

Instruction Manual
for
Refractometers
SK-100R SK-101R SK-102R SK-104R
SK-106R SK-107R SK-109R SK-200R

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H28.2

Introduction

Thank you for purchasing the hand held Refractometer.

- This optical instrument measures liquid concentration by determining the refractive index of the liquid, based on the principle of total internal reflection.
- It is portable and the blue field makes it easy to read boundary.
- Read this manual before using your refractometer, and keep the manual in a safe place for future reference whenever necessary.

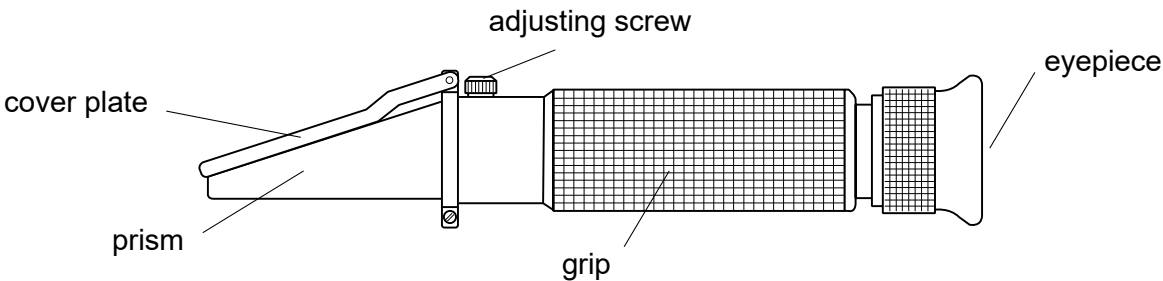
READ BEFORE USE!



Cautions!

- Read this manual before use and understand the features and operations of this instrument.
- When measuring substances that may be hazardous to humans, make sure you understand the nature of them and wear protective gloves and mask. Take special care when placing a sample on the prism, as it may spill over.
- Take care not to drop the instrument when carrying it.
- We (Sato Keiryoki Mfg. Co., Ltd.) will not be held responsible for any damage to the instrument caused by using it for any purpose other than to measure the concentration of a liquid.
- We will not be held responsible for any damage caused to the substance being measured.
- The prism which comes into contact with the sample being measured is a consumable item.

Names of Each Section



HOW TO USE

- For the models SK-100R, SK-102R, SK-104R and SK-109R
(w/ auto temperature correction)

Accessories: Wipe-out cloth, carrying case, screwdriver, dropper, distilled water

- Using the Refractometer after Adjustment with Distilled Water -

Note: Be sure to perform the scale adjustment before using this instrument for the first time each day, or if the ambient temperature changes.

- (1) Place yourself facing the light source and look through the eyepiece to see the scale. Adjust the focus to suit your eyes by rotating the eyepiece clockwise or counterclockwise.
- (2) While holding the instrument as shown in Figure 1, open the cover plate, place a few drops of distilled water on the prism and then close the cover plate. Look through the eyepiece to see the white and blue fields as shown in Figure 2 below
- (3) Scale adjustment
This instrument is designed to allow for scale adjustment at 20°C, and the intersection of the boundary of the white and blue fields is set to 0% when the distilled water is measured. If the boundary is not at 0%, slowly turn the adjusting screw clockwise or counterclockwise with the flat-bladed screwdriver supplied until the intersection is at 0% (Figure 2).
- (4) After completing the adjustment, thoroughly clean the prism and the cover plate with the cloth supplied.
- (5) Measurement
To take a reading, place a few drops of the liquid to be measured on the prism. Look through the eyepiece at the white and blue fields on the scale. The concentration of the liquid being measured is determined by the intersection of the boundary of those fields. For example, in Figure 3 the concentration is 16%.

