



P-2000 Digital Polarimeter

Introduction



P-2000 Digital Polarimeter



JASCO, a leading manufacturer of polarimeters since 1967, is proud to introduce the new P-2000 multi-option polarimeter. The P-2000 is designed as a customizable polarimeter with various options for a range of applications and budgetary requirements. The instrument system can also be field upgraded as application requirements change.



Ultimate flexibility for a wide range of applications

Foods, Pharmaceuticals, Sugars and Sweeteners, Essential oils, Flavors and Fragrances, Chemicals



P-2000 Digital Polarimeter



**Single model strategy
with ultimate
flexibility**

rather than plural models, with no way to update functions ... a single model to be configured in order to optimally meet the customer's applications, but easy to expand in the field, with a wide choice of available accessories



P-2000 Digital Polarimeter



A new generation of polarimeters offering simplicity, reliability and complete validation protocols

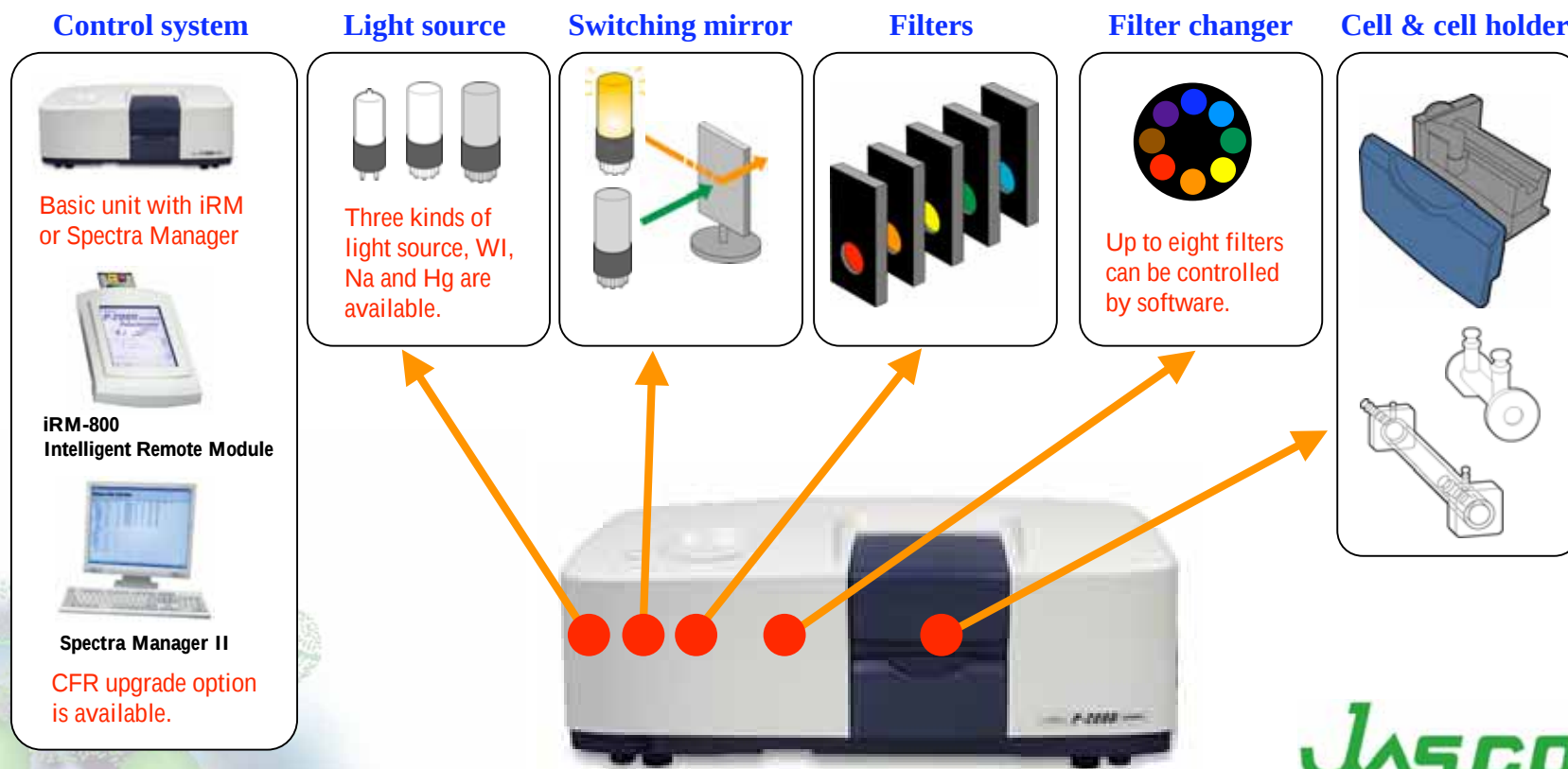
Reliability and instrument verification

A validation program is included as standard for GLP/cGMP laboratories or those regulated by the FDA. The program can be used for periodic validation of light source energy, zero repeatability, and rotational accuracy/repeatability. Inspected filters, sample cells with certified optical path length, and NIST-traceable rotation plates are also available as options.



Ultimate flexibility

P-2000 Digital Polarimeter provides a large choice of control system, light source, cell, cell holder and wavelengths ranging from the UV-Vis to NIR. The system most suitable for almost any requirement can be configured for the customer. A client can have the simplest system which includes those items required for his application.



