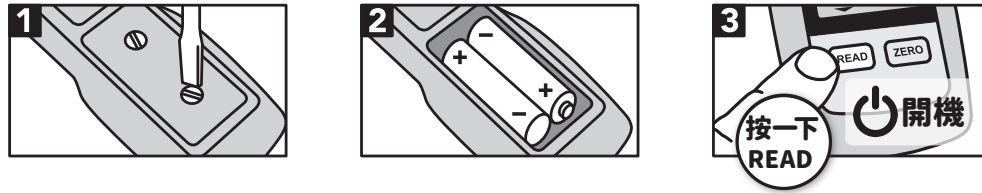


**快速操作指南**

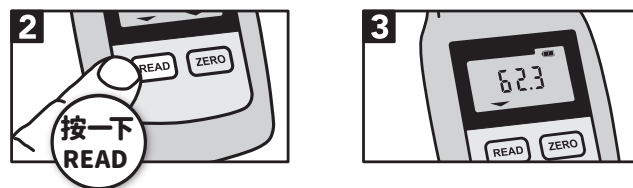
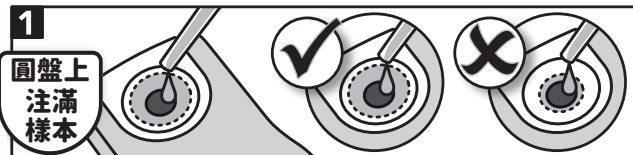
**安裝電池**



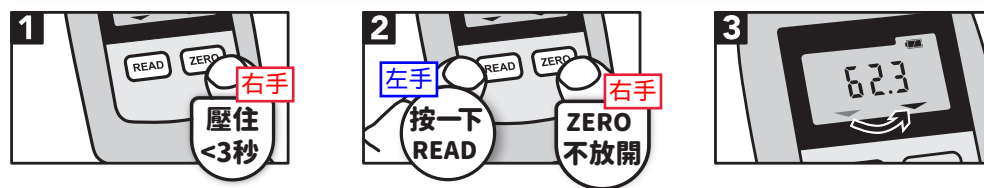
**零點校正**



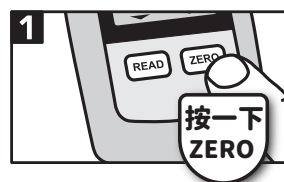
**測讀數據**



**切換量測刻度**



**顯示測定溫度**



**關機**



**製造商資訊**

a xylem brand

EN

Thank you for purchasing this OPTi<sup>®</sup> Multiple Scale Digital Handheld Refractometer. In order to ensure that this product provides many years of service, please follow the guidance in this document.

In order to register your instrument with the manufacturer and print a warranty certificate, please visit:  
[www.bellinghamandstanley.com](http://www.bellinghamandstanley.com)

User Guide Code: 38-421'01PA-EN

## Unpacking the instrument

Check that all parts listed below are present and that no transit damage has occurred.

### Contents list

- 1 OPTi Digital Handheld Refractometer
- 2 AAA alkaline battery (LR03)
- 1 User guide

## 儀器外觀簡介



## ! Safety precautions

### WARNINGS

Always check the relevant Material Safety Data Sheet for a sample before applying it to the refractometer. Wear appropriate protective equipment (PPE) when applying samples that may be harmful to the skin or eyes. Avoid unnecessary contamination of the refractometer by confining samples to the prism dish.

### CAUTION

This refractometer is a precision optical instrument and should be handled with care. Do not drop or subject the instrument to sharp knocks. The instrument housing and display panel areas are constructed from plastic materials that may suffer damage if contacted with aggressive solvents. For example, avoid contact with solvents such as acetone and certain aromatics.

Maintain your refractometer in a clean condition and avoid use and storage of the instrument outside the specified temperature range. Avoid dusty and high humidity environments and prolonged exposure to direct sunlight. Use the case provided to protect the instrument. Deterioration/loss of the display may be indicative of low battery power or low ambient temperature. Do not persist in using the instrument with low battery power. Check/replace the batteries as necessary.

