

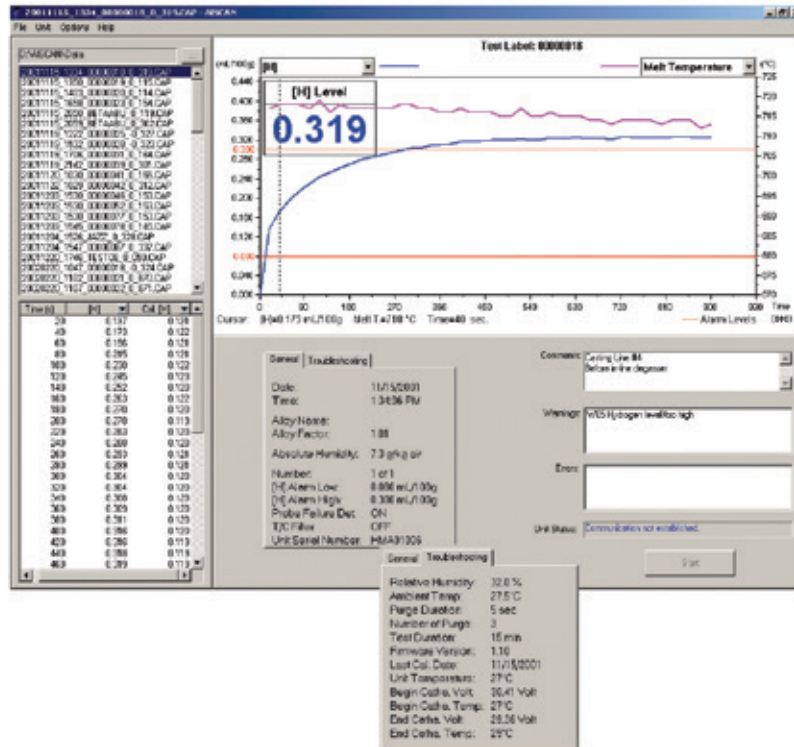


AlSCAN™

## AlSCAN™ and AlSCAN™ Argon Hydrogen analysis in liquid aluminum

# A<sub>l</sub>SCAN™ and A<sub>l</sub>SCAN™ Argon

## Hydrogen analysis in liquid aluminum



Today's global economy and competition have compelled aluminum producers and aluminum foundries to produce the highest possible quality aluminum and shape castings. Good process understanding is essential in securing top quality. It is attained by measuring key process parameters thus enabling control of the melt quality at all stages of the manufacturing process.

A<sub>l</sub>SCAN™ technology provides a proven solution for direct measurement of dissolved hydrogen in molten Aluminum.

The A<sub>l</sub>SCAN™ analyzer provides an on-line quantitative measurement based on field proven probe and Closed-Loop Recirculation (CLR) technologies.

### Benefits of Alscan

- Accurate on-line quantitative measurement of dissolved hydrogen
- Continuous monitoring capabilities
- Probe failure detection option

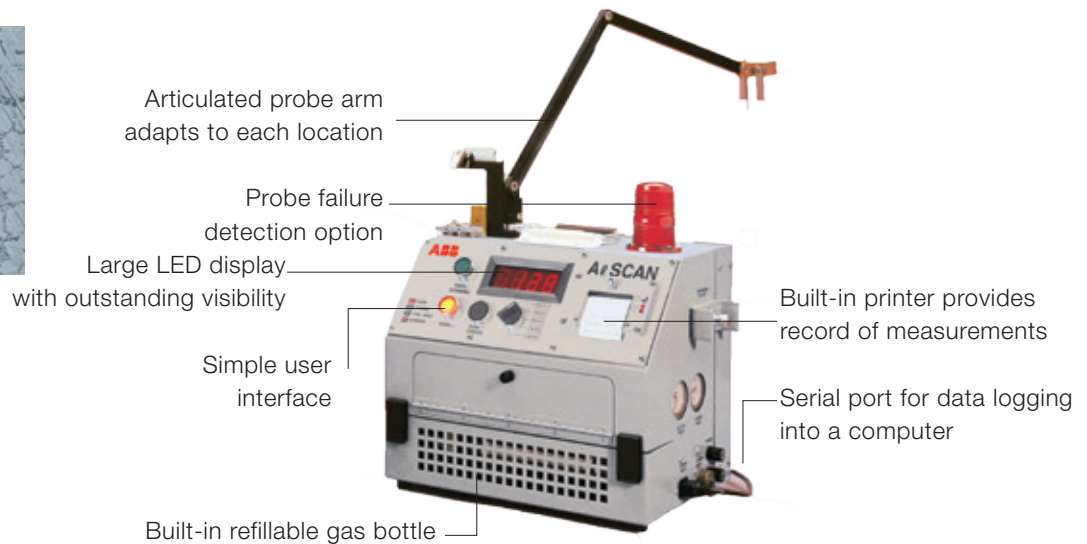
### A<sub>l</sub>scan™ Argon for very low hydrogen levels

