

# DIGITAL POLARIMETER

Model CDP - 001



**CONTECH**<sup>®</sup>  
**Instruments Ltd.**

AN ISO 9001, 14001 & OHSAS 18001 COMPANY

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## INTRODUCTION

Monochromatic rays from Infrared LED with 589.44nm wavelength travels through condenser, lens, polarizer, modulator and collinator to form a plane polarized light. The plane of polarization caused by the alternating current which flows through the Faraday coil at a particular frequency. This polarized light then passes through the sample tube containing the solution to be measured and then through the analyzer, lens, filter and an aperture before falling on the photomultiplier detector.

The light falling on the analyzer deviates from the optical zero position (with reference to the polarized light) to the extent of optical rotation of the sample and the photomultiplier detector output will produce an electrical signal with the frequency corresponding to the optical rotation of the sample. This signal after passing through the selective frequency amplifier and power amplifier drives the servo-motor & in turn the analyzer through a mechanical gear assembly until the optical zero position is regained.

After switching 'ON' the polarimeter, without the sample in the compartment the analyzer will stabilize at a position (optical zero position). When the sample with the optical rotation  $\alpha$  is placed in the sample compartment, the light falling on the analyzer deviates by angle  $\alpha$  from the optical zero position and hence the analyzer is rotated by angle  $\alpha$  through the servo motor coupled mechanism to get a new optical zero position. This rotation  $\alpha$  is measured through an encoder and is displayed on the digital readout.

The high voltage supplied to the photomultiplier tube varies in proportional to the intensity of light falling on it and hence this instrument is able to measure dark samples with transmittance upto 1%.

## SPECIFICATIONS

Light Source	: Infrared LED.
Wave length	: 589.44nm
Modulator	: Faraday magneto optical modular.
Measuring range	
Optical Rotation	: $-45^{\circ} \sim +45^{\circ}$
International Sugar Scale	: $-120^{\circ} \sim +120^{\circ}Z$
Accuracy	
Optical Rotation	: $\pm(0.01^{\circ} + \text{measuring value} \times 0.05\%)$
International Sugar Scale	: $\pm(0.03^{\circ}Z + \text{measuring value} \times 0.05\%Z)$
Minimum transmittance of sample	: 1%
Power Supply	: 230V, $\pm 10\%$ AC, 50/60 Hz
Dimensions	: 600mmx320mmx240mm
Weight	: 30kg

## OPERATIONS

Polarimeter should be placed on a stable, vibration free surface in a dry & clean room with good ventilation & temperature around 20<sup>o</sup>.

Power supply to the instrument is 230V and should be sourced through voltage stabilizer 1KVA with a proper earthing.

Turn on the power supply switch (Allow sufficient warm up time - 20 min. after and before testing to use the instruments.)

### KEYBOARD DESCRIPTION

0~9 : Numeric keys for entry of all parameters

AUTO : For Automatic measurement of parameters (measurement for the number of times automatically as per parameter N.

MANUAL : For manual measurement of the parameter

SET UP / ◀ : Setting the parameters, Stopping the test, Back entry of parameters.

ENTER : Forwarding of parameters in the entry mode, starting of test.

CLEAR : Clearing the screen.

ZERO : Zeroing the reading.

### DISPLAY DESCRIPTION

MODE : There are 4 modes of measurement corresponding to different measuring units.

MODE 1 : Optical Rotation

MODE 2 : Specific Rotation

MODE 3 : Concentration

MODE 4: International Sugar Scale

L is the length of sample tube in decimeter. There are 2 sizes of tubes available L = 1 dm(10 cm) & L = 2 dm(20 cm)

C is concentration of solution in gms/100ml.

N is number of measurements.

SET : For setting parameters by pressing ENTER key with display SET highlighted.

OK : OK of parameters when ENTER Key is pressed with OK highlighted

$\alpha$ : Optical rotation of a substance

$\bar{\alpha}$  : Average optical rotation

$[\alpha]$  : Specific Rotation

$[\bar{\alpha}]$  bar: Average Specific Rotation

C : Concentration in gms/100ml

C bar : Average concentration

Z : Sugar Scale

Z bar: Average sugar scale

$\delta$  : Standard deviation of parameters.