Ultimate flexibility 1 --- Control type

Stand alone



PC control



- Validation software program is standard.
- CFR upgrade option is available.



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- CFR upgrade option is available.

Ultimate flexibility 1 --- Control type

Stand alone

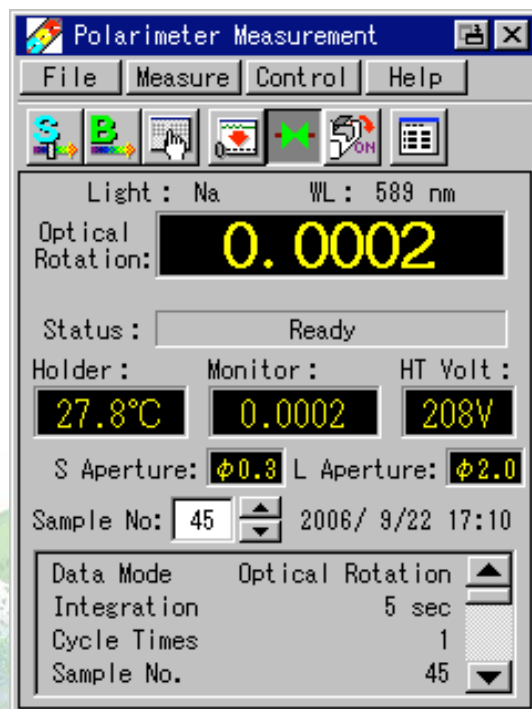


iRM-800 Intelligent Remote Module

CFR upgrade option is available.



Touch sensitive
display screen



- 1. High quality color LCD display*
- 2. Touch sensitive screen*
- 3. Easy data transfer to a PC*
- 4. Print using a USB printer*



LCD display can be
changed from portrait
to landscape direction.



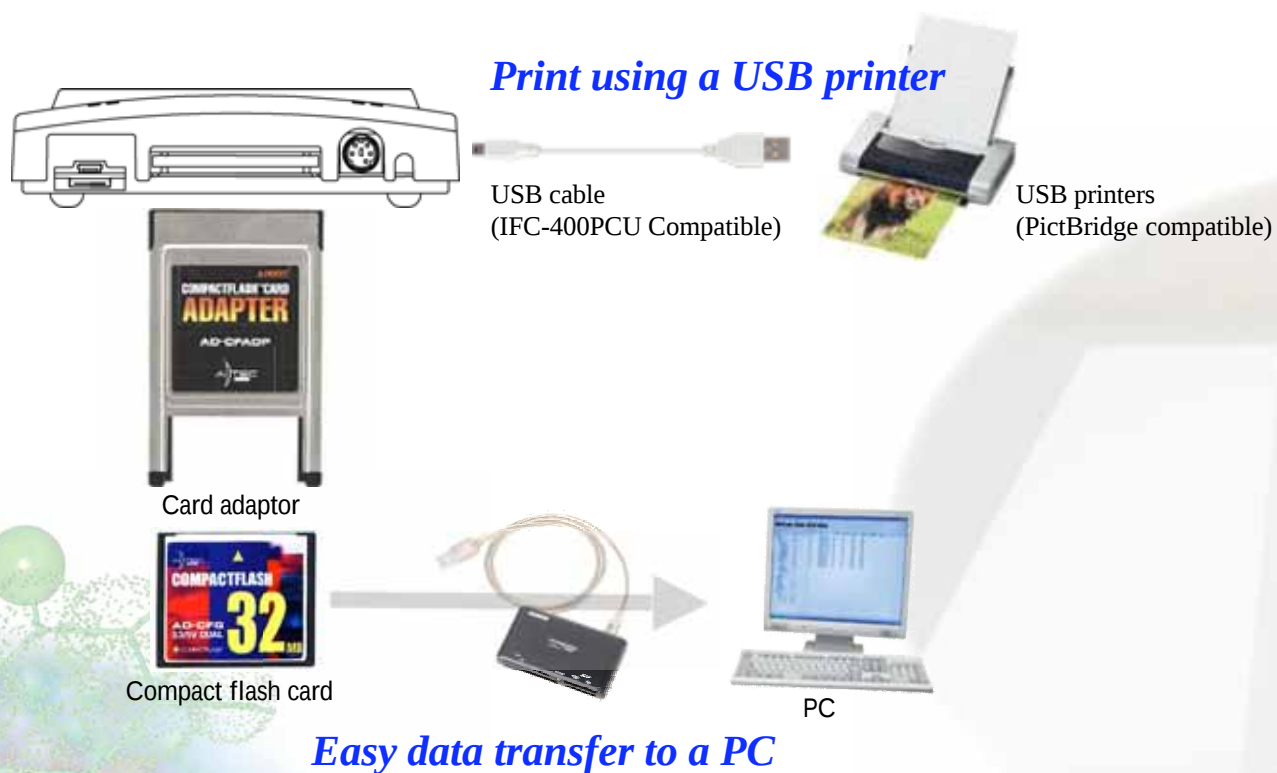
Ultimate flexibility 1 --- Control type

Stand alone



iRM-800 Intelligent Remote Module

CFR upgrade option is available.