The A<sub>l</sub>SCAN™ Argon is a special version of the A<sub>l</sub>SCAN™ analyzer that uses Argon as a carrier gas to allow accurate readings of very low hydrogen levels. A<sub>l</sub>SCAN™ Argon can accurately read hydrogen levels below 0.06 ml H<sub>2</sub>/100g Al and will not interpret low hydrogen levels as a probe leak.

# A<sub>2</sub>SCAN™ and A<sub>2</sub>SCAN™ Argon Hydrogen analysis in liquid aluminum



Hydrogen-induced porosity  
in castings



## The hydrogen problem

### Hydrogen measurement: essential in today's foundries

Hydrogen forms whenever molten aluminium comes into contact with water vapor, and easily dissolves into the melt. The gas tends to come out of the solution and forms porosities as the melt solidifies.

The detrimental effects arising from excess dissolved hydrogen in aluminium are numerous. Hydrogen causes porosity in aluminum products leading to many casting defects, reduced mechanical properties and lower corrosion resistance. Several methods are used to reduce the amount of dissolved hydrogen in the melt, such as furnace fluxing prior to the casting process or using in-line degassing equipment during the casting process.

On-line hydrogen measurement in aluminum is required to monitor the performance of the degassing process and ensure the quality of outgoing products. Traditional laboratory methods, such as hot extraction, are too expensive for routine quality assurance, and too slow for effective process control. Reduced-pressure tests sometimes used on the production floor are only semi-quantitative and do not provide the required degree of accuracy.

### A<sub>2</sub>SCAN: the leading hydrogen analyzer

Since its introduction in 1989, A<sub>2</sub>SCAN™ has established itself as the most-used hydrogen analyzer with more than 400 systems installed worldwide. Used by all major aluminum producers, its success is mainly due to outstanding reproducibility and a rugged, low cost probe that requires no preheating or careful handling. The A<sub>2</sub>SCAN™ is clearly superior to any other direct hydrogen measurement analyzer:

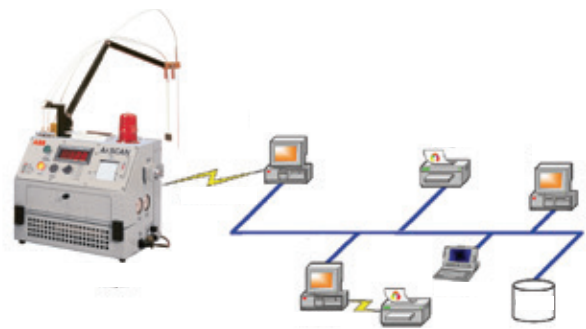
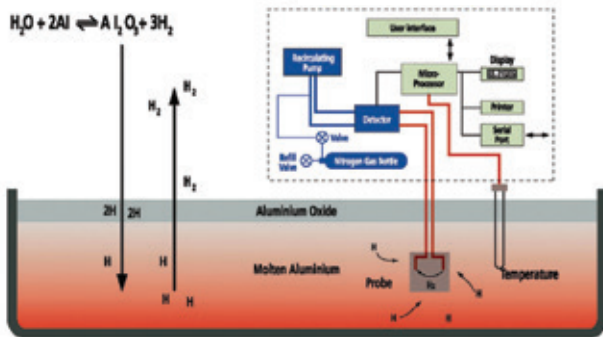
- It is user-friendly and designed for long-term reliability on the shop floor.
- It is easy to use by non-technical floor personnel even when they wear gloves.
- It can be programmed to perform single measurements or repeated automatic measurements. This flexibility enables the analyzer to continuously monitor the hydrogen level in molten metal.
- Once started up, the unit operates autonomously and requires little or no attention.