## ➤ MEASUREMENT PARAMETERS

Optical Rotation  $\alpha$ :

MODE : 1

L : Length of the tube in decimeters

C : 0.0000

N : Number of measurements required

Specific Rotation  $\alpha$  :

MODE : 2

L : Length of the tube in decimeters

C : Concentration in gms/100ml

N : Number of measurements required

Concentration C

MODE : 3

L : Length of the tube in decimeters

$[\alpha]$  : Specific Rotation

N : Number of measurements required

Sugar Scale Z

MODE 4

L : Length of the tube in decimeters

C : Concentration in gms/100ml

N : Number of measurements required

## MEASUREMENT

Keep the sample tube containing distilled water or any other blank solvent into the sample chamber and close the cover. Press ZERO key to display reading equal to '0'.

Make sure that there are no air bubbles in the sample tube by tilting the tube to make the air bubbles float on the protruded tube neck. The vapour drops on both the ends of sample tube should be wiped dry. The screw nuts on both ends of the sample tube should not be tightened too much to avoid stress on the end pieces or else the readings may get affected because of the stress.

If there is any marking of position and direction in the tube care should be taken while placing the tube.

Remove the sample tube, inject the solution to be measured into the tube and place it in the chamber and close the cover. Instrument will read the optical rotation.

The instrument will repeat the measurement for N number of times automatically & all readings are displayed along with average value and standard deviation of readings.

If the optical rotation of the sample exceeds  $\pm 45^\circ$  the motor oscillates at  $\pm 45^\circ$  the sample has to be diluted and tried again.

After the measurement, light source switch and power supply switch should be turned OFF in the same sequence.

## MEASUREMENT CALCULATIONS

Specific Rotation  $[\alpha] = 100 \times \alpha / LC$

Where  $\alpha$  is the measured optical rotation, L is the length of the tube in dm and C is the concentration of solution in gms/100ml.

Purity = Measured specific rotation as per instrument / theoretical specific rotation as per the above formula.

Measurement of International sugar concentration : While 26g of pure sugar is made upto 100ml of solution by adding distilled water and a 200mm test tube is used in a polarimeter using sodium light source of 589.44 nm wavelength at  $20^\circ\text{C}$ , the optical rotation should be  $+34.626$  and international sugar scale should be  $100^\circ\text{Z}$ .

## WARRANTY

**CONTECH INSTRUMENTS LTD** warrants all its products against defects in material and workmanship for a period of one year, subject to terms and conditions stated below and as further modified by warranty Amendment, in each product instruction manual. The warranty card must be registered with us within 15 days of purchase.

1. Warranty period will commence from the date of shipment from **CONTECH** to the original buyer.
  2. All warranty repairs are normally done at our service centre in Mumbai and our decision about faulty materials or workmanship will be final. The instrument should be sent in the original packing to our service centre at the address given below. Postage /Airfreight charges both ways are to be borne by the customer.
  3. If any of our product is opened by any one other than our engineers or our authorised representatives, this warranty will become null and void and **CONTECH** will be relieved of all responsibilities as to the service and operation of the said product.
  4. This warranty will not be applicable to :
    - a) Shipping damage or damages incurred while products are in transit.
    - b) Correction of operational problems arising out of environmental conditions beyond our control.
    - c) Maintenance necessitated by customer neglect, misuse, improper operation of the instrument or equipment.
    - d) Work necessitated by damages from war, accident, fire, flood, electrical failure, vandalism or any other causalities.
    - e) Repairs due to customers failure to perform any routine maintenance prescribed in the instruction manual.
- (The routine inspection of calibration and other parameters should be done periodically by the user)
5. **CONTECH** shall not be liable for any consequential damages nor labour loss or expense directly or indirectly arising from use of its products.,
  6. Amendments, assumed corollaries or statements contrary to the terms of this warranty shall not be binding on us unless they are put in writing and approved by us.
  7. Any disputes arising out of usage of this products will be subject to Mumbai jurisdiction.
  8. For warranty service. contact your local dealer or contact us on the below address.

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