Figure 1

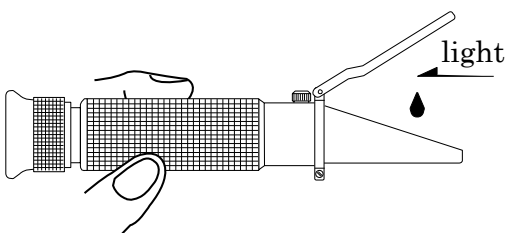


Figure 2
(SK-100R)

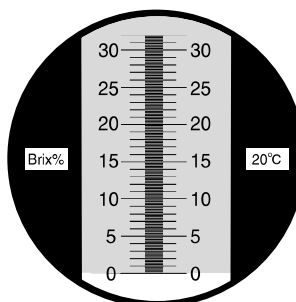
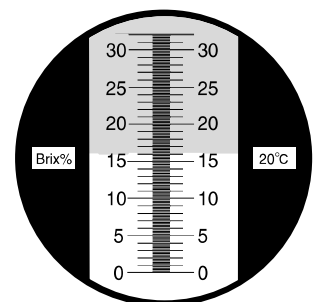


Figure 3
(SK-100R)



- **For the model SK-101R (w/ auto temperature correction)**
Accessories: Wipe-out cloth, carrying case, screwdriver, dropper, saturation salt water

- Using the Refractometer after Adjustment with Saturation Salt Water -

Note: Be sure to perform the scale adjustment before using this instrument for the first time each day, or if the ambient temperature changes.

- (1) Place yourself facing the light source and look through the eyepiece to see the scale. Adjust the focus to suit your eyes by rotating the eyepiece clockwise or counterclockwise.
- (2) While holding the instrument as shown in Figure 1, open the cover plate, place a few drops of saturation salt water on the prism and then close the cover plate. Look through the eyepiece to see the white and blue fields as shown in Figure 2 below.
- (3) Scale adjustment
This instrument is designed to allow for adjustment at 20°C, and the intersection of the boundary of the white and blue fields is set to 29.6%.when the saturation salt water is measured. If the boundary is not at 29.6%, slowly turn the adjusting screw clockwise or counterclockwise with the flat-bladed screwdriver supplied until the intersection is at 29.6% (Figure 2).
- (4) After completing the adjustment, thoroughly clean the prism and the cover plate with the cloth supplied.
- (5) Measurement
To take a reading, place a few drops of the liquid to be measured on the prism. Look through the eyepiece at the white and blue fields on the scale. The concentration of the liquid being measured is determined by the intersection of the boundary of those fields. For example, in Figure 3 the concentration is 38%.

Figure 1

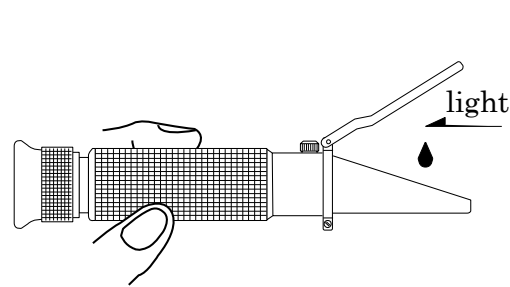


Figure 2

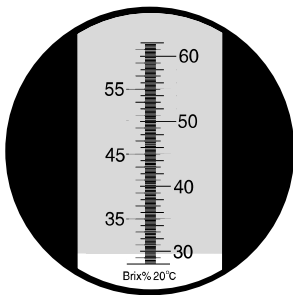
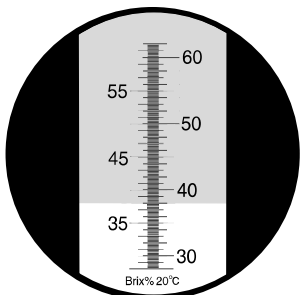


Figure 3



- **For the models SK-200R (for concentration of salt water) (w/ auto temperature correction)**

Accessories: Wipe-out cloth, carrying case, screwdriver, dropper, distilled water

- Using the Refractometer after Adjustment with Distilled Water -

Note: Be sure to perform the scale adjustment before using this instrument for the first time each day, or if the ambient temperature changes.

- (1) Place yourself facing the light source and look through the eyepiece to see the scale. Adjust the focus to suit your eyes by rotating the eyepiece clockwise or counterclockwise.
- (2) While holding the instrument as shown in Figure 1, open the cover plate, place a few drops of distilled water on the prism and then close the cover plate. Look through the eyepiece to see the white and blue fields as shown in Figure 2 below
- (3) Scale adjustment
This instrument is designed to allow for scale adjustment at 20°C, and the intersection of the boundary of the white and blue fields is set to 0% when the distilled water is measured. If the boundary is not at 0%, slowly turn the adjusting screw clockwise or counterclockwise with the flat-bladed screwdriver supplied until the intersection is at 0% (Figure 2).
- (4) After completing the adjustment, thoroughly clean the prism and the cover plate with the cloth supplied.
- (5) Measurement
To take a reading, place a few drops of the liquid to be measured on the prism. Look through the eyepiece at the white and blue fields on the scale. The concentration of the liquid being measured is determined by the intersection of the boundary of those fields. For example, in Figure 3 the concentration is 16%.