### Dual User Interface

#### The key to simplicity and flexibility

The A<sub>2</sub>SCAN™ analyzer has two distinct sets of controls. The control panel is used for routine procedures and can even be used by personnel wearing gloves! The controls located in the recessed panel are only used to configure operating parameters.

# A<sub>l</sub>SCAN™ and A<sub>l</sub>SCAN™ Argon Hydrogen analysis in liquid aluminum



## Operation principle

Closed Loop Recirculation (CLR) is a proven method for directly monitoring hydrogen in molten aluminium. A small volume of carrier gas, either nitrogen or argon, is brought in contact with the melt by means of an immersed probe, and is continuously recirculated in a closed loop until its hydrogen content reaches equilibrium with the vapor pressure of H<sub>2</sub> in the melt. The H<sub>2</sub> concentration in the gas is measured and converted into a reading of the gas concentration in the metal. This fast, reproducible and accurate method can be used on the cast shop floor for on-line measurements.

The amount of H<sub>2</sub> in the gas loop of the instrument is determined by a proprietary thermal conductivity sensor, which provides high reproducibility and a broad measurement range. The analyzer has a built-in microprocessor which controls its operation and processes data.

## A<sub>l</sub>SCAN continuous monitoring option

The A<sub>l</sub>SCAN™ Continuous Monitoring Option is a tool that allows the A<sub>l</sub>SCAN™ to perform long sequences of measurements while being connected to a remote computer. There is no need to babysit the instrument as its operation can be remotely monitored from a control room... or even from your own computer! Direct access to saved data and flexibility in the A<sub>l</sub>SCAN™ operation has never been so easy and straightforward, thanks to the networkability and multi-tasking qualities of the continuous monitoring option software.

As well, the A<sub>l</sub>SCAN™ continuous monitoring option is a powerful tool that links aluminium hydrogen content to its main source: the humidity content in ambient air. With this option, the analyzer also measures the ambient temperature and humidity then calculates the absolute humidity and the theoretical dissolved hydrogen content in the melt coming from this source. Process characterization and equipment optimization of an in-line degasser or other degassing treatments can be performed more rapidly and efficiently as all the information related to dissolved hydrogen are put together for easy data analysis.

# AlSCAN™ and AlSCAN™ Argon Hydrogen analysis in liquid aluminum



Courtesy of GM Central Foundry



Optional Dolly

## Analyzer calibration module

The analyzer calibration module is used to perform basic validation tests to confirm accuracy. Additionally the calibration module can be used to re-calibrate the analyzer as required.

The external-supply calibration unit is connected to the external low-pressure sources of calibration gases, including argon, helium and nitrogen. The unit is installed at a fixed location, where the analyzer is brought for verification about every four to eight weeks. Current users have proven that the AlSCAN™ analyzer remains stable and accurate month after month. New users do not have to believe this – they can verify it!

## ABB calibration certification service

ABB's internationally recognized calibration certification service meets ISO9000 standards. This service is offered to customers whose measuring and test equipment requires calibration for production service.

## Practical accessories

There are a number of practical and useful accessories available for the AlSCAN™ analyzer. Among them are:

- The rugged universal mounting plate
- The probe failure detection accessory
- The continuous monitoring option
- The spare part kit
- The heavy duty transport case
- The elongated probe arm for reaching into less accessible locations like the interior of crucibles
- The dolly to make the instrument more transportable and serves as a platform for measurements
- The bottle refilling accessory for safe and easy refilling of the built in gas bottle.



