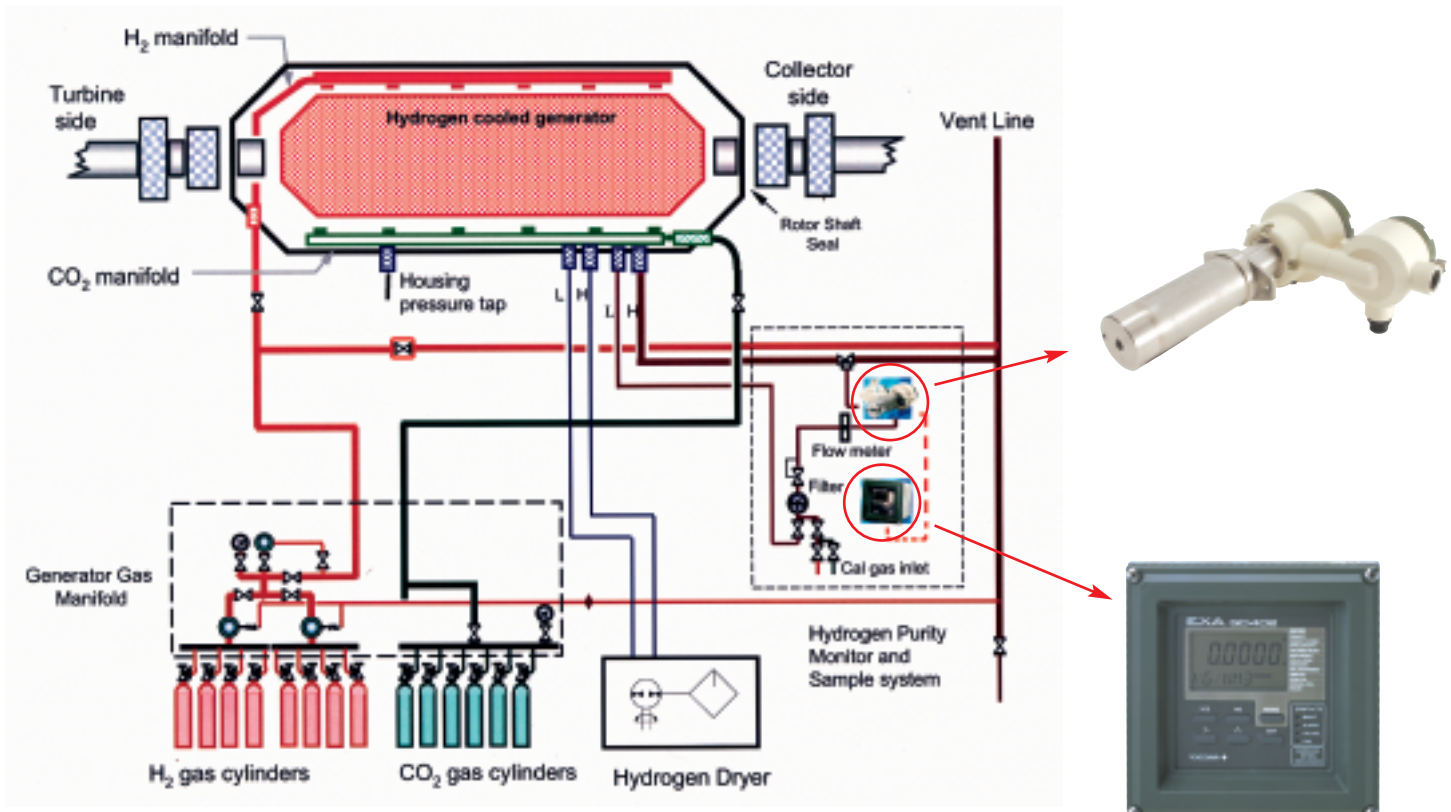


Fig. 1

machinery at risk. Monitoring hydrogen purity with the **EXA GD402** helps improve generator efficiency and reduce operational costs. (Fig 1)



## Control Output vs. Sudden Temperature Change

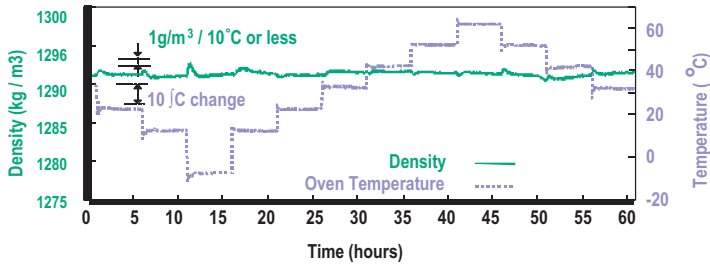


Fig. 2

## EXA GD402 vs TEMPERATURE!

With typical hydrogen measurement technology, sudden process temperature swings can lead to large purity measurement errors. The **EXA GD402/GD40** gas measurement remains stable in aggressive process conditions regardless of sharp changes in ambient or process gas temperature (Fig 2)

## EXA GD402 AND CALIBRATION

Calibration is fast and simple. The HPM requires only two gases and usually requires less than 10 minutes to calibrate.

“It takes longer to gather tools and walk to the instrument than it does to calibrate!”

