



# The AUTOPOL® I, II, and III Series of Polarimeters

## For Budget Focused, General Purpose and GLP/GMP Laboratories



Meeting the needs of your industry and application

- University Education and Research
- Flavor, Fragrance and Essential Oil
- Ingested Ingredients
- Chemical
- Pharmaceutical



# Select the Model and Feature

That Best Suits your Application and Budget



## Autopol I / Autopol I-T-AP

- The Autopol I is our entry-level polarimeter model designed for:
- University Education
- Starch Analysis
- Lactose in Milk
- Flavors
- Chemicals
- Natural Product Research
- Invert Sugar
- Vitamins
- Fragrance
- Limited USP Monograph Compliance

Standard Features: 0.01° Arc Accuracy, 589nm fixed wavelength, built in thermoprobe for temperature measurement, Windows Embedded for direct connection to the network server and flexible USB printing.

Optional Features:

- 100mm or 200mm TempTrol™ heating and cooling: 15°C – 40°C ±.2°C
- AP Accuracy Option: 0.004° Arc Optical Rotation is wavelength specific. For USP Pharmaceutical, Rudolph recommends 0.002 accuracy for measurements ±1.000 degrees
- USR Resolution Option: 0.01, 0.001° Arc Selectable



## Autopol II / Autopol II-T-AP

The Autopol II offers the same standard and optional features as the Autopol I, but allows greater wavelength flexibility.

Standard Wavelengths: 589nm and 546nm

Optional Wavelengths: 365nm, 405nm, 436nm, 578nm, 633nm

A total of 2-4 extra wavelengths may be ordered at time of purchase or added later when needed.

Optional Features:

- 100mm or 200mm TempTrol™ heating and cooling: 15°C – 40°C ±.2°C
- AP Accuracy Option: 0.004° Arc Optical Rotation
- USR Resolution Option: 0.01, 0.001° Arc Selectable



## Autopol III / Autopol III-T-AP-USR

The Autopol III is Rudolph's budget focused pharmaceutical solution:

Accuracy: 0.002°C, 0.2% above 1°

Standard Wavelengths: 589nm and 546nm

Complete Accessory Package with IQOQPO documentation, 2 user selectable cells and 1 NIST traceable calibration standard with NIST Certificate.

Optional Features:

- 100mm or 200mm TempTrol™ heating and cooling: 15°C – 40°C ±.2°C
- Optional Wavelengths: 365nm, 405nm, 436nm, 578nm, 633nm, (up to 4 wavelengths may be selected or added later.
- AP Accuracy Option: ±0.002° up to 10° Arc, ±0.004° 10° - 89° Arc
- USR Resolution Option: 0.01, 0.001, 0.0001°, Arc Selectable

# Select a Temperature Solution

## 1. Temperature Measurement Only

As shown in Figure A, the Autopol I, II, and III come with a Temperature Probe so that sample temperature can be measured, displayed, and printed.

However, if your product requires Temperature control, then we recommend a temperature control solution shown below.

For university education and research, starch analysis, invert sugar, flavors, fragrances temperature control is not required and temperature measurement is normally sufficient for these applications.

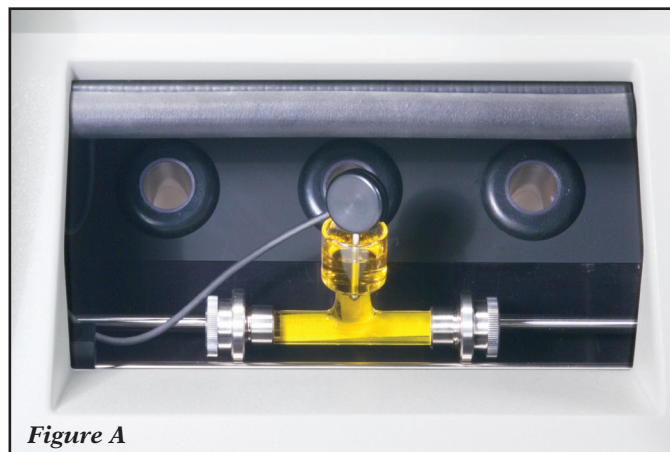


Figure A

## 2. Temperature Control With Water Bath

Rudolph Research Analytical jacketed cells come standard with quick release fittings which allow cells to be easily removed from the sample chamber.

