

POLARIS

Instruction manual



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Specifications

MODEL	: POLARIS
TYPE	: ROTATING POLARIMETER.
ANGLE OPTICAL SYSTEM	: 20°
POWER SUPPLY	: 220 V.
FUSE IN BASE	: 500 mA 5 x 20.
BULB	: NATRIUM
DIMENSIONS	: 440 x 130 x 300.
WEIGHT	: 10.5 Kg.

Principle

A polarimeter consists of a pair of polarisers mounted in line, one which can be rotated with respect to the other and the angle of rotation is measured on a scale.

When polarisers are crossed (this is to say when their polarising planes are mutually perpendicular) no light is passing through.

As soon as a polarising tube filled with an optically active solution is introduced between the polarisers, the transmission of light is restored to a certain level.

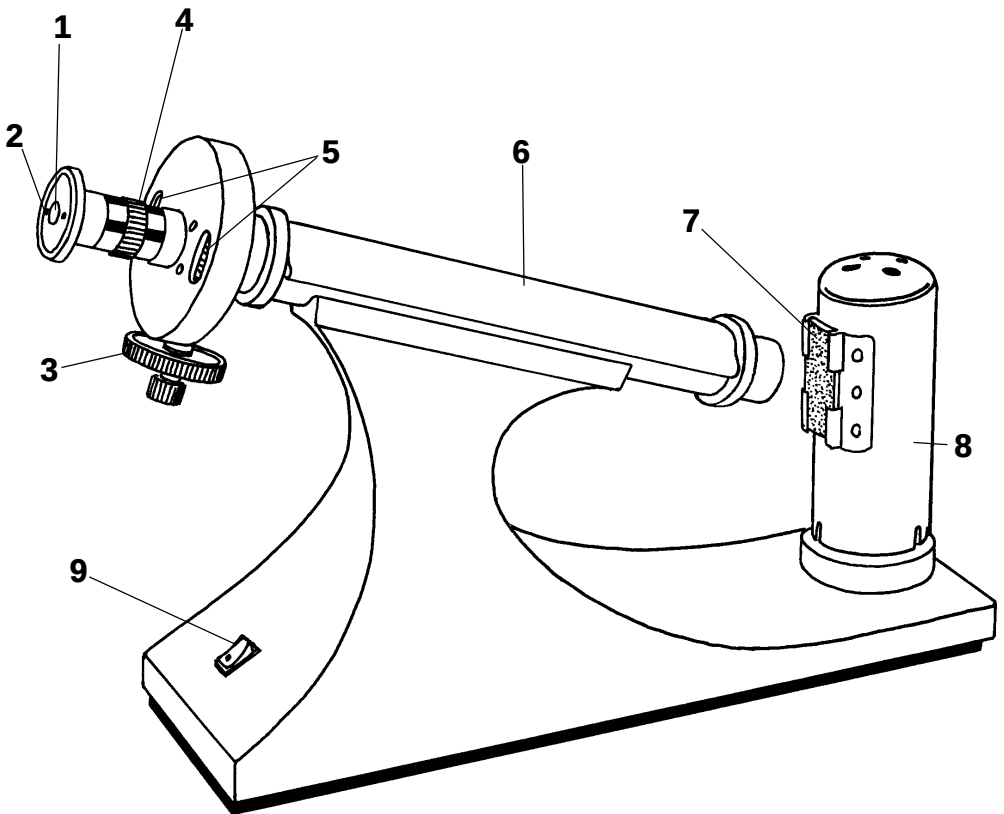
By rotating one polariser with respect to the other, the extinction of the light is obtained again and the angle of rotation is the value of the optical activity of the solution in the polarimeter tube.

The polariser is fitted with a small quartz $\frac{1}{2}$ wavelength plate which covers the centre of the polariser so that the circular field of view, seen through the eyepiece of the instrument, consists of three parts with fine dividing lines between them.

As the scale is rotated, the central part of the field changes in relative intensity in respect with the two other parts.

The relative intensity position in which the three parts exactly match is called zero point.

