

# E-Line 90 Refractometer



## User Guide



**Bellingham  
+ Stanley**

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ANALYTICS

## E-Line 90 Refractometer User Guide (Eng)

**B + S Code : 44-892**

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Table I

<i>Order Code</i>	<i>Range</i>	<i>Scale Division</i>	<i>Scale No.</i>	<i>Scale Ranges</i>
44-806	E-Line 90	0.2 °Brix minimum	1	0-42 °Brix
			2	42-71 °Brix
			3	71-90 °Brix

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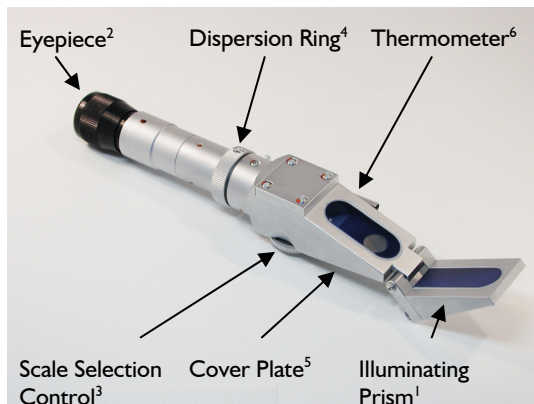
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## Product Description

The E-Line 90 is a full scale Brix refractometer ideal for use in the food industry and other applications requiring concentration measurements over a wide measurement range.

### Applying the sample to the refractometer:

Lift the illuminating prism<sup>1</sup> and apply the sample to the measurement prism. Close the prism and view the borderline (light/dark demarcation line) through the eyepiece<sup>2</sup>.



Always check sample Health & Safety Data before applying to the refractometer.

When applying samples to the prism which are likely to cause harm to skin or eyes, wear appropriate protective clothing and glasses.

Optical glass is relatively soft and care should be taken not to scratch the prism surface. Do not use metal spatulas or glass rods to apply samples but instead use softer materials such as plastic.

### Taking a reading:

Depending on the concentration of the sample, select the range of measurement<sup>(Table 1)</sup> by adjusting the scale selection control<sup>3</sup>. If the concentration is unknown, apply the sample and step through the ranges until a clear borderline is found. Adjustment of the dispersion ring<sup>4</sup> will sharpen the borderline and should be set so that no colour (blue/red) can be seen near the demarcation line. For dark samples, adjust the cover plate<sup>5</sup> to allow more light to enter the prism.

The concentration of the sample can be measured at the point the borderline crosses the scale. Take care to ensure that the reading is taken from the correct scale range.

Adjust the reading by measuring the temperature<sup>6</sup> of the instrument and adding the correction factor as shown on Table 2. Refractive Index values can be obtained by using a conversion table available from Bellingham + Stanley Ltd, see Table 3.

### Cleaning the prism:

Thoroughly clean the prism after use with water or other suitable solvent and dry with clean tissue. The prism surface could be damaged by strong alkalis or acids if left in contact for long periods of time. Clean samples from the prism as soon as practicable. Wiping the prism surface occasionally with alcohol will remove any build-up of oils left from the samples.

### Correcting the reading for temperature:

The refractometer is calibrated to read correctly at 20°C. The refractive index of the measured sample will vary with temperature and the reading must be corrected to take account of this. Please use the Table 2 below to adjust your reading accordingly.

### Temperature Correction Table (Table 2)

This table gives mass fraction corrections to refractometric tables for sucrose solutions at 589nm for temperature different from 20°C. Taken from ICUMSA, Appendix 2, SPS-3 (1998) page 8.