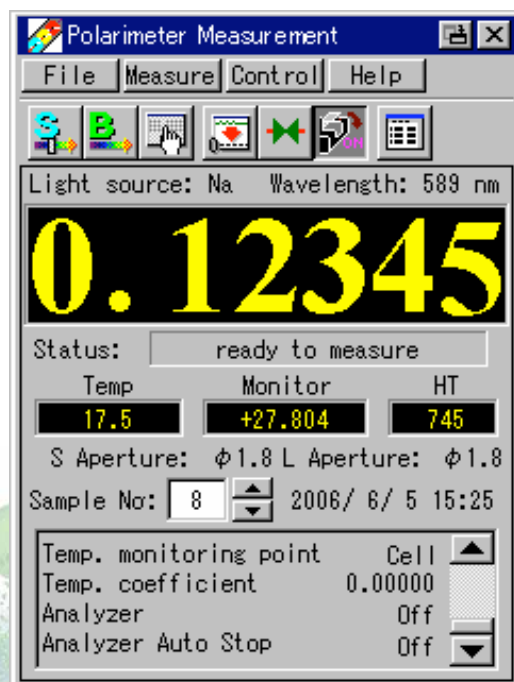
Ultimate flexibility 1 --- Control type

Stand alone



iRM-800 Intelligent Remote Module

CFR upgrade option is available.



Readout modes:

Optical rotation, optical specific rotation, concentration, sugar scale (Z), Brix purity, optical purity

Time course measurement mode:

Optical rotation, optical specific rotation

Statistical calculation:

Average value, standard deviation, coefficient of variation

Data processing:

Reaction rate calculation

Validation program (Tools are optional.)



Ultimate flexibility 1 --- Control type

Stand alone



iRM-800 Intelligent Remote Module

CFR upgrade option is available.

Parameter setting screens

Parameters 1 / 3

File Help

Data Mode : Optical Rotation

Integration : 5 sec

Cycle Times : 1

Cycle Interval : 0 sec

Sample No. : 45

☐ Subtract Blank

Blank : 0.0000 deg

Cell Length : 100.00 mm

Concentration : 1.0000 W/V%

OK Cancel

Parameters 2 / 3

File Help

Specific O.R. : 1.0000

Sugar Scale : 17.313

Brix : 0.1000

Sp.OR of STD : 66.5000

Factor : 1.00000

Sample :

Comment :

Operator :

OK Cancel

Parameters 3 / 3

File Help

Division :

Temp. Point : Holder

Temp. Correct. : 0.00000

☒ Analyzer after Measurement

OK Cancel

Ultimate flexibility 1 --- Control type

PC control



Spectra Manager II

CFR upgrade option is available.



Spectra Manager II software, the latest version of JASCO's innovative cross-platform spectroscopy software, provides instrument parameter settings, data acquisition and processing.

Readout modes: Optical rotation, optical specific rotation, concentration, sugar scale (Z), Brix purity, optical purity

Time course measurement mode:

Optical rotation, optical specific rotation

Statistical calculation: Average value, standard deviation, coefficient of variation

Data processing: Reaction rate calculation

Validation program (Tools are optional.)

Interface between PC and instrument: USB



Ultimate flexibility 1 --- Control type

PC control

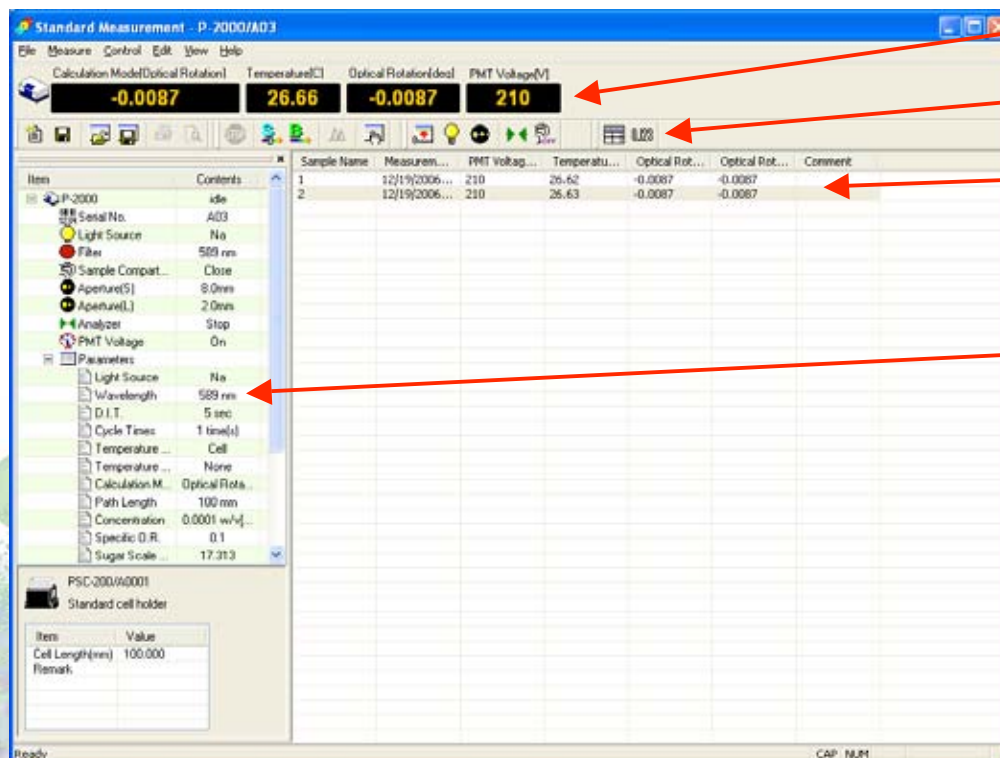


Spectra Manager II

CFR upgrade option is available.



