



**Bellingham  
+ Stanley**

# Hand-Held Refractometers & Optical Instrumentation



SI Analytics



# Hand-Held Refractometers



## E-line Economy Range

The E-Line Automatic Temperature Compensation (ATC) Range of hand-held refractometers offers versatility at a low price.

They are ideal for use in many applications including: fruit, beverage, sugar, food and industrial applications where concentration

measurements are required within a light industrial environment.

## E-Line 80 Refractometer

The e-line 80 refractometer offers a relatively wide measuring range when compared to conventional hand held refractometers and so facilitates the measurement of a wider range of samples without the need to carry multiple instruments. The instrument has dual input optics allowing measurement in transmitted or, for solid samples, reflected modes and is supplied with conversion tables for refractive index measurement.



Code	Range	Scale Division
<b>Standard Models</b>		
44-801	0-10 Sugar % (°Brix)	0.1
44-802	0-18 Sugar % (°Brix)	0.1
44-803	0-32 Sugar % (°Brix)	0.2
44-804	28-62 Sugar % (°Brix)	0.2
44-805	45-82 Sugar % (°Brix)	0.5
44-812	10-30 Water-in-Honey (%)	0.1
<b>Special Application Models</b>		
44-808	E-line Aquatic 0-100 ‰ Saline 1.000-1.070 Saline (SG)	1 ‰ 0.001
44-820	E-line Glycol Heat Transfer 0-70 EG/PG % vol/vol 0 to -50 EG/PG °C Protection	5 5
44-821	E-line Automotive 0 to -50 EG/PG Protection (°C) 1.1 to 1.4 Battery (SG) 0 to -40 Windscreen (°C)	5 0.05 0.2
44-825	E-line Veterinary 1.33-1.360 RI 1.000-1.050 Urine (SG) 0-12 Serum Protein g/100ml	0.0005 0.005 0.2
44-828	1.3330-1.3848 RI	0.0001
44-829	1.435-1.520 RI	0.001
<b>Wine Models</b>		
44-809	0-40 % Mass (°Brix) 0-25 Alcohol Probable (A.P.)	0.2 0.2
44-817	0-32 % Mass (°Brix) 0-140 Oechsle D	0.2 1
44-818	0-140 Oechsle 0-27 Babo (KMW) 0-32 % Mass (°Brix)	1 0.2 0.2
44-819	0-20 Baume 0-25 Alcohol Probable (A.P.)	0.2 0.2

Specifications	E-Line 80
Range: Scale One Scale Two	0-50 °Brix 50-80 °Brix
Scale Division	1
ATC type	Manual
Order Code	44-807

Spare Illuminator Flaps (5 – ATC)
Code 44-881

# Hand-Held Refractometers

## Eclipse Professional Range

Manufactured in the UK using only the highest quality optical components and the most modern manufacturing practices, the Eclipse refractometer is the ultimate optical hand held refractometer on the market today. A comprehensive choice of scale types offers versatility across a wide application scope from testing fruit ripeness in the field to monitoring industrial fluids in harsh machine shop environments.

Eclipse refractometers have a number of unique features not available on many other brands of refractometer.



Code	Food, Beverage, Sugar & General Models	Range	Scale Division
45-01	Sugar % (°Brix)	0-15	0.1
45-02	Sugar % (°Brix)	0-30	0.2
45-07	Sugar % (°Brix)	0-32	0.2
45-03	Sugar % (°Brix)	0-50	0.5
45-08	Sugar % (°Brix)	28-65	0.2
45-05	Sugar % (°Brix)	45-80	0.2
45-06	Sugar % (°Brix)	72-95	0.2
45-22	Wine - °Zeiss (ABV)	10-135	1
45-27	Water-in-Honey (%)	10-30	0.2
45-81	Low Volume (Nectar <1-micro-litre)	0-50	0.5
45-82	Low Volume (Nectar <1-micro-litre)	45-80	0.2