Figure 1

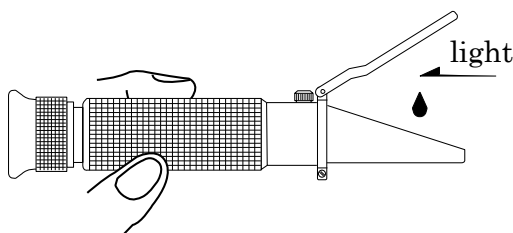


Figure 2

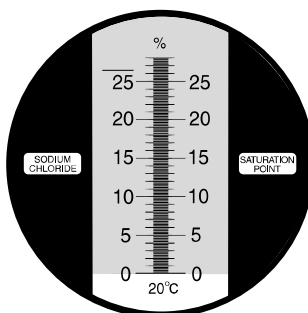
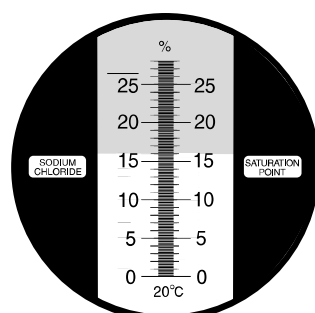


Figure 3



- **For the models SK-106R and SK-107R**
Accessories: Wipe-out cloth, carrying case, screwdriver, dropper, block for adjustment, oil for adjustment

- Using the Refractometer after Adjustment with Oil for Adjustment -

Note: Be sure to perform the scale adjustment before using this instrument for the first time each day, or if the ambient temperature changes.

- (1) Place yourself facing the light source and look through the eyepiece to see the scale. Adjust the focus to suit your eyes by rotating the eyepiece clockwise or counterclockwise.
- (2) While holding the instrument as shown in Figure 1, open the cover plate and place oil for adjustment on the center of the prism to become uniform. Put block for adjustment (7 x 14mm) while with designating the smooth aspect of the block as under and in order for the oil to spread the whole surface. Then close the cover plate. Look through the eyepiece to see the white and blue fields as shown in Figure 2 below.
- (3) Scale adjustment
This instrument is designed to allow for adjustment at 20°C, and the intersection of the boundary of the white and blue fields is set to 78.5% when the oil attached is measured.. If the boundary is not at 78.5%, slowly turn the adjusting screw clockwise or counterclockwise with the flat-bladed screwdriver supplied until the intersection is at 78.5% (Figure 2).
- (4) After completing the adjustment, thoroughly clean the prism and the cover plate with the cloth supplied.
- (5) Measurement
To take a reading, place a few drops of the liquid to be measured on the prism. Look through the eyepiece at the white and blue fields on the scale. The concentration of the liquid being measured is determined by the intersection of the boundary of those fields. For example, in Figure 3 the concentration is 68%.

Figure 1

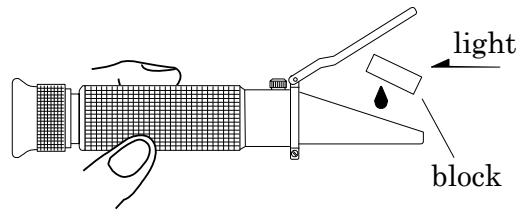


Figure 2
(SK-106R)

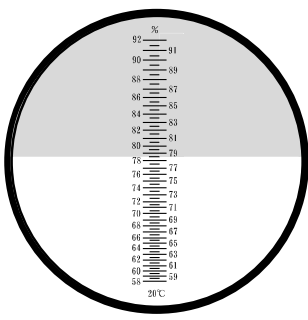
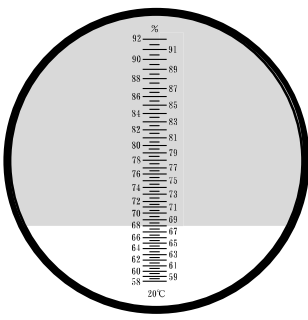


Figure 3
(SK-106R)



Temperature Correction

An auto temperature correction has been attached in the models SK-100R, SK-101R, SK-102R, SK-104R, SK-109R and SK-200R; however SK-106R and SK-107R do not have the function.

The SK-106R and SK-107R are also designed to measure samples when their temperatures are 20°C. For samples having other temperatures, perform temperature correction according to the table below.