Measurement window (example of optical rotation measurement)



Monitor bar

Tool bar

Data sheet of the measurement results

Measurement parameters and accessory information



Ultimate flexibility 1 --- Control type

PC control



Spectra Manager II

CFR upgrade option is available.



Parameters window (example of optical rotation measurement)

The image displays two side-by-side screenshots of the 'Parameters' window in the Jasco Spectra Manager II software, showing settings for an optical rotation measurement.

Left Screenshot (General tab):

- Light source:** ☐ Wl, ☒ Na, ☐ Hg. ☐ External source: []
- Wavelength:** 589 nm
- D.I.T.:** 5 sec
- Cycle Times:** 1 time(s)
- Cycle Interval:** 0 sec
- Temperature monitor:** Monitor: ☒ Cell, ☐ Holder. ☐ Temperature Correction (at 20 C): 0
- Calculation Parameters:** Mode: Optical Rotation (dropdown). Path Length: 100 mm. Concentration: 0.0001 w/v[%]. Calc. Conc... button. Specific D.R.: 0.1. Sugar Scale Factor: 17.313. Spec D.R. (STD): 66.45. Brix Conc.: 0.1. Factor: 1.
- Buttons: Open..., Save..., Default, OK, Cancel.

Right Screenshot (Control tab):

- Aperture:** Sample compartment: 8.0mm (dropdown). Light source: Auto (dropdown).
- ☒ Stop analyzer after measurement.
- Buttons: Open..., Save..., Default, OK, Cancel.

Ultimate flexibility 1 --- Control type

PC control

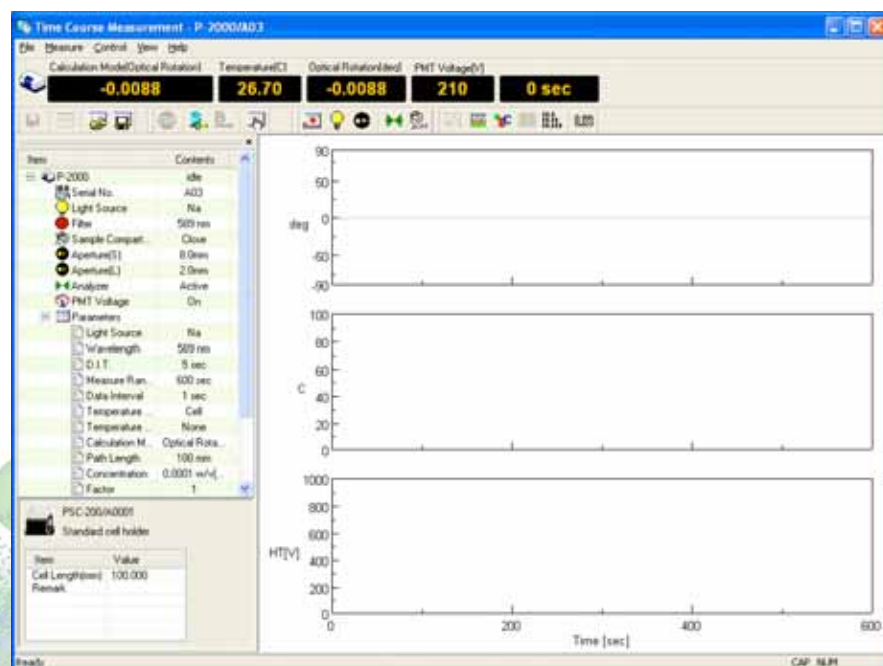


Spectra Manager II

CFR upgrade option is available.



Time course measurement



Ultimate flexibility 1 --- Control type

PC control



Spectra Manager II

CFR upgrade option is available.



Validation

Parameters

Repeatability of O.R. Accuracy of O.R.

Method Light Energy Repeatability of Zero

Inspection Items

	Item
☒	Light Energy
☒	Repeatability of Zero
☒	Repeatability of O.R.
☒	Accuracy of O.R.

Light Source

☐ W lamp ☒ Na lamp ☐ Hg lamp

Default All Open... Save... OK Cancel

Parameters

Method Light Energy Repeatability of Zero

Repeatability of O.R. Accuracy of O.R.

Test Sample : 5g/100mL Sucrose solution Default

Criteria : 3.325 +/- 0.007 degree(s)

Measure : 5 time(s)

☐ Temperature Correction factor(at 20 C)

Measure Point : ☒ Cell ☐ Holder ☐ Input

☐ Concentration factor: 1

Path Length : 100.00 mm

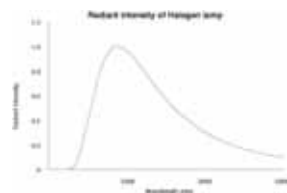
Default All Open... Save... OK Cancel

Ultimate flexibility 2 --- Light source

Available light sources

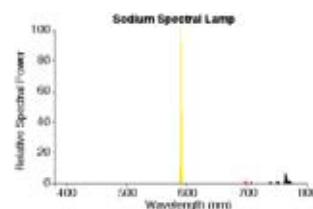
WI

Tungsten-Halogen lamp



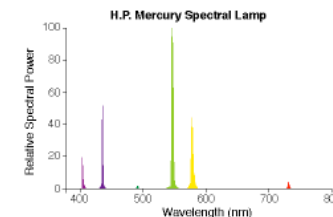
Na

Sodium lamp

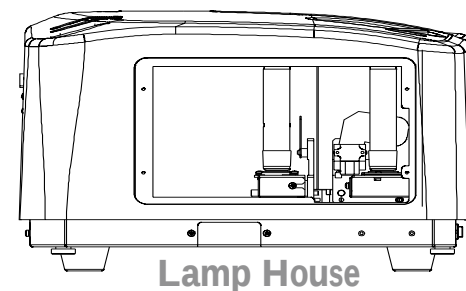


Hg

Mercury lamp



- Up to two light sources can be installed inside the instrument.
- Automatic light source recognition
- Light source can be easily changed in the field.