### Industrial Models

45-26	Starch (%)	0-30	0.2
45-41	Refractive Index	1.330-1.420	0.001
45-44	Antifreeze	- °C Protection	0 to -40
		- Battery acid SG	1.1-1.35
45-45	Antifreeze	- °F Protection	30 to -40
		- Battery acid SG	1.1-1.35
45-46	Antifreeze	- % Ethylene Glycol	0-60
		- % Propylene Glycol	0-60
45-65	Salinity (% NaCl)	0-28	0.2

### Special features make measurement easy and reliable

- All metal construction
- Rubber handgrip for insulation
- Robust ergonomics for easy handling
- Anti-roll supports
- High precision, clear scale
- Sample 'dribble' feed
- Zero adjust with lock
- Push on prism flap
- Ideal for hot & cold samples
- Serial numbered
- Certificate of Conformity

Spare Illuminator Flaps (5)

Code 45-003



# OPTi



## OPTi Digital Range

Bellingham + Stanley designed OPTi digital hand held refractometers are manufactured in the UK as highly reliable premium quality instruments suitable for use in the harshest of environments across a wide application scope.

OPTi refractometers are constructed using the latest manufacturing techniques including stainless steel injection molding to construct the easy clean prism dish, ultrasonic welding to bond the housings and a rubberized switch membrane to further

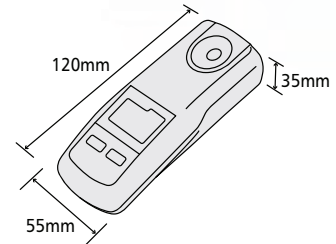
protect against moisture ingress and excess wear.

The OPTi refractometer may be used to control the dissolved solids or blend ratios of numerous products from fresh fruit to industrial chemicals.

- Ergonomic design
- Wide application scope
- Single and Duo scale models
- Zero calibrate with water
- Shallow prism dish
- Small hand print

## Single Scale Models

Code	Range
38-02	0-54 % Sugar (°Brix)
38-20	1.33-1.42 RI
38-22	0-30 % Starch
38-23	0-40 % Urea
38-28	0-28 % Salinity (NaCl)



OPTi refractometers are supplied with a Certificate of Calibration as standard. OPTi refractometers are verified using UKAS Certified Reference Materials manufactured in accordance with EN ISO IEC 17025:2005.

## General Specifications

Resolution (°Brix / Refractive Index) <sup>1</sup>	0.1 / 0.0001
Accuracy (°Brix / Refractive Index) <sup>1</sup>	±0.2 / ±0.0003
Automatic Temperature Compensation <sup>1</sup>	ICUMSA / App. Specific / None
Ambient Temperature Range	5 – 40°C
Measurement Time	2 seconds
Battery Life	10,000 readings
Battery Type	3V 2 x AAA (LR03)

1. For model specific details, visit our website



# Hand-Held Refractometers



## Dual Scale Models

Having two pre-programmed model specific scales, OPTi Duo refractometers offer versatility in applications where a second product type is commonly measured such as diesel exhaust fluid (Adblue®) and antifreeze within the automotive service industry or in viniculture,

where a regional unit must be supported by an internationally recognised scale.

Further application specific OPTi Duo refractometers are listed on our website. OPTi refractometers with customer or product specific scale data may also be supplied.