FIG. 1



Parts of the Polaris

1-1	EYEPIECE
1-2	READ-OUT MAGNIFIER
1-3	CONTROL WHEEL
1-4	FOCUSING RING
1-5	SCALE AND VERNIER
1-6	SAMPLE COMPARTIMENT
1-7	GROUND GLASS FILTER
1-8	NATRIUM LAMP COVER
1-9	ON/OFF SWITCH

Unpacking and assembling

- The instrument is packed in styrofoam which is packed in a carton box.
- All the components and spare parts are packed in a wooden case inside the styrofoam packing.
- Extract carefully the instrument from it's packing and place the instrument on a firm level.

Preparation for use

- Connect the mains lead to an earthed socket 220 V.
- Switch on the natrium lamp using the on/off switch (fig 1-9.)
- After the ignition of the natrium lamp wait long enough (5 minutes) to obtain a full monochromatic radiation.
- Your instrument is ready for use.

Calibration

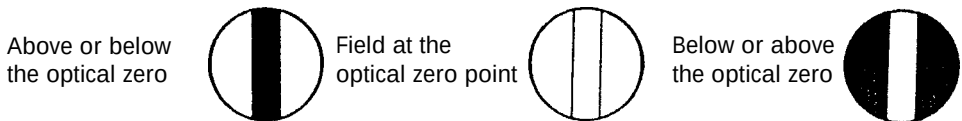
- This instrument is calibrated by CETI and ready for use.
- If there is a calibration problem follow next steps to check the calibration.
- Open the sample compartment (fig.1-6)
- Insert an empty observation tube,with both windows mounted,into the sample compartment.

!! Take care of the cleanness of the windows and the observation tube!!

Scale reading

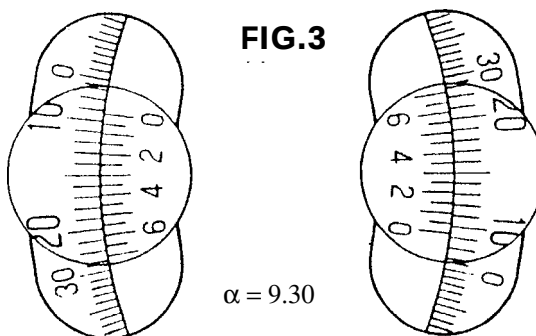
- The scale has 360 divisions of 1 degree each.
- The vernier has 20 divisions which are equal to 19 divisions on the scale.
- Adjust the focusing ring (fig 1-4) to obtain a clear and sharp image.
- Rotate the control wheel (fig 1-3) until the scale indication is zero on both sides.
- Observe the field of view, an equally illuminated yellow-orange field divided by two clearly visible vertical lines must appear.
- The zerosetting can be adjusted by shifting the position of the analyser. This calibration should be done by a qualified technician.
- A better solution is to proceed to a first reading and to establish the deviation of the zerosetting. This value should be added to, or deducted from the value of the measured angle.

FIG. 2



Scale reading

- The scale has 360 divisions of 1 degree each.
- The vernier has 20 divisions which are equal to 19 divisions on the scale.
- Direct reading on the vernier is up to 0.05°.
- A positive (+) figure means right rotation.
- A negative (--) figure means left rotation.



The angle of rotation is 9.30 degrees.

- To calculate the concentration of a solution the following formula must be applied:

$$C = \frac{100 \times a}{l \times (a)}$$

- C = Concentration of the optical active substance in grammes per 100 ml of solution.
- l = Thickness of the sample (tube lenght) in decimeters.
- a = The angle of rotation measured under the D line of sodium at 20 degrees Celcius.
- (a) = Medium specific rotation angle of the optical active substance measured under the D line of sodium at 20 degrees Celcius.

A correction can be made for temperature differences of the sample.
The angle of rotation will reduce with 0.3 % as the temperature rises by 1°.

Measuring the sample

- Introduce the tube into the sample compartment (fig 1-6) take care maintain the air bubbles in the enlarged part of the tube.
- Observe the field through the eyepiece and focus eventually with the focussing ring (fig 1-4).
- Rotate the scale control wheel until a uniformly illuminated field is obtained.
- Read out the scale accurately using both verniers (fig 1-5) and the reading magnifiers in the eyeguard.(fig 1-2)