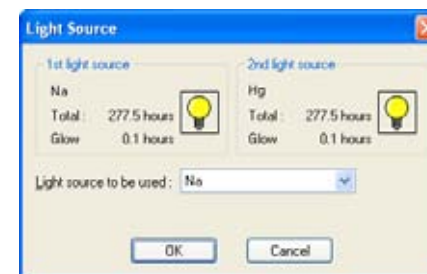
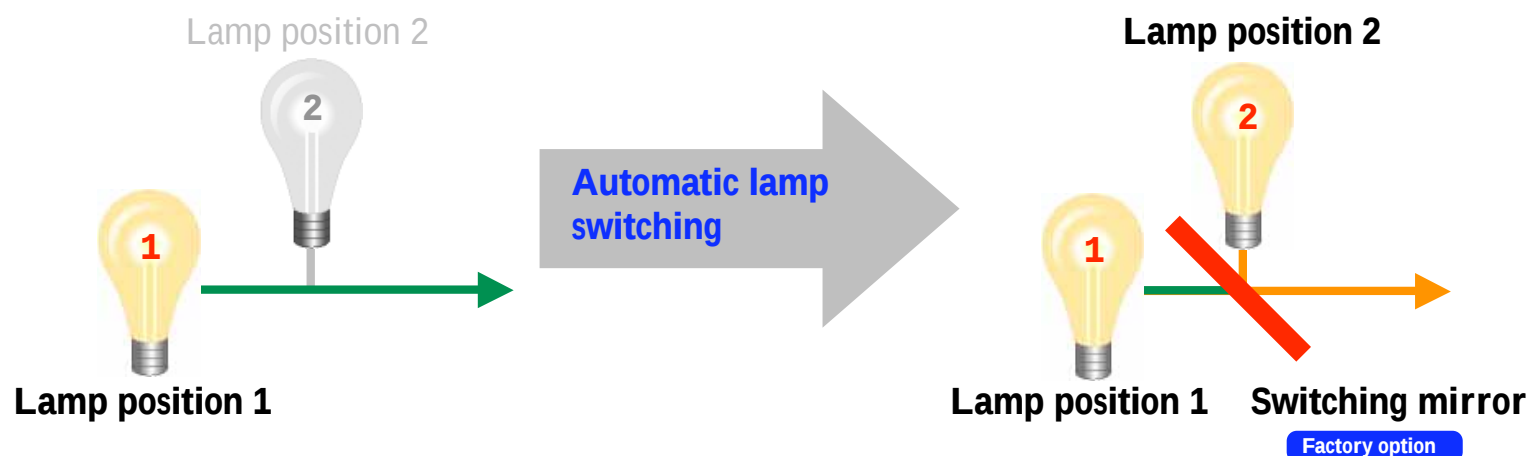


Lamp House

Ultimate flexibility 2 --- Light source

Light source switching mirror

Factory option

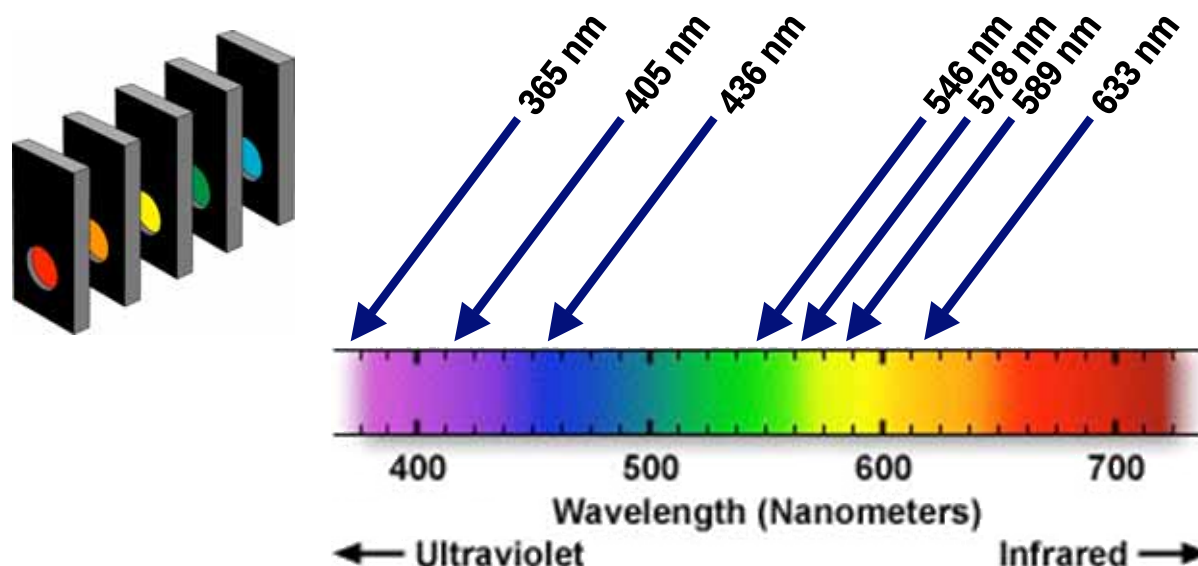


Light sources can be switched automatically.