*Georgia Power Plant Yates, Technician*

## TRI GAS ANALYZER

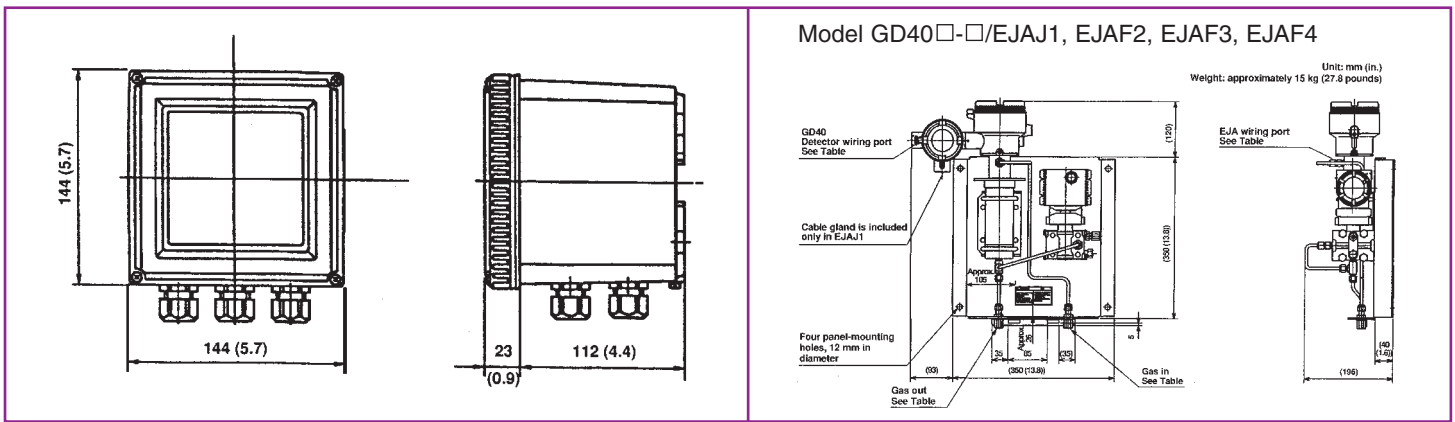
Hydrogen must be replaced with breathable air before generator maintenance. Since H<sub>2</sub> and air are a potentially explosive mixture, a third purge gas must be used as part of the generator outage process. CO<sub>2</sub> is used to buffer the H<sub>2</sub> from the air during generator maintenance. The Yokogawa HPM measures and outputs a separate 4-20mA signal for all phases of the generator purge sequence.

## THE SAMPLE SYSTEM

A well-designed gas sampling system can eliminate unplanned measurement outages by removing oil, dust and water before they foul the instrument. Resident particulate and moisture filters, pressure regulators, flow meters and valves facilitate easy calibration, measurement isolation, and stable, repeatable gas sample conditions. Ask your sales representative for more information about the sample system, core monitor and gas dryer capability with our alliance partner —



## External Views and Dimensions



## Hydrogen Purging Standard Ranges

	H <sub>2</sub> in Air vol%	H <sub>2</sub> in CO <sub>2</sub> vol%	Air in CO <sub>2</sub> vol%
<b>Range</b>	85 - 100	0 - 100	0 - 100
<b>Minimum Range</b>			
<b>Response Time 90%</b>	approximately 5 seconds		
<b>Linearity</b>	±1	±1	±1
<b>Repeatability</b>	±0.5	±0.5	±0.5
<b>Long Term Stability</b>	±0.5/month	±0.5/month	±0.5/month

Density is the basic measurement, all other representations are derived from the basic density data.

### Yokogawa Corporation of America

2 Dart Road, Newnan, GA 30265-1094, USA  
Phone: 800-258-2552 Fax: 770-254-0928  
www.us.yokogawa.com

### Yokogawa Europe B.V.

Databankweg 20, 3821 AL Amersfoort  
The Netherlands  
Phone: 31-33-464-1611 Fax: 31-33-464-1610

### Yokogawa Electric Corporation

World Headquarters  
9-32, Nakacho 2-chome, Musashino-shi,  
Tokyo 180-8750, Japan  
Phone: 81-422-52-6785 Fax: 81-422-55-1728

### Represented by:

### Yokogawa Engineering Asia PTE. LTD

5 Bedok South Road, Singapore 469270  
Singapore  
Phone: 65-241-9933 Fax: 65-241-9537

### Yokogawa América Do Sul Ltda.

Praca Acapulco, 31 Santo Amaro  
04675-190 Sao Paulo SP, Brazil  
Phone: 55-11-548-2666 Fax: 55-11-523-6242



What does **vigilance™** mean to Yokogawa? For starters, always, always making sure the products and solutions that leave our research and development labs are the best the world has seen - from day one throughout your business life cycle. Our innovative technologies and committed experts help design, install and manage your production systems efficiently and dynamically. In an ever-changing business environment, we help plan for the future to ensure continuity and flexibility in your automation strategies. Yokogawa goes the extra mile to do things right. Let us be vigilant about your business.

A Yokogawa Commitment to Industry

**vigilance™**