Tubing is held in place by rubber gasketing on top of the trough and the door. Optional stopper (choose "S" after the cell part no.) for evaporative samples (Figure B).

Temperature control is obtained through the use of an external water bath and a jacketed cell (Figure C). This temperature control solution is popular for very high temperature applications.



Figure B



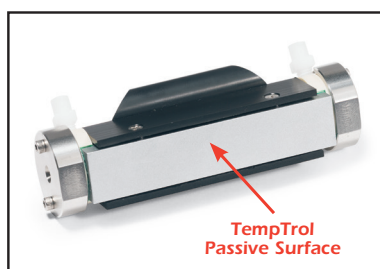
Figure C

## 3. Patented TempTrol™ Technology Eliminates the Need for a Water Bath. Here's how the TempTrol System works:



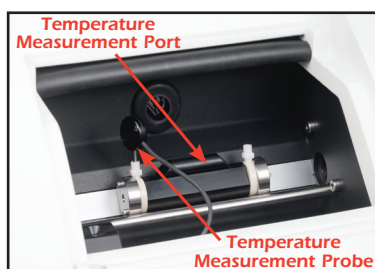
TempTrol Peltier Active Surface

TempTrol heating and cooling Peltier transfer surface



TempTrol Passive Surface

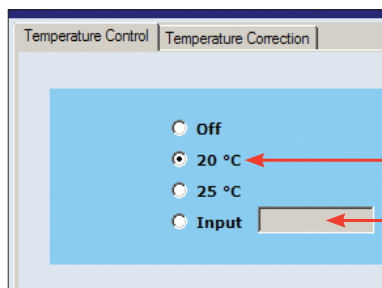
TempTrol cell with mating heating and cooling transfer surface



Temperature Measurement Port

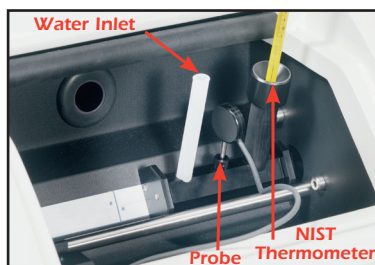
Temperature Measurement Probe

Place the TempTrol cell in your TempTrol equipped Autopol® sample chamber to measure to within  $\pm 0.2^\circ\text{C}$  of the USP, EP, JP or BP specified temperature (normally  $20^\circ\text{C}$  or  $25^\circ\text{C}$   $\pm 0.5^\circ\text{C}$ )



Temperature is selected via touch screen. Temperature selection of  $20^\circ\text{C}$  shown at left.

Select temperature up to  $40^\circ\text{C}$



Water Inlet

Probe NIST Thermometer

Rudolph provides a temperature validation cell with every TempTrol system. The temperature validation cell along with an optional NIST traceable thermometer is designed to validate the temperature control performance of the polarimeter and cell to  $\pm 0.2^\circ\text{C}$ .

# Select the Accessories

To meet your application

## Selection

With over 50 cells to choose from, Rudolph Research Analytical has a cell to meet every application.

Rudolph offers cells with volumes as small as 100 micro liters and cell lengths from 10 mm to 200 mm. Rudolph 40T and 316 stainless steel cells come with lifetime warranty against accidental breakage.

## Autopol I and II

The Autopol I and II come standard with Package A, which includes:



Package A

2 lamps and a Type 14 center fill glass cell with a 100 mm length and a 6 ml volume.

For validation purposes Rudolph recommends a NIST Traceable Calibration Standard with NIST Certificate to ensure your polarimeter is operating according to specification. (Choose Package B)



Package B



## Autopol III

The Autopol III comes standard with 2 lamps, 2 user selectable cells and a calibration standard. Although the user may select from any of our 60 plus cells, popular packages (C, D, and E) are shown below. If TempTrol is selected, Package F is supplied.



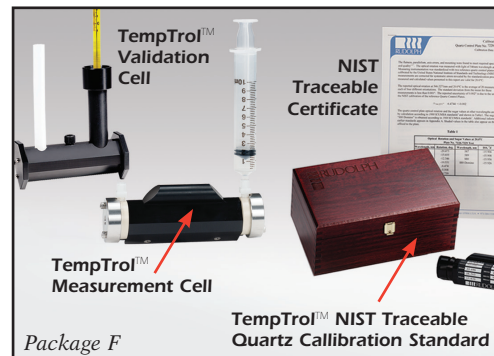
Package C



Package D



Package E



Package F

# Simple Solutions

## Set up a Method

Methods

You are in Setup > Methods > Edit

Method Name: **Metrosine** Mode: **Sp. Rot.**

Zero/Rotation Offset: **0.000** Prompt - Sp Rot.