Ultimate flexibility 3 --- Filters

A range of available filters covers a wide range of applications.



- Automatic filter recognition
- The optional wavelength extension kit enables measurements from UV-Vis (254 nm) to NIR (880 nm).

Ultimate flexibility 3 --- Filters

A range of available filters covers a wide range of applications.



Light Source	WI (Tungsten-Halogen lamp)	Na (Sodium lamp)	Hg (Mercury lamp)
633 mm	PBH-633 Interference filter, 633nm		
589 mm	PBH-589 Interference filter, 589nm	PBH-589 Interference filter, 589nm	
578 mm	PBH-578 Interference filter, 578nm		PBH-578 Interference filter, 578nm
546 mm	PBH-546 Interference filter, 546nm		PBH-546 Interference filter, 546nm
436 mm	PBH-436 Interference filter, 436nm		PBH-436 Interference filter, 436nm
405 mm	PBH-405 Interference filter, 405nm		PBH-405 Interference filter, 405nm
365 mm	PBH-365 Interference filter, 365nm		PBH-365 Interference filter, 365nm

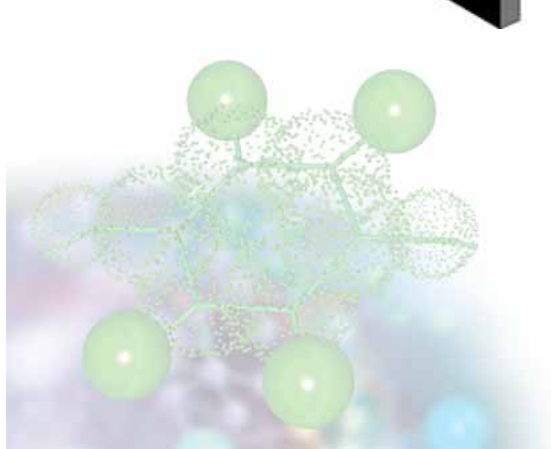
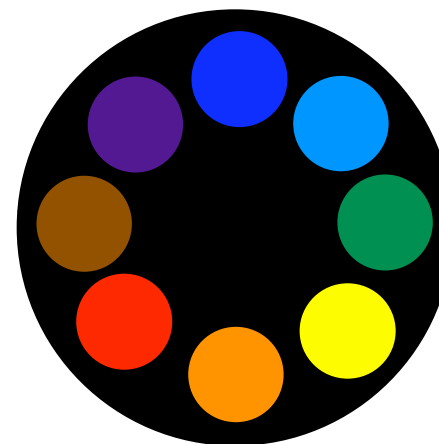
Ultimate flexibility 3 --- Filters

The optional 8-position filter changer

Factory option



Automatic filter
switching



JASCO

Ultimate flexibility 4 --- Sample holder

A wide range of sample holders



A full line of accessories are offered for functional expansion of the P-2000 to support a wide variety of applications. Quick-connect fittings with flow control valves in the sample compartment provide simple and secure exchange of water-thermostatted cells for temperature control with water baths. A newly developed Peltier cell holder offers accurate temperature control with $\pm 0.1^\circ$ accuracy.

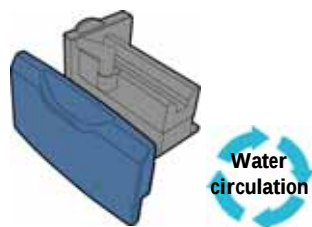
- IQ accessory function for automatic accessory recognition



Ultimate flexibility 4 --- Sample holder

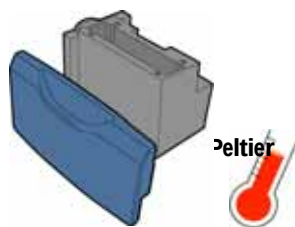
A wide range of sample holders

RSC-200
V-shape cell holder



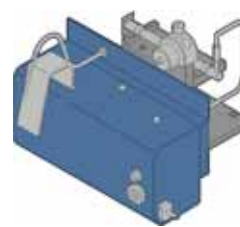
At room temperature
Or
Under temperature control
by water circulation bath

PTC-203
Peltier cell holder



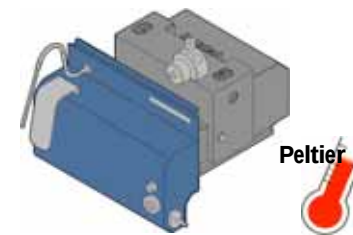
Under temperature
control by Peltier
elements built-in