Temp. (°C)	Measured Sucrose Brix (Mass Fraction)																	
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
15	-0.29	-0.30	-0.32	-0.33	-0.34	-0.35	-0.36	-0.37	-0.37	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.37	-0.37
16	-0.24	-0.25	-0.26	-0.27	-0.28	-0.28	-0.29	-0.30	-0.30	-0.30	-0.31	-0.31	-0.31	-0.31	-0.31	-0.30	-0.30	-0.30
17	-0.18	-0.19	-0.20	-0.20	-0.21	-0.21	-0.22	-0.22	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	-0.22
18	-0.12	-0.13	-0.13	-0.14	-0.14	-0.14	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15	-0.15
19	-0.06	-0.06	-0.07	-0.07	-0.07	-0.07	-0.07	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.08	-0.07
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07
22	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15
23	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.22
24	0.27	0.28	0.29	0.29	0.30	0.30	0.31	0.31	0.31	0.32	0.32	0.32	0.32	0.31	0.31	0.31	0.30	0.30
25	0.34	0.35	0.36	0.37	0.38	0.38	0.39	0.39	0.40	0.40	0.40	0.40	0.40	0.39	0.39	0.38	0.38	0.37
26	0.42	0.43	0.44	0.45	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.46	0.46	0.45
27	0.50	0.51	0.52	0.53	0.54	0.55	0.55	0.56	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.54	0.53	0.52
28	0.58	0.59	0.60	0.61	0.62	0.63	0.64	0.64	0.64	0.65	0.65	0.64	0.64	0.63	0.63	0.62	0.61	0.60
29	0.66	0.67	0.68	0.70	0.71	0.71	0.72	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.71	0.70	0.69	0.67
30	0.74	0.76	0.77	0.78	0.79	0.80	0.81	0.81	0.82	0.82	0.81	0.81	0.80	0.80	0.79	0.78	0.76	0.75
31	0.83	0.84	0.85	0.87	0.88	0.89	0.89	0.90	0.90	0.90	0.90	0.89	0.89	0.88	0.87	0.86	0.84	0.82
32	0.92	0.93	0.94	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.98	0.97	0.96	0.95	0.93	0.92	0.90
33	1.01	1.02	1.03	1.05	1.06	1.07	1.07	1.08	1.08	1.08	1.07	1.07	1.06	1.04	1.03	1.01	1.00	0.98
34	1.10	1.11	1.13	1.14	1.15	1.16	1.16	1.17	1.17	1.16	1.16	1.15	1.14	1.13	1.11	1.09	1.07	1.05
35	1.19	1.21	1.22	1.23	1.24	1.25	1.25	1.26	1.26	1.25	1.25	1.24	1.23	1.21	1.19	1.17	1.15	1.13
36	1.29	1.30	1.31	1.33	1.34	1.34	1.35	1.35	1.35	1.34	1.34	1.33	1.31	1.29	1.28	1.25	1.23	1.20
37	1.39	1.40	1.41	1.42	1.43	1.44	1.44	1.44	1.44	1.43	1.43	1.41	1.40	1.38	1.36	1.33	1.31	1.28
38	1.49	1.50	1.51	1.52	1.53	1.53	1.54	1.54	1.53	1.53	1.52	1.50	1.48	1.46	1.44	1.42	1.39	1.36
39	1.59	1.60	1.61	1.62	1.63	1.63	1.63	1.63	1.63	1.62	1.61	1.59	1.57	1.55	1.52	1.50	1.47	1.43
40	1.69	1.70	1.71	1.72	1.73	1.73	1.73	1.73	1.72	1.71	1.70	1.68	1.66	1.63	1.61	1.58	1.54	1.51

Calibration:

Water may be used for checking the zero of the instrument, whilst accurately made sugar solutions are ideal for checking points further up the scale. When using water or sugar standards, always apply temperature correction (Table 2). Solid test plates may also be used but do not require temperature correction. The E-Line 90 does not have a facility to adjust calibration and in the event that the calibration is found to be incorrect, please contact Bellingham + Stanley Ltd. For further information on calibration materials, visit the Bellingham + Stanley website.

Care Warning:



This refractometer is a precision optical instrument and should be handled with care. Do not drop or subject it to sharp knocks.

°Brix to Refractive Index Conversion Table (Table 3)

The table below can be used to convert °Brix readings taken from the instrument scale into refractive index.

°Brix	Refractive Index at 589.3nm and 20.0°C	°Brix	Refractive Index at 589.3nm and 20.0°C	°Brix	Refractive Index at 589.3nm and 20.0°C
0	1.33299	30	1.38115	60	1.44193
1	1.33442	31	1.38296	61	1.44420
2	1.33586	32	1.38478	62	1.44650
3	1.33732	33	1.38661	63	1.44881
4	1.33879	34	1.38846	64	1.45113
5	1.34026	35	1.39032	65	1.45348
6	1.34175	36	1.39220	66	1.45584
7	1.34325	37	1.39409	67	1.45822
8	1.34477	38	1.39600	68	1.46061
9	1.34629	39	1.39792	69	1.46303
10	1.34782	40	1.39986	70	1.46546
11	1.34937	41	1.40181	71	1.46790
12	1.35093	42	1.40378	72	1.47037
13	1.35250	43	1.40576	73	1.47285
14	1.35408	44	1.40776	74	1.47535
15	1.35568	45	1.40978	75	1.47787
16	1.35729	46	1.41181	76	1.48040
17	1.35891	47	1.41385	77	1.48295
18	1.36054	48	1.41592	78	1.48552
19	1.36218	49	1.41799	79	1.48811
20	1.36384	50	1.42009	80	1.49071
21	1.36551	51	1.42220	81	1.49333
22	1.36720	52	1.42432	82	1.49597
23	1.36889	53	1.42647	83	1.49862
24	1.37060	54	1.42862	84	1.50129
25	1.37233	55	1.43080	85	1.50398
26	1.37406	56	1.43299	86	1.50669
27	1.37582	57	1.43520	87	1.50941
28	1.37758	58	1.43743	88	1.51215
29	1.37936	59	1.43967	89	1.51490
				90	1.51768

Data Source: ICUMSA Methods Book, Specification and Standard SPS-3 (2000), Refractometry and Tables - (Official)

Note: °Brix values greater than 85.00 are extrapolated from the relationship given in ICUMSA SPS-3 (2000) Equation I.

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