# A<sub>2</sub>SCAN™ and A<sub>2</sub>SCAN™ Argon Hydrogen analysis in liquid aluminum



## Measurement

### Hydrogen Measurement

- Sensor type: Thermal conductivity catharometer
- Range: 0 to 9.99 mL of hydrogen per 100g of aluminum (mL/100g)
- Reproducibility:  $\pm 0.01$  mL/100g or 5% of reading, whichever is higher
- Duration : Typically 10 minutes, varies with alloy and hydrogen level, adjustable from 1 to 99 minutes
- Automatic sequence: Adjustable from 1 to 99 measurements

### Melt Temperature Measurement

- Sensor type: Type K Thermocouple, ungrounded
- Range: Range 650 - 1260°C (1202 - 2300°F)
- Repeatability:  $\pm 1.2\%$

### Hardware

- Display: 3 1/2 digits, 2.5 cm (1 in.) high LEDs
- Printer: Dot matrix thermal printer
- Communications: Serial, RS-232 (standard)

## Supplies

### Gas requirements

- Gas: Nitrogen or Argon
- Purity: 99.998% high purity grade (99.995% minimum purity)
- Cylinder size\*: Typically 15 cm (6 in.) dia. x 63.5 cm (26 in.) maximum height
- Delivery pressure: 300 mbar (5 psig) nominal pressure
- Average consumption: Typically 0.5 liter at STP per measurement

### Electrical

- Rated line voltage: 100 to 240 VAC (self-adjusting)
- Rated line frequency: 50-60 Hz
- Rated line current: 0.9 A at 100V, 0.4 A at 240V
- Fuse type: T2A/250V

The AC supply must have a 3-wire configuration: live wire (100-240 VAC), neutral wire (0 V), and safety ground.

## Environmental and Physical

### Environmental

- Storage temperature: 10 to 50°C (50 to 122°F)
- Operating temperature: 10 to 50°C (50 to 122°F)
- Storage humidity: Up to 60% (non-condensing)
- Operating humidity: Up to 90% (non-condensing)

# A<sub>2</sub>SCAN™ and A<sub>2</sub>SCAN™ Argon

## Hydrogen analysis in liquid aluminum

### Physical

- Analyzer: 38 cm W x 23.5 cm D x 30.5 cm H (15 in. x 9 1/4 in. x 12 in.) / 16 kg (35 lb.)
- Probe holding arm: Aluminum, 2 segments, friction joints, 57 cm L (22.5 in.) (fully extended)
- Extended probe holding arm: Aluminum 4 segments, friction joints, 114 cm L (45 in.) (fully extended)
- Calibration module: 20.3 cm W x 25.4 cm D x 30.5 cm H (8 in. x 10 in. x 12 in.) / 5,6 kg (12.5 lb.)
- Trough mating plate: 30.5 cm W x 20 cm D x 38 cm H (12 in. x 8 in. x 15 in.) / 5 kg (11 lb.)
- Dolly: 56 cm W x 61 cm D x 122 cm H (22 in. x 24 in. x 48 in.) / 34 kg (75 lb.)

### Probes

#### Probes for wrought alloys P/N HME0200D

- Application: Repetitive immersions in wrought alloys. Not suitable for 7xxx alloy series and high Mg 5xxx alloy series.
- Average probe lifetime: Typically more than 10 immersions, or 3 hours cumulative immersion time, whichever comes first.

#### Probes for foundry alloys P/N HME0300D

- Application: Repetitive immersions in wrought and foundry alloys. Not suitable for strontium modified foundry alloys.
- Average probe lifetime: Typically more than 10 immersions, or 3 hours cumulative immersion time, whichever comes first.

#### Probes for continuous monitoring P/N HME1200D

- Application: Repetitive immersion, continuous monitoring or long sequence of immersions in wrought and foundry alloys. Recommended for strontium modified foundry alloys with a concentration of up to 300 ppm. Recommended for High purity aluminum alloys where alloy contamination is a concern. Not suitable for 7xxx and Al-Li alloy series.
- Average probe lifetime: Dependent on alloy; a rated life of 20 hours of continuous immersion in metal with a minimum of 8 hours, or a rated life of 11 distinct dippings with a minimum of 6 dippings, whichever comes first.

### Physical

- Length: 105 cm long (41 in.) - 160 cm (63 in.) with probe extensions.

# Contact us

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Sales



Service