OPERATION MANUAL · SOP

BH-01 真空測氫儀
標準操作流程

BH-01 Vacuum Hydrogen Meter — Standard Operating Procedure

準確、安全、高效的鋁液含氫量檢測指南

A practical guide to fast, safe and reliable hydrogen checks in molten aluminum



產品說明 Product Description

採用減壓凝固法（RPT），檢測鋁液中的含氫量，可在精煉、除氣後更準確地評估鋁液品質。適用於鋁鑄造廠與實驗室。

Uses the reduced pressure solidification (RPT) principle to check the hydrogen content of aluminum melts, giving a more accurate assessment after refining and degassing. Suitable for aluminum foundries and laboratories.

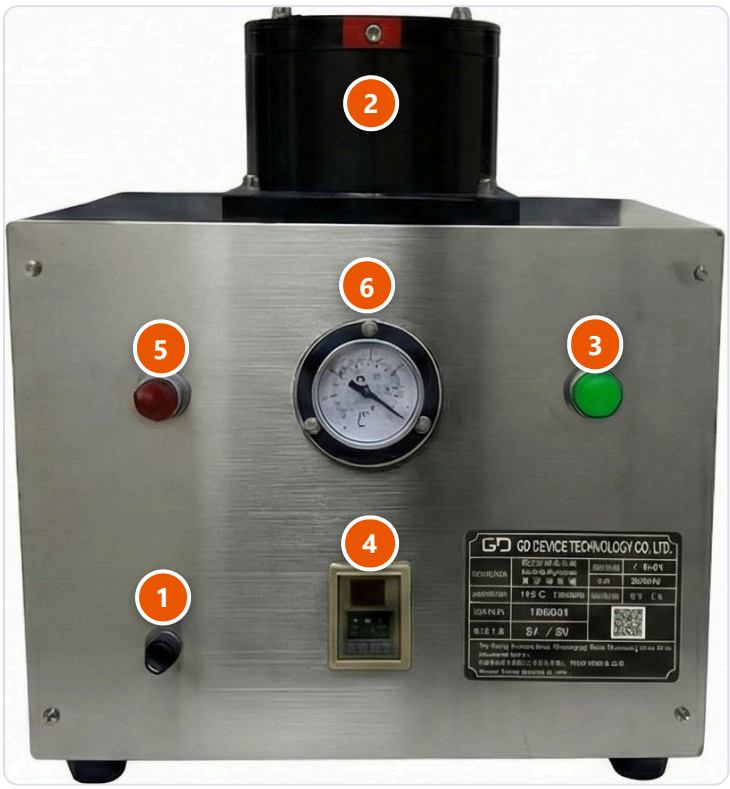
產品特色 Features

- 體積小巧，方便移動 — Compact and portable.
- 約 5 分鐘完成一次含氫量檢測 — Analysis completed in about five minutes.
- 操作簡單，不需複雜訓練即可安全使用 — Easy to operate safely without complex training.

01

設備概覽：主要組件與功能

Equipment Overview: Main Components



1. **保險絲 Fuse**
   電路安全保護裝置
2. **真空室蓋 Lid**
   放置試杯後蓋上，形成真空密封
3. **啟動鍵（綠） Start**
   開始抽真空程序
4. **數位計時器 Digital Timer**
   設定每次真空測試的時間
5. **電源開關（紅） Power**
   開啟或關閉設備總電源
6. **真空壓力表 Vacuum Gauge**
   即時顯示真空室內的壓力

測試原理 How It Works

取少量鋁液放入真空室，讓試樣在負壓下凝固。溶解在鋁液中的氫氣會膨脹，在試樣表面或切面形成氣孔與凸起；氣孔越多，代表鋁液含氫量越高、除氣效果越差。

A small sample of molten aluminum solidifies in the vacuum chamber under negative pressure. Dissolved hydrogen expands and forms pores or surface bulging. More pores mean higher hydrogen content and less effective degassing.