Optional Belt Pouch

Code 38-016

Application/Model Description	Code	Range A	Range B
<b>Wine &amp; Beer</b>			
Wine AP	38-41	0-35 Mass SW% (°Brix)	0-22° Alcohol Probable
Wine OE-D	38-42	0-35 Mass SW% (°Brix)	30-130 Oechsle (German)
Wine OE-CH	38-43	0-35 Mass SW% (°Brix)	0-130 Oechsle (Swiss)
Wine KMW	38-44	0-35 Mass SW% (°Brix)	0-25 Babo (KMW)
Wine Baume	38-45	0-35 Mass SW% (°Brix)	0-28 Baume
Wine Baume/AP	38-46	0-28 Baume	0-22° Alcohol Probable
Wine ABV	38-47	0-35 Mass SW% (°Brix)	10-135 °Zeiss (ABV)
Brew	38-49	10-135 °Zeiss (ABV)	0-30 °Plato
<b>Life Science</b>			
Aquatic	38-51	0-180 ‰ Seawater (PPT)	1.000-1.070 Seawater SG
Sport	38-52	1.000-1.050 Urine SG Human	0-30 Sugar % (°Brix)
Veterinary	38-53	1.000-1.050 Urine SG (SM)	1.000-1.050 Urine SG (LM)
<b>Industrial</b>			
General Purpose C1	38-31	0-54 °Brix	1.33-1.42 RI
Chemical C2	38-37	1.33-1.42 RI	5-40 °C (temperature)
Automotive DEF/Ethylene C	38-65	0-40 % Urea	0 to -50°C Protection (EG)
Automotive Antifreeze C	38-67	0 to -50°C Protection (EG)	0 to -50°C Protection (PG)
Heat Transfer Propylene C/vol	38-70	0-60 % vol/vol (PG)	0 to -50°C Protection (PG)
Heat Transfer Ethylene C/vol	38-71	0-60 % vol/vol (EG)	0 to -50°C Protection (EG)
Heat Transfer Glycol %	38-72	0-60 % vol/vol (EG)	0-60 % vol/vol (PG)
Coolant	38-81	0-18 °Brix	1.33-1.38 RI
Aviation	38-83	1.33-1.42 RI (ATC)	0-0.25 DiEGME (FSII)

°F versions also available. (Table Abbr. EG: Ethylene Glycol. PG: Propylene Glycol)

More information and latest OPTi news: [www.bellinghamandstanley.com](http://www.bellinghamandstanley.com)

# Abbe Refractometers



Abbe 60

Bellingham+Stanley offer a number of Abbe refractometers and a choice can be made in accordance with the measurement requirement and budget availability.

The Abbe 60 direct reading models are manufactured to extremely high standards. The latest designs incorporate an externally mounted LED light source for sample illumination with a second internally mounted LED for scale illumination. Wavelength compensation is by achromatizing prisms to 589.3nm. Refractive Index measurements are made directly from the scale to 0.001 RI allowing estimation to  $\pm 0.0001$  RI.

The Abbe 5 refractometer has similar operational features to the Abbe 60 but has been designed with budget in mind, so is ideal for use in schools, colleges and commercial laboratories with a low throughput of samples. Refractive Index readings may be read directly from the scale to 0.0005RI. Simple dispersion measurements may also be performed with the Abbe 5 Refractometer.

Some applications dictate that readings must be carried out at wavelengths other than 589.3nm. The Abbe 60ED and 60LR models facilitate measurement at any wavelength within the visible spectrum and by adopting a monochromatic light source and an evenly divided scale; by using PC software, readings may be obtained to an accuracy of  $\pm 0.00004$  RI. Typical applications include investigation of polymer films, hydrocarbons, fibre optics, semi-solids and glass. A full set of accessory items are available, including spectral emission lamps, interference filters, etc., details of which may be found on the Company website.

All models have a digital temperature display and may be connected to a waterbath for temperature control.



Abbe 5

Code	Model	Scale and Scale Division	
		Refractive Index	Sugar % (°Brix)
10-99	60/DR	1.30-1.74 x 0.001	0-95 x 0.5
10-03	60/95	1.30-1.535 x 0.001	0-50 x 0.2 & 50-95 x 0.1
10-04	60/ED	1.30-1.74 (equivalent to)	0-95 (equivalent to)
10-06	60/LR	1.20-1.70 (equivalent to)	0-95 (equivalent to)
44-501	Abbe 5	1.30-1.70 x 0.0005	0-95 x 0.25

