



# G4 PHOENIX

- Determination of Diffusible Hydrogen

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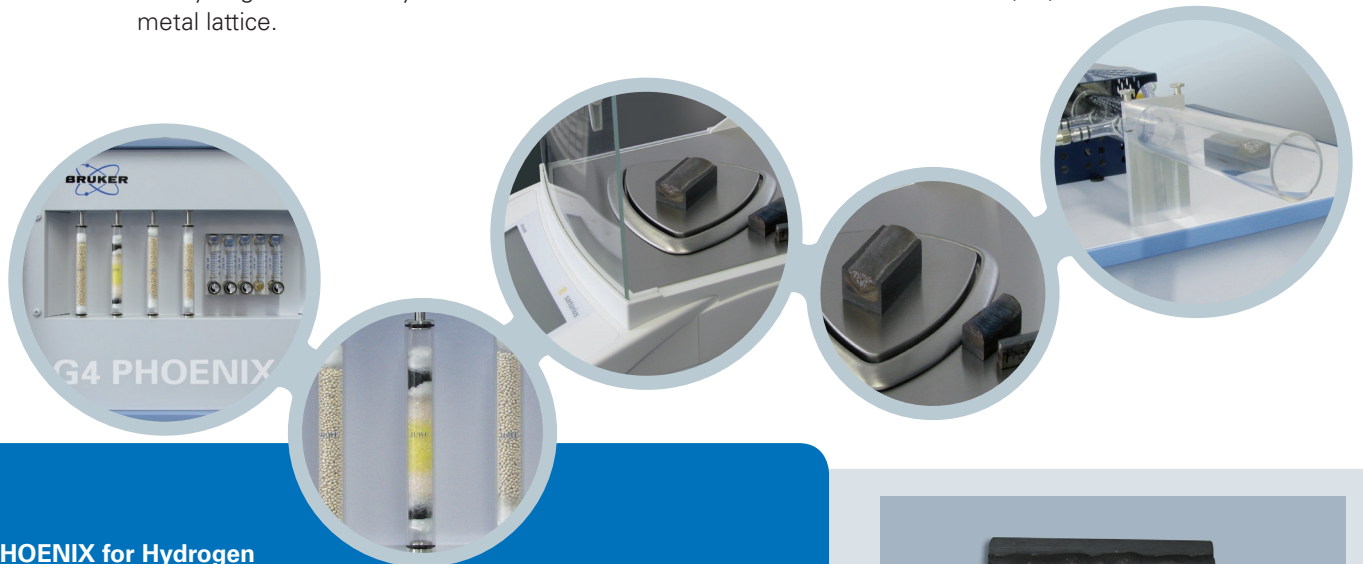
## Reliable Product Monitoring

Mechanical properties of solids are defined and influenced by their chemical composition. Certain elements have positive or negative effects on the material's properties. Consequently the control of these elements helps to improve and maintain product quality. Today analytical instruments offer accurate and rapid methods to analyze and monitor element concentrations from the raw material to the finished product. Hydrogen, when absorbed in metal, may cause the embrittlement often encountered in steel making, parts processing, welding, etc. Cracks may result in catastrophic failures and critical concentrations should be closely monitored.

The light density and small size of atoms supports the interstitial effect and allows the hydrogen to be easily absorbed into the metal lattice.

When gathered in irregularities and lattice defects like pores and blow holes, the hydrogen may recombine again into molecular hydrogen gas and - due to the volume leap - produce pressures up to 1000 bar inside the defect! Thus, the hydrogen causes cracks and brittle failure in the material. Due to the relatively slow diffusion at room temperature, such cracks may also occur at a later date.

Regular monitoring of all relevant processes with the G4 PHOENIX helps to preventatively avoid such compromising effects. This measurement will considerably simplify and reliably record your production control. Due to its universal application possibilities and its easy programming, this analysis system is also recommended for research purposes.



## G4 PHOENIX for Hydrogen

The G4 Phoenix helps to determine the diffusible hydrogen in different sample matrices. The analysis system comprises a rapid-heating infrared furnace with a quartz tube for holding the sample. The diameter of the tube is 30mm so that even large sample pieces can be analyzed directly. A simple and reliable calibration of the measurement system is guaranteed by a gas calibration unit with 10 different volumes. The heart of the system is a highly sensitive and long-term stable thermal conductivity detector that is able to measure even the smallest hydrogen concentrations.

The G4 PHOENIX is also available for the analysis of nitrogen and oxygen. Please inquire about our separate publication to learn more about this application!



With the infrared furnace all industry-standard welding samples can be analyzed thanks to the 30 mm diameter furnace tube.