SHP-201
Sipper



Quick and easy
measurements of
multiple samples at
room temperature

SHP-201P
Peltier sipper

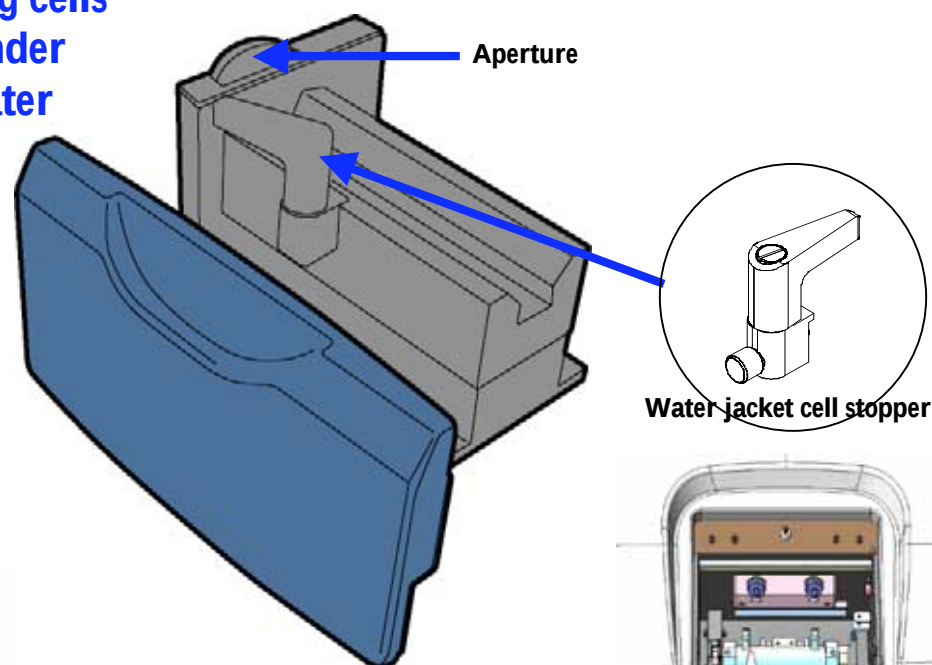


Quick and easy
measurements of
multiple samples under
temperature control by
Peltier elements

Ultimate flexibility 4 --- Sample holder

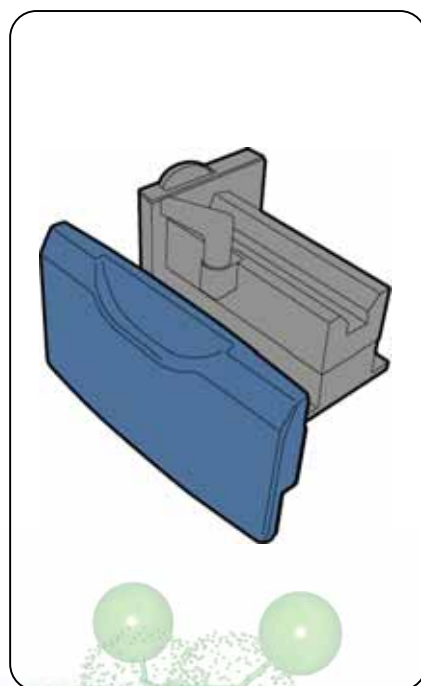
RSC-200 V-shape cell holder

For measurements by using cells at room temperature or under temperature control by water circulation bath



Ultimate flexibility 4 --- Sample holder

RSC-200 V-shape cell holder



For measurements at
ambient temperature

At room temperature

Select a cylindrical cell.

Cell diameter: 10 mm, 3.5 mm, 2.5 mm
Cell path length: 100 mm, 50 mm, 10 mm



Optional

For temperature
control by water
circulation bath

Temperature control by water circulation

Select a water jacket cylindrical cell.

Cell diameter: 10 mm, 3.5 mm, 2.5 mm
Cell path length: 100 mm, 50 mm, 10 mm



Optional

Optional

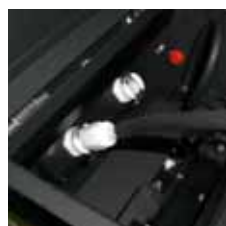
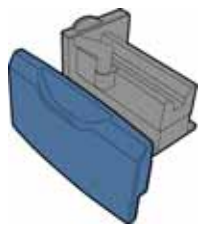


PT-31 Peltier
thermostatted
Water
circulation
bath



Ultimate flexibility 4 --- Sample holder

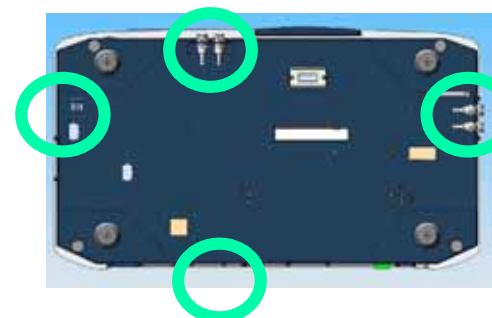
RSC-200 V-shape cell holder



Quick-lock fittings with valve allow easy and secure water handling, cell exchange.



Optional
PT-31 Peltier
thermostatted
Water
circulation
bath



Internal water plumbing enables flexible layout for external water bath.