### INTENDED USE

This product is for general laboratory, manufacturing and research use only and is not intended for any animal or human therapeutic or diagnostic use.

## 安裝電池以及開關機

### 安裝電池

1. 逆時針旋開電池蓋上的兩顆一字螺絲。
2. 裝入電池前請先確認電池槽是乾淨且乾燥的。
3. 依照指示方向放入兩顆四號鹼性電池。
4. 蓋上電池蓋，以順時針方向旋緊兩顆一字螺絲。

- \* 建議使用鹼性電池。
- \* 長時間未使用或長途運輸期間請將電池取出。
- \* 螢幕上的電池電量指示顯示為空格時請更換電池。

### 開關機

1. 開機：按一下**READ**鍵即開機。
2. 關機：壓住**READ**鍵3秒直到螢幕顯示-**OFF**-，放開**READ**鍵即關機。或者待機1分鐘後即自動關機。

## 製造商資訊

Bellingham + Stanley, a Xylem brand  
Xylem, Longfield Road, Tunbridge Wells, Kent, TN2 3EY, UK.  
[sales.bs.uk@xyleminc.com](mailto:sales.bs.uk@xyleminc.com)  
[www.bellinghamandstanley.com](http://www.bellinghamandstanley.com)

## 設定OPTi

OPTi 屈折度計出廠預設刻度為“Channel A—Brix (S.A.01)”。這對大部分的使用者而言已足夠。開機時，螢幕上會依序顯示Channel A、B、C設定的刻度，如為第一次開機，預設僅一個刻度，則顯示如下：

Opti	>>	S.R.01
------	----	--------

如欲設定或修改A、B、C每一個Channel的刻度，請參照下面【功能選單操作流程】以及下頁【刻度列表】所列之刻度與對應的代碼進行設定。設定完成後，重新開機時螢幕上會依序顯示每個位置所設定的刻度，顯示如下：

Opti	>>	S.R.01	>>	5b.34	>>	5c.22
------	----	--------	----	-------	----	-------

請注意，如您的代理商已預先將刻度設定好，則您可忽略上述步驟。

## 功能選單

### 功能選單操作流程

1. 按一下**READ**鍵開機
2. 左手壓住**READ**鍵直到-**OFF**-顯示，此時左手快速放開**READ**鍵，同時右手按一下**ZERO**鍵，進入如下功能主選單：

請運用**ZERO**鍵（切換）和**READ**鍵（選定）進行操作，說明如下：

- **ZERO** = 切換各個功能
- **READ** = 進入該功能
- **ZERO** = 切換該功能內的選項
- **READ** = 選定該選項以完成設定並退出