步驟一　前置設定
Step 1 · Setup & power check

步驟二　執行測試
Step 2 · Run test & monitor

步驟三　完成取樣
Step 3 · Finish & retrieve

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STEP 1

前置設定與電源檢查

Setup and Power Check

1-1 電源確認 Check Power Supply

1. 確認設備背面銘牌標示的電壓（AC 110V 或 220V）與現場插座電壓相符。
   Check that the nameplate voltage matches your power outlet: AC 110V or 220V, built to order.
2. 確認無誤後，再插上電源插頭。
   Plug in the power cord only after confirming the voltage.



1-2 計時器設定 Set the Timer

1. 確認計時器單位切換在「**M**」（分鐘）。
   Set the unit switch to "M" (minutes).
2. 使用面板上的撥碼按鈕，將數值設定為「**5**」。
   Use the thumbwheel buttons to set the value to "5".
3. 確認顯示器顯示 **05**。
   Confirm the display reads 05.

建議測試時間	鋁液測試基礎設定為 **5 分鐘**
Recommended	5 minutes for aluminum melt testing

每次開始測試前，請確認真空室內部乾淨、無殘留鋁屑，蓋子的密封面完好。

Before each test, make sure the chamber is clean and free of aluminum residue, and the lid seal is in good condition.

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STEP 2

執行測試與真空監控

Run the Test and Monitor Vacuum



2-1 放置試樣 Place the Sample

1. 打開真空室蓋。
   Open the chamber lid.
2. 將裝有鋁液的專用試杯，平穩放入真空室中央。
   Place the test cup with molten aluminum steadily in the center of the chamber.

2-2 啟動程序 Start the Process

1. 確實蓋好真空室蓋。
   Close the lid firmly.
2. 按下綠色啟動鍵，開始抽真空。
   Press the green Start button to begin evacuation.



2-3 監控真空值 Monitor the Vacuum

1. 觀察真空壓力表，確認真空度。
   Watch the vacuum gauge to confirm the vacuum level.

性能指標	啟動後約 **10 秒**內可達 -700 mmHg
Performance	Reaches -700 mmHg within about 10 seconds
合格標準	正常運作時，真空值應穩定在 **-745 mmHg** 以上（指針越過橘色 -745 刻度）
Pass criterion	Vacuum holds steady beyond -745 mmHg (needle past the orange mark)

> 若 10 秒內真空值上不去，請停止測試，檢查蓋子是否蓋緊、密封面是否有異物。
> If the vacuum does not build within 10 seconds, stop and check that the lid is closed and the seal is clean.

STEP 3

測試完成與安全取樣

Finish the Test and Retrieve the Sample

3-1 自動洩壓 Automatic Pressure Release

1. 計時器倒數歸零時，系統會**自動洩壓**，這就是測試結束的信號。
   When the timer reaches zero, the system releases pressure automatically. This signals the end of the test.

3-2 取出試杯 Retrieve the Test Cup

1. 等壓力表指針歸零、真空完全釋放後，才能打開蓋子。
   Open the lid only after the gauge returns to zero and the vacuum is fully released.
2. 戴上耐熱手套，取出已凝固的試杯，進行後續分析。
   Wearing heat-resistant gloves, remove the solidified sample for analysis.

結果判讀 Reading the Results

建議將凝固後的試樣切開，觀察內部氣孔。氣孔越多，代表含氫量越高，需要再除氣。
Cut the solidified sample to inspect internal porosity. More pores mean higher hydrogen content and the melt needs further degassing.



除氣前：切面氣孔多
Before degassing — many pores



除氣後：切面緻密
After degassing — dense section

安全注意事項 Safety

- 操作鋁液與試杯時，請穿戴耐熱手套與護目鏡。
  Wear heat-resistant gloves and eye protection.
- 真空未完全釋放前，請勿強行打開蓋子。
  Never force the lid open before the vacuum is released.

日常保養 Maintenance

- 每次使用後清潔真空室與蓋子密封面。
  Clean the chamber and lid seal after each use.
- 真空泵浦油每 500 小時更換一次。
  Replace the vacuum oil every 500 working hours.

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