

Model 275R

# Portable Purge Gas Analyzer for Turbine Generators

The portable Model 275R accurately and reliably measures hydrogen-in-CO<sub>2</sub> and air-in-CO<sub>2</sub> during maintenance purging of hydrogen-cooled turbine generators. These measurements help assure that the purging proceeds quickly, efficiently and effectively. Switch selectable ranges on the Model 275R make it easy to choose the measurement you require. Plus, the Model 275R features a third range that alerts you to air leaks in the hydrogen cooling gas and thus helps assure optimum efficiency during normal generator operation.



## Specially Designed for Turbine Generator Applications

The Model 275R is a rugged, portable, easy-to-use gas analyzer that monitors purge gases and the cooling gas in hydrogen-cooled turbine generators. The Model 275R has three switch-selectable ranges that:

- Monitor purge gas composition during maintenance purging, and
- Spot-check hydrogen purity during normal generator operation

The portability of the Model 275R practically eliminates installation costs and makes it easy to move from one generator to another. There are no moving parts to wear out, no filters to change and no traps to clean. So, the Model 275R is virtually maintenance-free. A simple periodic calibration is all that is needed to assure years of trouble-free service.

**Application Information.** Before workers can perform periodic maintenance inside a hydrogen-cooled

turbine generator, the hydrogen (H<sub>2</sub>) cooling gas must be purged out and replaced with a breathable atmosphere (air). However, air/H<sub>2</sub> mixtures are potentially explosive, so a maintenance purge is used that proceeds in two stages. First, carbon dioxide (CO<sub>2</sub>) is used to purge out the H<sub>2</sub>. Then, in the second stage, air purges out the CO<sub>2</sub>.

## Minimizes Costly Downtime

To minimize costly maintenance downtime, it is important for the 2-step purge process to proceed quickly. It is equally important for the process to be effective and efficient. The Model 275R helps achieve all these objectives.

During the first stage of maintenance purging, the Model 275R monitors the changing H<sub>2</sub>/CO<sub>2</sub> mixture. This allows operators to know the earliest moment to begin the second stage (air purge). This also saves money by minimizing CO<sub>2</sub> usage.

Then, during the second stage, the Model 275R monitors air-in-CO<sub>2</sub>, which helps you decide when workers can begin maintenance.

## Assures Optimum Efficiency

In addition to fast and effective purge monitoring, the Model 275R also measures air-in-H<sub>2</sub> during normal generator operation.

Air leaks reduce H<sub>2</sub> purity and increase viscosity. This increases drag on rotors, thus reducing efficiency and increasing heat. Air contamination also reduces the ability of H<sub>2</sub> to conduct heat, which also in-

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creases heat build-up. This increases electrical resistance and further lowers efficiency.

The Model 275R monitors the purity of H<sub>2</sub> and is therefore important for helping minimize losses due to friction and heat build-up. The Model 275R also helps determine whether or not contaminated H<sub>2</sub> cooling gas should be replaced.

## Principle of operation

The Model 275R analyzes gas composition by comparing the sample gas with a reference gas of known thermal conductivity. This comparison is performed in a 2-chamber detector cell block. Reference gas occupies one chamber, and in the Model 275R the reference is helium (which has a thermal conductivity nearly identical to H<sub>2</sub>). Sample gas flows through the other chamber.

A pair of temperature-sensitive heated filaments are mounted in each chamber. These filaments are part of a Wheatstone Bridge circuit. Should the sample gas composition change, its thermal conductivity will also change. This means it will conduct a different amount of heat away from the sample gas filaments; since the resistance of the filaments is a function of their temperature, their resistance changes when the sample gas composition changes. Any such change creates an imbalance in the Wheatstone Bridge, resulting in an electrical signal proportional to the change. Since the temperature of the

filaments in the reference chamber are precisely maintained by a proportional temperature controller, the Model 275R provides an accurate measure of changes in sample gas composition.

## Advantages

- ▼ Portable, lightweight (10.5 lbs)
- ▼ Installation costs are zero
- ▼ Easy start-up: Perform a simple calibration and then connect a sample gas line from the turbine housing to the analyzer
- ▼ Sealed reference cell... no need for a flowing reference support gas
- ▼ The analyzer uses no consumables and is virtually maintenance-free

## Benefits

- ▼ Minimizes costly maintenance downtime
- ▼ Saves money by avoiding needless waste of CO<sub>2</sub> purge gas
- ▼ Helps assure optimum efficiency by detecting air contamination

## Features

- ▼ Rugged yet lightweight
- ▼ Portable and easy to use
- ▼ Reliable and durable
- ▼ Proven t/c detector
- ▼ Precise temperature control provides optimum accuracy
- ▼ Three switch-selectable ranges for easy choice of desired measurement
- ▼ Large, easy to read precision analog meter, ideal for accurate readings and observing rate of change (trending) of purge gas mixtures

## SPECIFICATIONS\*

### Ranges (switch selectable):

0-100% H<sub>2</sub> in CO<sub>2</sub>  
0-100% Air in CO<sub>2</sub>  
90-100% H<sub>2</sub> in Air

### Sealed Reference gas:

Helium (thermal conductivity nearly identical to H<sub>2</sub>)

### Zero drift\*\*:

Less than 1% per day

### Accuracy\*\*:

±5% of full scale or better, depending on the range selected

### Response time:

90% in 50 seconds (depending on flowrate)

### Sample flowrate:

0 to 0.5 SCFH

### Area classification:

For use in general purpose (non-hazardous) areas

### Signal output:

0 to 1 VDC (mVDC outputs also available)

### Meter readout:

Integral analog meter

### Operating temperature (ambient):

+32 to +125°F (0 to +52°C)

### Electrical requirements:

115 VAC, 60 Hz, 115 Watts  
(100 or 220 VAC, 50/60 Hz also available)

### Approximate dimensions (including handle):

9 inches x 10 inches x 14 inches  
(H x W x D)  
(230 mm x 250 mm x 360 mm)

### Approximate weight:

10.5 lbs (4.8 kg) — analyzer  
0.7 lbs (0.3 kg) — power cord

\*Specifications/Features: vary with application; are established and validated during design; are not to be construed as test criteria for every product manufactured; and subject to change without notice.

\*\*At 77°F (25°C)

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