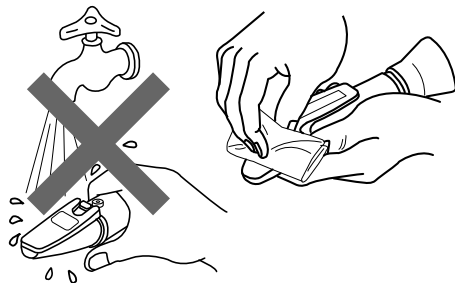
For example: for a sample of 25.0% at 24°C, 0.30% should be added. Therefore, the result will be 25.3% ($25.0 + 0.3 = 25.3$ (%))

Temperature Correction Table (JIS B7185)

			Concentration (%)														
			0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Temperature (°C)	deduct from reading	10	0.50	0.54	0.58	0.61	0.64	0.66	0.68	0.70	0.72	0.73	0.74	0.75	0.76	0.78	0.79
		11	0.46	0.46	0.53	0.55	0.58	0.60	0.62	0.64	0.65	0.66	0.67	0.68	0.69	0.70	0.71
		12	0.42	0.45	0.48	0.50	0.52	0.54	0.56	0.57	0.58	0.59	0.60	0.61	0.61	0.63	0.63
		13	0.37	0.40	0.42	0.44	0.46	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.54	0.55	0.55
		14	0.33	0.35	0.37	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.45	0.46	0.46	0.47	0.48
		15	0.27	0.29	0.31	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.39	0.40	0.40
		16	0.22	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.30	0.30	0.31	0.31	0.32	0.32
		17	0.17	0.18	0.19	0.20	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24
		18	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16
		19	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	add to reading	21	0.06	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
		22	0.13	0.13	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
		23	0.19	0.20	0.21	0.22	0.22	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.24	0.24	0.24
		24	0.26	0.27	0.28	0.29	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.32	0.32	0.32	0.32
		25	0.33	0.35	0.36	0.37	0.38	0.38	0.39	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
		26	0.40	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
		27	0.48	0.50	0.52	0.53	0.54	0.55	0.55	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
		28	0.56	0.57	0.60	0.61	0.62	0.63	0.63	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64
		29	0.64	0.66	0.68	0.69	0.71	0.72	0.72	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
		30	0.72	0.74	0.77	0.78	0.79	0.80	0.80	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81

NOTES

- After measurement, clean the prism and the cover plate to completely remove the sample, otherwise it may corrode the instrument.
- If the surface of the prism or cover plate is smeared with oil or similar liquids, it will repel the sample and prevent measurement. Completely wipe off the contaminant with a soft material such as tissue paper soaked in fresh water.
- Do not wash this instrument under running water.
- This instrument is an optical device.
Handle it with care, and avoid dropping or knocking it.



Specifications

Cat. No.	Model	Scale (Brix)	Min. Scale	Grip Dia.	Length	Weight
0180-00	SK-100R	0.0 to 32.0%	0.2%	29mm	170mm	105g
0181-00	SK-101R	28.0 to 62.0%	0.2%	29mm	160mm	105g
0182-00	SK-102R	0.0 to 18.0%	0.1%	29mm	195mm	120g
0184-00	SK-104R	0.0 to 10.0%	0.1%	29mm	195mm	120g
0186-00	SK-106R	58.0 to 92.0%	0.2%	29mm	150mm	100g
0187-00	SK-107R	45.0 to 82.0%	0.5%	29mm	145mm	100g
0189-00	SK-109R	0.0 to 50.0%	0.5%	29mm	155mm	100g
0190-00	SK-200R	* 0.0 to 28.0%	0.2%	29mm	170mm	105g

* for concentration of salt water

Materials

- Main unit : Aluminum alloy
- Cover plate : Polycarbonate
- Prism : Optical glass
- Grip : Synthetic rubber
- Adjusting screw : Stainless steel

Measuring Range for each model

Model	(Min SCALE)	0	20	40	60	80	100
SK-100R	(0.2%)						
SK-101R	(0.2%)						
SK-102R	(0.1%)						
SK-104R	(0.1%)						
SK-106R	(0.5%)						
SK-107R	(0.5%)						
SK-109R	(1.0%)						

Brix of samples

	0	20	40	60	80	100
Salad oil						
Cutting Lubricant						
Emulsification...						
Antifreeze						
Petroleum crude...						

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