顯示	功能	操作	說明
-RGL-	AG Test Mode	按 <b>READ</b> 進入	<ul style="list-style-type: none"><li>• 按一下<b>READ</b>鍵以開啟AG Test Mode</li><li>• 儀器進入AG Test Mode</li><li>• 關機即可退出AG Test Mode</li></ul>
-S.R.-	設定Channel A刻度	按 <b>READ</b> 進入或輸入PIN碼	<ul style="list-style-type: none"><li>• 按一下<b>ZERO</b>鍵可切換刻度代碼</li><li>• 選定所要的刻度代碼後，按一下<b>READ</b>鍵即完成設定並退出返回主選單。</li></ul>
-S.b.-	設定Channel B刻度		
-S.c.-	設定Channel C刻度		
-tSc-	溫度顯示單位	按 <b>READ</b> 進入或輸入PIN碼	<ul style="list-style-type: none"><li>• 按一下<b>ZERO</b>鍵切換溫度單位 °F 或 °C</li><li>• 選定後按一下<b>READ</b>鍵即完成設定並退出返回主選單</li></ul>
-dLY-	歸零或測讀的延遲時間	按 <b>READ</b> 進入或輸入PIN碼	<ul style="list-style-type: none"><li>• 按一下<b>ZERO</b>以切換延遲時間選項 (0~60秒/5秒)</li><li>• 選定後按下<b>READ</b>鍵即完成設定並退出返回主選單</li></ul>
-Pin-	設定或移除PIN碼	按 <b>READ</b> 進入或輸入PIN碼	設定PIN碼（三位數）： <ul style="list-style-type: none"><li>• 按一下<b>ZERO</b>鍵以增加數字</li><li>• 選定數字後按一下<b>READ</b>鍵完成設定並移動到下一位數</li><li>• 重複上述步驟（儀器會重複出現一次PIN碼輸入畫面）</li><li>• 如設定完成則螢幕顯示 -SEt-</li></ul> 移除PIN碼： <ul style="list-style-type: none"><li>• 輸入原先設定的PIN碼</li><li>• 如輸入正確則螢幕顯示 PASS且PIN碼自動被移除</li><li>• 儀器自動返回功能主選單</li></ul>
-Ver-	版本	按 <b>READ</b> 進入	查看軟體版本及儀器序號
-End-	儲存或離開	按 <b>READ</b> 進入	儲存設定並離開功能主選單回到待測主畫面

## 確效證明

1. 本儀器已在20°C環境下完成出廠校正。
2. Analytical Grade Water<sup>1</sup> and AG Calibration Fluids<sup>2</sup> 是用來確認儀器基本刻度（Brix）準確度的溶液，其他刻度理論上比照認定，其準確度視為可信。

種類	確效數據 (Brix/RI)	允收範圍
Analytical Grade Water	0.00 / 1.33299	±0.2 Brix / ±0.0003 RI
AG30 Fluid	30.00 / 1.38115	
AG50 Fluid	50.00 / 1.42009	

All materials used to verify the performance of this OPTi refractometer were calibrated by Bellingham & Stanley Ltd., UKAS accredited calibration laboratory no. 0834, accredited to ISO/IEC 17025:2017.

1. Refractive index values for Water are obtained from "Revised Formulation for the Refractive Index of Water and Steam as a Function of Wavelength, Temperature and Density", adopted by the International Association for the Properties of Water and Steam (IAPWS) and available as part of NIST Standard Reference Database 10. Refractive indices calculated from the formulation are absolute refractive indices; conversion to refractive index against air requires division by the respective absolute refractive index of air (NIST Engineering Metrology Toolbox).

2. AG calibration fluids are prepared by mixing water with a soluble chemical of higher refractive index. The Brix value of the fluid is determined using a high accuracy digital refractometer at 20.0°C, which has been calibrated with a NIST traceable sucrose calibration standard of Brix value equal to the target value for the AG fluid according to a Laboratory Procedure QL-103. The AG fluid composition is finely adjusted to give a measured value to within ± 0.01 Brix (± 0.00002 RI) at 20.0°C.