Wavelength: **546** nm Specific Rotation:

Cell Length: **100.00** mm Prompt for Concentration

Measurement Mode: **Multiple** Concentration:  g/100ml

Number Of Measurement: **5** Prompt for Multiplier

Time Delay: **5** Sec Multiplier:

Buttons: Add, Edit, Next, Print, Cancel, Exit

## cGMP/GLP Printing

Measurement reports can be saved as an Excel or PDF file and edited quickly and easily. You can import logos and print your company's customized "C of A" directly.

S.No	Time	Result	Scale	OR %Arc	WLG	Lg.mm	Temp.	Comment
1	4:32:05 PM	34.467	OR	34.467	589	100.00	20.0	

## Select a Method

Methods

You are in Setup > Methods

Methods List:

- Dactinomycin
- Dextrose
- Finasteride
- Lisinopril
- Lopamidol
- Metaraminol Bitartra
- Methylopatate Hyrdroch
- Methotrexate
- Metrosine
- Sucrose

Buttons: Add, Edit, Delete, Print, Erase All, Exit

Print your customized Certificate of Analysis including your company logo directly from the Autopol® touch screen

n	Average	Std.Dev.	Maximum	Minimum
5	34.467	0.0000	34.467	34.467

Capable of making multiple measurements on a single sample and reporting complete statistical data and all measurement results

## Select a Temperature

Methods

You are in Setup > Methods > Edit

Temp Control: **ON**

Set Temp: **30.0** C

Temp Correct: **Off**

Response Time: **2** Sec

Statistics: **On (n-1)**

Range Check: **ON**

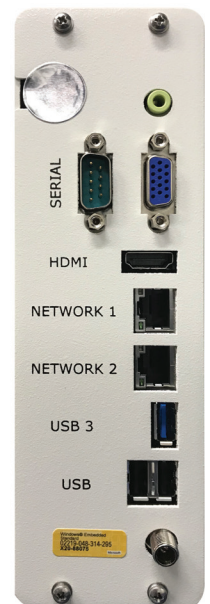
Range High: **195.00**

Range Low: **185.00**

Buttons: Add, Edit, Save, Back, Cancel, Exit

## Versatile Communication Capability

- Connect directly to Rudolph's service department for remote testing and diagnostics via Internet connection.
- Connect to any Windows® based printer via USB or direct to the server via Windows® Print Library
- Save measurement data direct to your Network/Server