## ● Comprehensive yet Simple

### Software

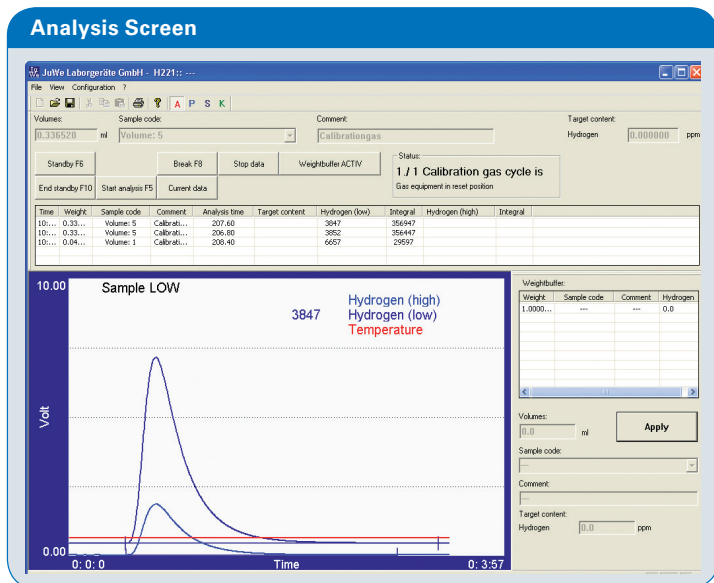
The G4 PHOENIX user-interface is clearly structured and easy to use. All tasks to be performed by the software are organized in four main screens.

### Control Screen

On the main screen, the control display, all analyses and signal performance tasks are executed. The weight may either be entered manually or directly imported by the analytical balance via serial interface. The integrated weight buffer allows storage of as many weights as required. Current signal data will be presented numerically and graphically in real-time. The analyzer can also easily be controlled by the integrated front-panel buttons. The results of the last five analyses are displayed simultaneously. It is also possible to reload the archived signal waveform in the future.

### Statistics

The statistical evaluation of all analyses can be done on the statistics screen. From all selected analyses the average, standard deviation, variance, variance coefficient, minimum, and maximum value can be calculated. A print function outputs the documentation to a connected printer.

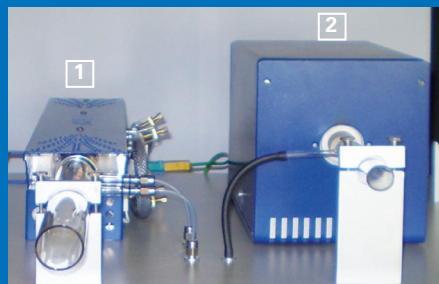


### Program Settings

On the screen for the program settings, operating parameters such as temperature and integration time, for one specific application can be stored as a configuration as a user-defined name.

### Calibration

On the calibration screen different calibration methods can be selected. Single-point, two-point, or multivariate calibrations are possible with gas calibration or standard samples.



### The furnace for your application

1 Infrared furnace for up to 900°C

2 Tube furnace for up to 1200°C

• External degassing device adaptable

# Technical data

## Measuring apparatus:

- **Measuring range**  
0.05 - 1000 ml/100g (approx. 0.05 - 1030 ppm) via hot extraction
- **Analysis time**  
approx. 3 min to 2 hours,  
typically 15 to 20 min for welding samples  
depending on sample material and weight
- **Resolution**  
0.001 ml/100 g
- **Reproducibility**  
± 0.01 ml/100 g or ± 1% rel.,  
depending on sample material and weight
- **Carrier gas**  
nitrogen min. purity 99.999 %  
2 bar pressure
- **Cooling water (only for IR furnace)**  
approx. 1 l/min
- **Dimensions & Weight**  
460 x 750 x 500 mm (WxDxH),  
18.11 x 29.52 x 19.68 inches  
~50 kg, ~110 lbs
- **Electrical supply**  
Analyzer 230 V, 1 kVA  
Peripherals 230 V, 300 VA
- **System requirements**  
Operating system: Windows XP  
CD-ROM  
2 serial ports RS 232

G4 PHOENIX



## Outstanding Characteristics:

- Rapid analysis, automatic operation
- Rapid-heating infrared furnace up to 900° C, with 30 mm quartz tube
- Optional tube furnace up to 1200° C, with 18 mm ceramic tube
- Highly sensitive and longterm stable thermal conductivity detector
- Accurate gas calibration with 10 different volumes
- Data Report according to ISO 3690
- Result output selectable as ppm, ml/100g or % hydrogen
- Analysis time adjustable; up to more than 2 hours
- Use of large samples possible
- Calculation of weld sample mass directly
- Operation control and analysis via PC
- Data storage for retrieval and evaluation of all analyses
- Transfer via FTP or local network connection

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