# 刻度列表

索引	應用	刻度	單位	範圍	解析度	準確度	溫度補償
01	基本	°Brix (ATC) (糖度含溫度補償)		0-95	0.1	±0.2	°Brix
02	基本	°Brix (糖度)		0-95	0.1	±0.2	None
03	基本	Refractive Index (ATC) (折射率含溫度補償)		1.33-1.53	0.0001	±0.0003	°Brix
04	基本	Refractive Index (折射率)		1.33-1.53	0.0001	±0.0003	None
05	汽車	AdBlue®/DEF (NOx reduction)	% Weight / Weight	0-40	0.1	±0.2	AUS32
06	汽車	Ethylene Glycol (乙二醇)	°C Freezing Point	0 to -50	1	±1	EG
07	汽車	Ethylene Glycol (乙二醇)	°F Freezing Point	30 to -40	1	±1	EG
08	汽車	Propylene Glycol (丙二醇)	°C Freezing Point	0 to -50	1	±1	PG
09	汽車	Propylene Glycol (丙二醇)	°F Freezing Point	30 to -40	1	±1	PG
10	食物飲料	°Butyro		0-100	0.1	±0.5	Butyro
11	食物飲料	Fructose (果糖)	% Weight / Weight	0-85	0.1	±0.2	°Brix
12	食物飲料	Glucose (葡萄糖)	% Weight / Weight	0-85	0.1	±0.2	°Brix
13	食物飲料	42 HFCS (高果糖玉米糖漿)	% Weight / Weight	0-95	0.1	±0.2	°Brix
14	食物飲料	55 HFCS (高果糖玉米糖漿)	% Weight / Weight	0-95	0.1	±0.2	°Brix
15	食物飲料	90 HFCS (高果糖玉米糖漿)	% Weight / Weight	0-95	0.1	±0.2	°Brix
16	食物飲料	Invert Sugar (轉化糖)	% Weight / Weight	0-85	0.1	±0.2	°Brix
17	食物飲料	Maltose (麥芽糖)	% Weight / Weight	0-60	0.1	±0.2	°Brix
18	食物飲料	Salinity (NaCl) (鹽度)	% Weight / Volume	0-28	0.1	±0.2	NaCl
19	食物飲料	Total Solids of Waste Milk (廢乳品總固形物)	%	5-15	0.1	±0.5	°Brix
20	食物飲料	Water in Honey (蜂蜜水份)	% Weight / Weight	10-30	0.1	±0.2	Honey
21	工業	Arbitrary (隨意)		0-95	0.1	±0.2	
22	工業	Calcium Chloride (氯化鈣)	% Weight / Weight	0-40	0.1	±0.2	CaCl <sub>2</sub>
23	工業	Ethanol (乙醇)	% Volume / Volume	0-20	0.5	±1	Ethanol
24	工業	Ethylene Glycol (乙二醇)	% Volume / Volume	0-60	0.1	±0.4	EG
25	工業	Ethylene Glycol (乙二醇)	% Weight / Weight	0-60	0.1	±0.4	EG
26	工業	FSII DiEGME (ASTM D 5006) (防凍劑)	% Volume / Volume	0.0-0.25	0.01	±0.02	°Brix
27	工業	Hydrogen Peroxide (過氧化氫)	% Weight / Weight	0-50	0.2	±0.5	°Brix
28	工業	Methanol (甲醇)	% Weight / Weight	0-40	1	±0.2	Meth
29	工業	Propylene Glycol (丙二醇)	% Volume / Volume	0-60	0.1	±0.4	PG
30	工業	Sodium Sulphate (硫酸鈉)	% Weight / Weight	0-22	0.1	±0.2	Na <sub>2</sub> SO <sub>4</sub>
31	工業	Starch (澱粉)	%	0-30	0.1	±0.2	°Brix
32	工業	Sulphuric Acid (Battery Acid) (硫酸)	Specific Gravity (d20/20)	1.000-1.501	0.001	±0.003	SA
33	工業	Urea (CRC data) (尿素)	% Weight / Weight	0-40	0.1	±0.2	AUS32
34	生命科學	Colostrum Quality (初乳品質)		Poor / PASS	Poor / PASS	±0.2	°Brix
35	生命科學	Seawater (Practical Salt Units) (海水)	Part Per Thousand	0-180	1	±1	NaCl
36	生命科學	Seawater (Practical Salt Units) (海水)	Specific Gravity (d20/20)	1.000-1.090	0.0005	±0.001	NaCl
37	生命科學	Serum Protein (血清蛋白)	g/100ml	0-30	0.1	±0.2	°Brix
38	生命科學	Urine (SG) Human (人類尿液)	Specific Gravity (d20/20)	1.000-1.050	0.0005	±0.0010	°Brix
39	生命科學	Urine (SG) Large Mammal (大型哺乳類尿液)	Specific Gravity (d20/20)	1.000-1.050	0.0001	±0.0010	°Brix
40	生命科學	Urine (SG) Small Mammal (小型哺乳類尿液)	Specific Gravity (d20/20)	1.000-1.050	0.0005	±0.0010	°Brix
41	酒類	°Baumé (波美比重)		0-50	0.1	±0.2	°Brix
42	酒類	°Zeiss (ABV)	% Volume / Volume	10-135	0.1	±0.5	°Brix
43	酒類	Alcohol Probable (AP)		0-22	0.1	±0.2	°Brix
44	酒類	KMW (Babo) (法國糖度)		0-25	1	±1	°Brix
45	酒類	Oechsle (German) (德國糖度)		30-130	1	±1	°Brix
46	酒類	Oechsle (Swiss) (瑞士糖度)		0-130	1	±1	°Brix
47	酒類	°Plato (柏拉圖度)		0-30	0.1	±0.2	°Brix
48	酒類	Mass Sugar (°Brix) (ATC)	% Weight / Weight	0-95	0.1	±0.2	°Brix
49	酒類	Mass Sugar (°Brix)	% Weight / Weight	0-95	0.1	±0.2	None
50	酒類	Wort (Sucrose Equivalent) (麥芽汁蔗糖當量)	Specific Gravity (d20/20)	1.000-1.120	0.0005	±0.001	°Brix