# Specifications

Models	AUTOPOL I	AUTOPOL II	AUTOPOL III
Measuring Mode	Optical Rotation, Specific Rotation, Concentration, Sugar Degrees, °Z (ISS)	Optical Rotation, Specific Rotation, Concentration, Sugar Degrees, °Z (ISS)	Optical Rotation, Specific Rotation, Concentration, Sugar Degrees, °Z (ISS)
Measuring Scale	Degrees Arc Optical Rotation	Degrees Arc Optical Rotation	Degrees Arc Optical Rotation
Resolution	0.01° Arc Optical Rotation, 0.01% Concentration, 0.01 Specific Rotation	0.01° Arc Optical Rotation, 0.01% Concentration, 0.01 Specific Rotation	0.001° Arc Optical Rotation, 0.001% Concentration, 0.001 Specific Rotation
Accuracy	0.01° Arc Optical Rotation, 0.03°Z (ISS) Sugar Degrees	0.01° Arc Optical Rotation, 0.03°Z (ISS) Sugar Degrees	0.002° Arc up to 1°, 0.2% above 1°, 0.01° Z (ISS) 0.010° above 5°
AP Accuracy Option	Resolution: 0.001° Arc Optical Rotation Reproducibility: 0.002° Arc Optical Rotation, Accuracy: ±0.004° Arc Optical Rotation	Resolution: 0.001° Arc Optical Rotation Reproducibility: 0.002° Arc Optical Rotation, Accuracy: ±0.004° Arc Optical Rotation	Accuracy: ±0.002° up to 10°, ±0.004° 10° - 89° Arc Optical Rotation
AP Resolution Option	Selectable Resolution: 0.01, 0.001 and 0.0001°Arc	Selectable Resolution: 0.01, 0.001 and 0.0001°Arc	Selectable Resolution: 0.01, 0.001 and 0.0001°Arc
Reproducibility	0.01° Arc Optical Rotation	0.01° Arc Optical Rotation	0.002° Arc Optical Rotation
Measuring Range	± 89.9° Arc Optical Rotation, ± 999.99° Arc Specific Rotation, 0-99.9% Concentration	± 89.9° Arc Optical Rotation, ± 999.99° Arc Specific Rotation, 0-99.9% Concentration	± 89.9° Arc Optical Rotation, ± 999.99° Arc Specific Rotation, 0-99.9% Concentration
Prism	Glan Thompson Calcite	Glan Thompson Calcite	Glan Thompson Calcite
Optical Wavelengths	589nm	589nm, 546nm standard Optional wavelengths: 365nm, 405nm, 436nm, 578nm	589nm, 546nm standard Optional wavelengths: 365nm, 405nm, 436nm, 578nm
Wavelength Selection	Fixed	Touchscreen Selectable: 2 standard, 4 optional	Touchscreen Selectable: 2 standard, 4 optional
21 CFR Part 11 Compliant Software	Yes with optional PC software	Yes with optional PC software	Yes with optional PC software
Temperature Control	By external water bath (standard) TempTrol™ Automatic Electric Heating and Cooling 15°- 40°C ±0.2°C (optional)	By external water bath (standard) TempTrol™ Automatic Electric Heating and Cooling 15°- 40°C ±0.2°C (optional)	By external water bath (standard) TempTrol™ Automatic Electric Heating and Cooling 15°- 40°C ±0.2°C (optional)
Temp. Probe Range	10° - 100°C	10° - 100°C	10° - 100°C
Temp. Probe Accuracy	±0.1°C	±0.1°C	±0.1°C
Measurement Time	5 measurements in less than 25 seconds (avg.)	5 measurements in less than 25 seconds (avg.)	5 measurements in less than 25 seconds (avg.)
Light Source Standard	Tungsten-Halogen 6V, 20W, avg. 2,000 hour life	Tungsten-Halogen 6V, 20W, avg. 2,000 hour life	Tungsten-Halogen 6V, 20W, avg. 2,000 hour life
Light Source Optional	LED 20-30 mA 100,000 hr. avg. life	NA	NA
Sample Chamber	Accepts sample tubes up to 200 mm	Accepts sample tubes up to 200 mm	Accepts sample tubes up to 200 mm
Data Storage	32 GB Non-removable Compact Flash	32 GB Non-removable Compact Flash	32 GB Non-removable Compact Flash
Communication Interface	4 – USB Ports, 2 – RS232 Ports, Ethernet CAT 16 Port for Network Connection	4 – USB Ports, 2 – RS232 Ports, Ethernet Port CAT 16 for Network Connection	4 – USB Ports, 2 – RS232 Ports, Ethernet Port CAT 16 for Network Connection
Calibration	Automatic calibration via touchscreen	Automatic calibration via touchscreen	Automatic calibration via touchscreen
Display	8" color, 800 x 600 pixel resolution with 400 nits of brightness	8" color, 800 x 600 pixel resolution with 400 nits of brightness	8" color, 800 x 600 pixel resolution with 400 nits of brightness
User Interface	Touchscreen	Touchscreen	Touchscreen
Automatic Sensitivity Control	Measures samples with transmittance as low as 0.01% (up to O.D. 4.0)	Measures samples with transmittance as low as 0.01% (up to O.D. 4.0)	Measures samples with transmittance as low as 0.01% (up to O.D. 4.0)
Input Power	100 - 240V, 50/60 Hz	100 - 240V, 50/60 Hz	100 - 240 V, 50/60 Hz
Operating Dimensions	24.3" W x 12.7" H x 17.5" D 617 mm W x 323 mm H x 445 mm D	24.3" W x 12.7" H x 17.5" D 617 mm W x 323 mm H x 445 mm D	24.3" W x 12.7" H x 17.5" D 617 mm W x 323 mm H x 445 mm D
Operating Weight	42 lbs. (19.05 kg)	42 lbs. (19.05 kg)	42 lbs. (19.05 kg)