CONVERSION TABLE

To convert angular measurements into terms of sugar concentration

Ang°	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.0	0.00	0.29	0.58	0.87	1.16	1.44	1.73	2.02	2.31	2.60
1.0	2.89	3.18	3.47	3.76	4.04	4.33	4.62	4.91	5.20	5.49
2.0	5.78	6.07	6.35	6.64	6.93	7.22	7.51	7.80	8.09	8.38
3.0	8.67	8.95	9.24	9.53	9.82	10.11	10.40	10.69	10.98	11.27
4.0	11.55	11.84	12.13	12.42	12.71	13.00	13.29	13.58	13.86	14.15
5.0	14.44	14.73	15.02	15.31	15.60	15.89	16.18	16.46	16.75	17.04
6.0	17.33	17.62	17.91	18.20	18.49	18.78	19.06	19.35	19.64	19.93
7.0	20.22	20.51	20.80	21.09	21.37	21.66	21.95	22.24	22.53	22.82
8.0	23.11	23.40	23.69	23.97	24.26	24.55	24.84	25.13	25.42	25.71
9.0	26.00	26.29	26.57	26.86	27.15	27.44	27.73	28.02	28.31	28.60
10.0	28.89	29.17	29.46	29.75	30.04	30.33	30.62	30.91	31.20	31.48
11.0	31.77	32.06	32.35	32.64	32.93	33.22	33.51	33.80	34.08	34.37
12.0	34.66	34.95	35.24	35.53	35.82	36.11	36.40	36.68	36.97	37.26
13.0	37.55	37.84	38.13	38.42	38.71	38.99	39.28	39.57	39.86	40.15
14.0	40.44	40.73	41.02	41.31	41.59	41.88	42.17	42.46	42.75	43.04
15.0	43.33	43.62	43.91	44.19	44.48	44.77	45.06	45.35	45.64	45.93
16.0	46.22	46.50	46.79	47.08	47.37	47.66	47.95	48.24	48.53	48.82
17.0	49.10	49.39	49.68	49.97	50.26	50.55	50.84	51.13	51.42	51.70
18.0	51.99	52.28	52.57	52.86	53.15	53.44	53.73	54.02	54.30	54.59
19.0	54.88	55.17	55.46	55.75	56.04	56.33	56.61	56.90	57.19	57.48
20.0	57.77	58.06	58.35	58.64	58.93	59.21	59.50	59.79	60.08	60.37
21.0	60.66	60.95	61.24	61.53	61.81	62.10	62.39	62.68	62.97	63.26
22.0	63.55	63.84	64.12	64.41	64.70	64.99	65.28	65.57	65.86	66.15
23.0	66.44	66.72	67.01	67.30	67.59	67.88	68.17	68.46	68.75	69.04
24.0	69.32	69.61	69.90	70.19	70.48	70.77	71.06	71.35	71.63	71.92
25.0	72.21	72.50	72.79	73.08	73.37	73.66	73.95	74.23	74.52	74.81
26.0	75.10	75.39	75.68	75.97	76.26	76.55	76.83	77.12	77.41	77.70
27.0	77.99	78.28	78.57	78.86	79.15	79.43	79.72	80.01	80.30	80.59
28.0	80.88	81.17	81.46	81.74	82.03	82.32	82.61	82.90	83.19	83.48
29.0	83.77	84.06	84.34	84.63	84.92	85.21	85.50	85.79	86.08	86.37
30.0	86.66	86.94	87.23	87.52	87.81	88.10	88.39	88.68	88.97	89.25
31.0	89.54	89.83	90.12	90.41	90.70	90.99	91.28	91.57	91.85	92.14
32.0	92.43	92.72	93.01	93.30	93.59	93.88	94.17	94.45	94.74	95.03
33.0	95.32	95.61	95.90	96.19	96.48	96.76	97.05	97.34	97.63	97.92
34.0	98.21	98.50	98.79	99.08	99.36	99.65	99.94	100.23	100.52	100.81
35.0	101.10	101.39	101.68	101.96	102.25	102.54	102.83	103.12	103.41	103.70
36.0	103.99	104.27	104.56	104.85	105.14	105.43	105.72	106.01	106.30	106.59
37.0	106.87	107.16	107.45	107.74	108.03	108.32	108.61	108.90	109.19	109.47
38.0	109.76	110.05	110.34	110.63	110.92	111.21	111.50	111.79	112.07	112.36
39.0	112.65	112.94	113.23	113.52	113.81	114.10	114.38	114.67	114.96	115.25
40.0	115.54	115.83	116.12	116.41	116.70	116.98	117.27	117.56	117.85	118.14