## 操作說明

### 測定樣本

在測定樣本前，請使用水或甲醇清潔稜鏡表面。

1. 將樣本注滿圓盤
2. 按一下**READ**鍵
3. 數秒後測定結果將顯示於螢幕

測完後請移除樣本並清潔圓盤及稜鏡表面。

### 切換量測刻度 (A > B > C)

本儀器可設定三個Channel的刻度，螢幕上顯示的箭頭指向當下選定的Channel。箭頭指向A則為Channel A，箭頭指向B則為Channel B，箭頭同時指向A、B則為Channel C。如欲切換Channel：

1. 右手壓住**ZERO**鍵；
2. 在3秒內左手按一下**READ**鍵即可切換到下一個Channel，切換完成後雙手同時放開。

 **請注意！**按壓**ZERO**鍵不要超過3秒，否則儀器會自動進入零點校正。

## 儀器驗證

### 使用已知濃度的蔗糖溶液驗證儀器

本儀器可使用已知濃度 (weight/weight) 的蔗糖溶液進行驗證，使用的刻度為Brix，操作如下：

1. 執行零點校正；
2. 將驗證用的蔗糖溶液注滿圓盤；
3. 停留10秒使溫度平衡；
4. 按一下**READ**鍵；
5. 測定完畢，查看測定的數值，如為該溶液標定濃度 $\pm 0.2^\circ$  Brix代表驗證通過。

 **請注意！**如驗證結果超出允收標準，請重新執行一次驗證或聯絡製造商。

## 其他資訊

For calculation of ABV of finished wine, beer and cider using a refractometer and hydrometer, please use our ABV Calculator:



[www.bellinghamandstanley.com/en/customer-support/calculators](http://www.bellinghamandstanley.com/en/customer-support/calculators)



Instructions / Mode d'emploi / Anleitung /  
Instrucciones / Istruzione:

[www.bellinghamandstanley.com/en/home/OPTi-UG](http://www.bellinghamandstanley.com/en/home/OPTi-UG)

### 零點校正

每日第一次操作前請先使用蒸餾水 (RO水、一次水) 進行零點校正以確保儀器的準確度。

1. 清潔稜鏡表面並擦乾；
2. 將蒸餾水注滿圓盤；
3. 停留10秒讓溫度平衡；
4. 壓住**ZERO**鍵4秒，待螢幕顯示000即可放開；
5. 螢幕顯示000表校正完成。

 **請注意！**一定要壓住**ZERO**鍵4秒

### 顯示溫度

如欲查看測定樣本時的溫度：

1. 按一下**ZERO**鍵
2. 螢幕顯示溫度值

 **請注意！**如無測定樣本，則查看溫度將顯示為--.[

### 使用“AG Test Mode”驗證儀器

本儀器亦可使用效期較長且穩定性高的AG Fluid進行驗證。AG Fluid並非蔗糖成份，因此無法使用以蔗糖為基準的溫度補償功能。使用AG Fluid驗證儀器必須進入AG Test Mode進行操作：

