Heraeus

ELECTRO-NITE

Hydris®
HydroVAS®
Measuring Systems for Quick Determination of Hydrogen

Hydris® and HydroVAS®

Measuring Systems for Quick Determination of Hydrogen

Introduction

Hydrogen entrapped in steel can cause blowholes, micro-cracks and embrittlement in the final product. Hydrogen can also cause breakouts in the continuous casting machine by reacting with mold powder.

Heraeus Electro-Nite has developed **two distinct systems**;

- the **Hydrogen Direct Reading Immersion System (Hydris®)** and
- the **Hydrogen Vacuum Analysis System (HydroVAS®)**.

The latest also enables measurements in special steel grades.

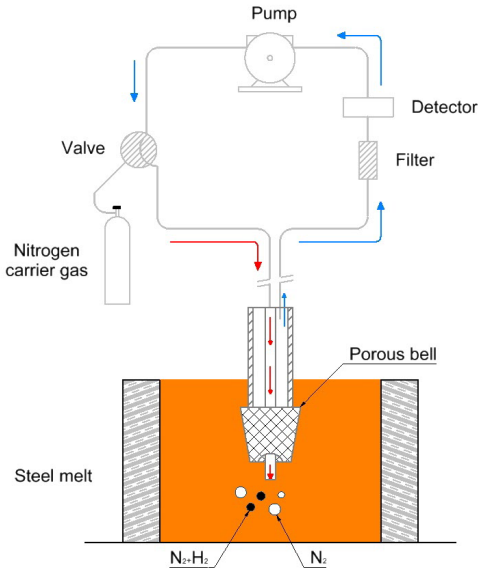
The **Hydris®** system determines the hydrogen content by means of a Sieverts' equilibrium measurement in a **closed circulation system**. While **HydroVAS®** makes use of an **open system** that reaches a steady state equilibrium with the concentration in solution in the melt.

Hydris®

- The Hydris® probe is immersed into the steel melt by means of a manual or automatic immersion lance.
- A pneumatic cable links the Hydris® lance with the Hydris® pneumatic unit.

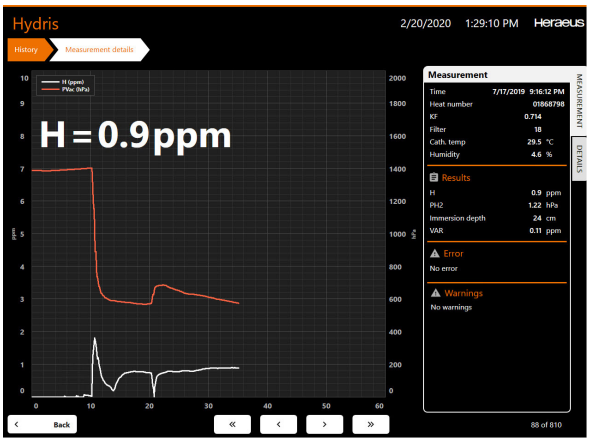
Hydris® system with (1) Processor Unit, (2) Pneumatic Unit, (3) Pneumatic cable, (4) Pneumatic lance, (5) Hydris® Probe

Measuring principle Hydris®



- The Hydris® pneumatic unit conveys a carrier gas through the Hydris® pneumatic lance and attached Hydris® probe into the steel melt. Here, the gas absorbs the hydrogen contained in the steel melt.
- The carrier gas is continuously circulated through the measuring system until a Sieverts' equilibrium is reached between the hydrogen content in the steel melt and the carrier gas.
- The hydrogen content is measured and displayed as the result, when the equilibrium has been reached.

Display of measuring results Hydris®



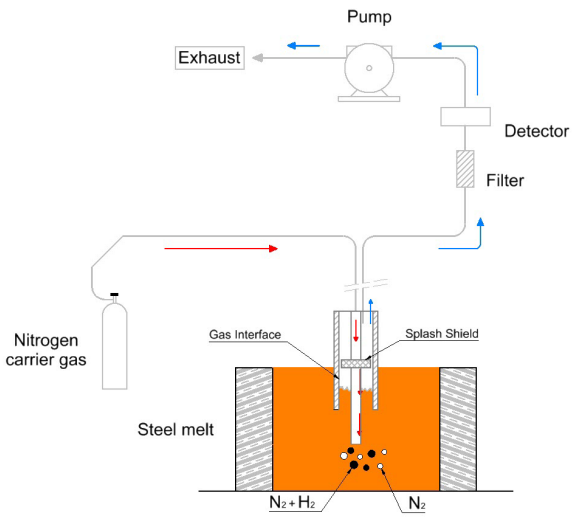
HydroVAS®

The method of taking a measurement in the steel melt is similar to Hydris®. The HydroVAS® pneumatic unit also conveys a carrier gas through the HydroVAS® pneumatic lance and attached HydroVAS® probe into the steel melt.

HydroVAS® system with (1) Screen, (2) Pneumatic Unit, (3) Processor Unit.

Measuring principle HydroVAS®

In the sampling chamber, that is immersed in the melt, a gaseous interface is in contact with the melt containing the inert carrier gas and hydrogen gas. The hydrogen quickly comes to steady state in these surroundings and a vacuum pump draws the equilibrated gas rapidly to the sensor device. This result is displayed on the pneumatic unit, as well as on the screen associated with the Processor Unit, similar to Hydris®.



Display of measuring results HydroVAS®

Instruments for both the Hydris® and HydroVAS® systems

Pneumatic unit

The pneumatic unit (n°2 on the pictures) is installed on site at the place of measurement. Its robust design is suitable for steel mill applications and ensures reliable operation even under extreme environmental conditions.

The front of the instrument houses three signal lights for the measurement sequence, a start push button, and a display for measurement results. The housing is provided with plug-in connections for immersion lances, moisture filter and carrier gas. Functional units, such as valves, pumps, conductivity detector and the electronic unit, are accommodated and protected inside the pneumatic unit.

Processor unit

The processor unit, also designed for the harsh conditions in a steel mill, is either a unit with a built-in display with touch screen operating function (n°1 on the Hydris® picture) or a desktop processor unit (n°3 on the HydroVAS® picture) with separate touch screen.

Comparison of Hydris® and HydroVAS®

Hydris®	HydroVAS®
Closed loop method	Open loop method
Measurement range: 0.5 to 20 ppm	Measurement range: 0.5 to 20 ppm
Accuracy: +/- 0.1 ppm	Accuracy: +/- 0.15 ppm
Sieverts' equilibrium measurement	Steady state measurement which enables measurements in special steel grades.

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