The working temperature range for these instruments is from +5 to 75°C



Description	Code (230V)	Code (110V)
Sodium Lamp Outfit (free standing) for 60ED and 60LR	59-01	59-06
Spectral Lamp Outfit (free standing) for 60ED and 60LR	59-20	59-25
Abbe 5 Light Source (230V 50-60 Hz)	44-520	
Abbe 5 Light Source (110V 50-60 Hz)	44-525	

# Model D7 Polarimeter

For over 40-years, the Model D polarimeter and sodium lamp outfit has been the primary choice of leading industrial and academic institutions throughout the world, offering practical assessment of optically active materials combined with high accuracy measurement.

Changes in legislation, particularly within the sugar and pharmaceutical sectors, has demanded a shift towards digital instrumentation, however, the need for a high quality optical polarimeter is still paramount where circumstances dictate that an optical instrument should be used. Such applications include use in contract laboratories of low sample throughput and of course the continued use in both physics and chemistry departments within the education field.

Bellingham + Stanley has updated the original Model D design to meet the requirements of 21st Century applications. The instrument body has been replaced with a new 'low weight' component that reduces shipping costs, significantly important where a number of instruments are supplied to one destination, and the sodium lamp has been replaced with a lightweight, low cost LED light source with an interference filter and integral intensity control. Retaining the measurement specification of the original Model D, the new D7 provides the user with one of the highest specification optical measurements of rotation at a fraction of the cost of its predecessor.

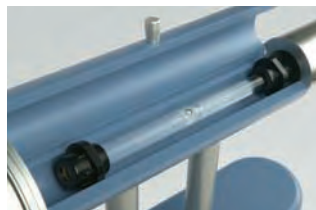


## Features:

- Dual scale
- LED light source
- Intensity control
- 90-230V~, 50/60Hz
- Lightweight

Specification		
	Angular (°A)	ISS (°Z)
Range	0-360	-30 to +130
Sub Division	1	1
Resolution by Micrometer Drum	0.05	0.1
Reading by Estimation	±0.02	±0.05

Code	Description
31-02	Model D7 Polarimeter with integral LED light source, intensity control, power supply, 200mm 'bubble' polarimeter tube and instructions for use.



## E-Line Gemological

Refractive Index is one of the most important optical parameters used to identify and authenticate polished precious and semi-precious gemstones. The E-Line Gemological refractometer is a low cost, lightweight measuring instrument used by jewellers and traders of gemstones. The Gemological refractometer can also be used to identify whether a particular stone is Isotropic or Anisotropic (uniaxial or biaxial).



Specification	
Measuring range	1.30-1.81
Resolution	0.01

Code	Description
44-861	E-Line Gemological Refractometer

# Application Specific Test Kits

Bellingham + Stanley supply a number of portable test kits for specific industrial applications, including those for monitoring concentration and oil contamination of Diesel Exhaust Fluids (AUS-32, Adblue®) as well as an alcohol test kit for determining the strength of beer, wine and cider used by manufacturers and trading standards officers alike.

Further information on the suitability and use of such test kits are available from the Bellingham + Stanley Internet site.

## DEF/Adblue® Test Kits

Code	Description	Range
38-65	OPTi Duo Digital Refractometer Automotive (Adblue®/Antifreeze)	0-50 % Urea 0 to -50 °C Protection (EG)
44-862	Adblue® hydrometer	GO/NO GO
44-865	Adblue® hydrometer (SG)	1.086-1.093
44-863	Oil in Water Test Strips (pack of 100 strips)	

## ABV Test Kit Components

Code	Description	Range	Scale Division
38-49	OPTi Duo Digital Refractometer Brew (ABV/Wort)	10-135 Zeiss 0-30 °Plato	1 0.1
45-22	ABV Eclipse Refractometer	10-135 Zeiss	1
44-839	Hydrometer (SG)	0.980 to 1.050	0.001
44-838	Hydrometer Jar		

## Bellingham + Stanley

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