1. 執行零點校正
2. 進入功能主選單
3. 功能主選單第一個就是AG Test Mode (顯示為-RLT-)，按一下**READ**鍵進入AG Test Mode (此時閃爍顯示-RLT-)
4. 將AG Fluid注滿圓盤
5. 停留10秒使溫度平衡
6. 按一下**READ**鍵，此時螢幕將輪流顯示測定數值與-RLT-
7. 查看測定的數值，如為該AG Fluid標定濃度 $\pm 0.2^\circ$ Brix代表驗證通過。
8. 直接關機。



This symbol is an internationally agreed indicator that the product bearing it should not be disposed of as general waste or garbage which might end up in landfill sites, but should instead be sent for special processing and/or recycling in those countries where appropriate legislation and facilities are in place.



This symbol indicates a caution or warning, please refer to the manual.

## 錯誤代號

H <sub>1</sub>	L <sub>0</sub>	樣本濃度超過或低於測定範圍
EL	EH	溫度過高或過低
		電池電量 (過低 / 尚可 / 足夠)
12.3 (閃爍)		樣品體積不足或室內環境過亮
-HRL-		室內環境過亮
--- C/F		無溫度紀錄 (沒有測定樣本)
-AGT- / 40.1 (輪流顯示)		AG Test Mode已啟動
FAIL		PIN碼輸入錯誤
NONE		無效的PIN碼

## General specification

### Prism and dish

Dish material	316 stainless steel
Prism seal	Silicone rubber
Prism material	Optical glass
Sample surface	8 mm diameter

### Housing

Material	Acrylonitrile Butadiene Styrene
IP rating	IP65 water resistant
Relative humidity	95% RH

### Measurement accuracy

Brix / Refractive Index	±0.2 / ±0.0003
-------------------------	----------------

### Physical

Length	115 mm
Width	54 mm
Height	30 mm
Weight	85g (without batteries fitted)

### Temperature

Storage	-10 to 60°C
Operating	5 to 40°C
Brix measurement	5 to 60°C
Other scale measurement	5 to 40°C

## Automatic temperature compensation

Automatic temperature compensation will correct readings of water and sucrose solutions to 20°C. It conforms to the published ICUMSA 1978 correction tables which covers the ranges 10 to 40°C and 0 to 80° Brix and has been extended to cover 5 to 70°C by using additional data. Although the correction is specifically applicable to pure sucrose solutions, it is also valid for many sugar based food products. Application (scale) specific temperature compensation has been applied to non-sugar related scales using published or experimental data as appropriate.

## Declaration of conformity

According to ISO/IEC 17050-1 & 2 : 2004 Bellingham + Stanley declares that the OPTi Digital Handheld Refractometer (all models) conforms to the following technical requirements:

EMC	Emissions	EN 61326-1:2006 & 2013	CISPR 11:2003, Class B
	AS/NZS CISPR 11		CISPR 11:2003, Class B
	FCC/CFR 47:Part 15		ANSI C63.4:2003, Class B
	Canadian Standard ICES-003:Issue 4		CISPR 22:1997 inc A2:2003
	Immunity	EN 61326-1:2006 & 2013	IEC 61000-4-2:1995 inc A2:2001
		EN 61326-1:2006 & 2013	IEC 61000-4-3:2002 & 2006
Supplementary	The product herewith complies with the requirements of the EMC Directive 2014/30/EU		

## Warranty and customer care

This refractometer is warranted for 12 months after the date of purchase against any manufacturer defect in materials or workmanship. As this refractometer is a precision optical instrument, care must be taken to ensure correct storage, handling and use of the instrument. Failure to do so could invalidate the instrument's warranty.