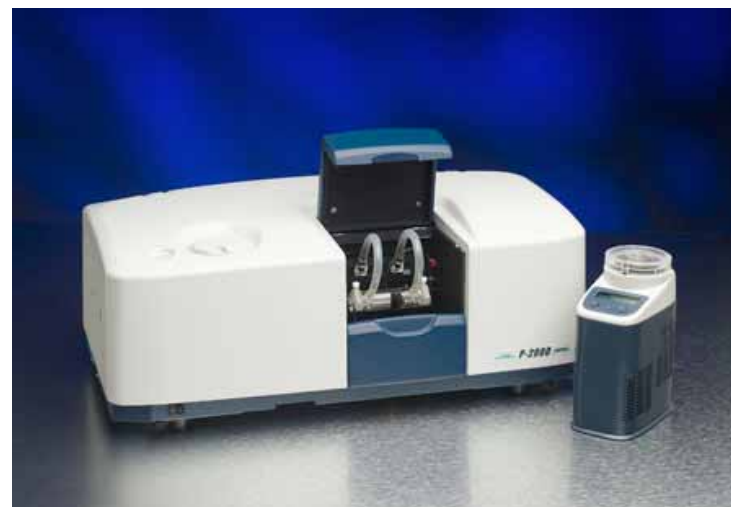


Ultimate flexibility 4 --- Sample holder

PT-31 Peltier thermostatted water circulation bath



Electronic water bath thermostat with peltier element is a versatile, high-performance instrument. It is extremely robust, compact and easy to operate. Because it is so small it does not take up valuable space in the laboratory.



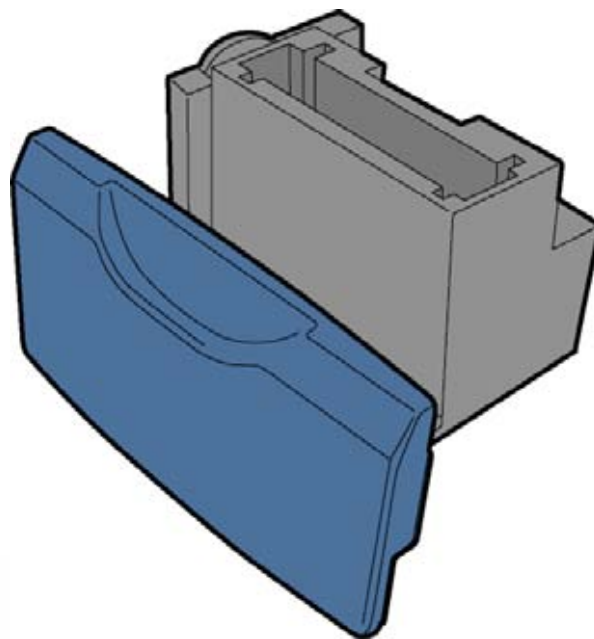
Temperature:	8 ~ 40°C
Accuracy of temperature:	± 0.2°C
Power of pump:	2000 Pa
Pump performance:	20 L/hour
Cooling power:	15W
Heating power:	30W
Power supply:	115 ~ 230 VAC 60W
Dimensions:	140(L) x 80(W) x 210(H) mm
Weight:	1.5 kg



Ultimate flexibility 4 --- Sample holder

PTC-203 Peltier cell holder

For temperature control by Peltier



Under temperature
control by Peltier elements
built-in

Features

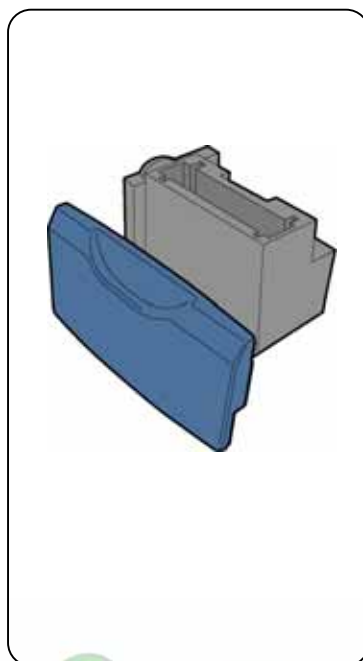
1. Built-in air cooled Peltier controller (no external box). Range 15-40°C
2. Newly implemented accurate temperature control by firmware. ($\pm 0.1^\circ\text{C}$)
3. Suitable for rectangular and cylindrical glass cells as well as for new SS cells.



Ultimate flexibility 4 --- Sample holder

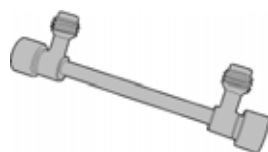
PTC-203 Peltier cell holder

For temperature control by Peltier



Applicable Cells **Optional**

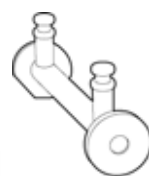
-SUS demountable cell, 3.5ø x 100 mm



-CG1-100 Cylindrical glass cell, 10ø x 100 mm

-CG3-100 Cylindrical glass cell, 3.5ø x 100 mm

-CG2-100 Cylindrical glass cell, 2.5ø x 100 mm



Cell adaptor **Optional**

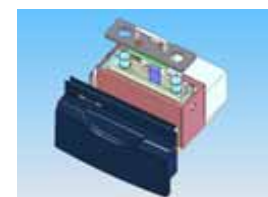
- PACH-245 Cell adaptor



- PCH1-250 Cell adaptor

- PCH2-251 Cell adaptor

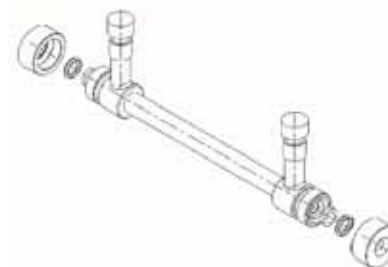
- PCH3-252 Cell adaptor



SS demountable Cell

Features

1. Durable: made of SS tube
2. Washable: cell and windows (individually)
3. Good thermal conductivity: ideal for Peltier operation

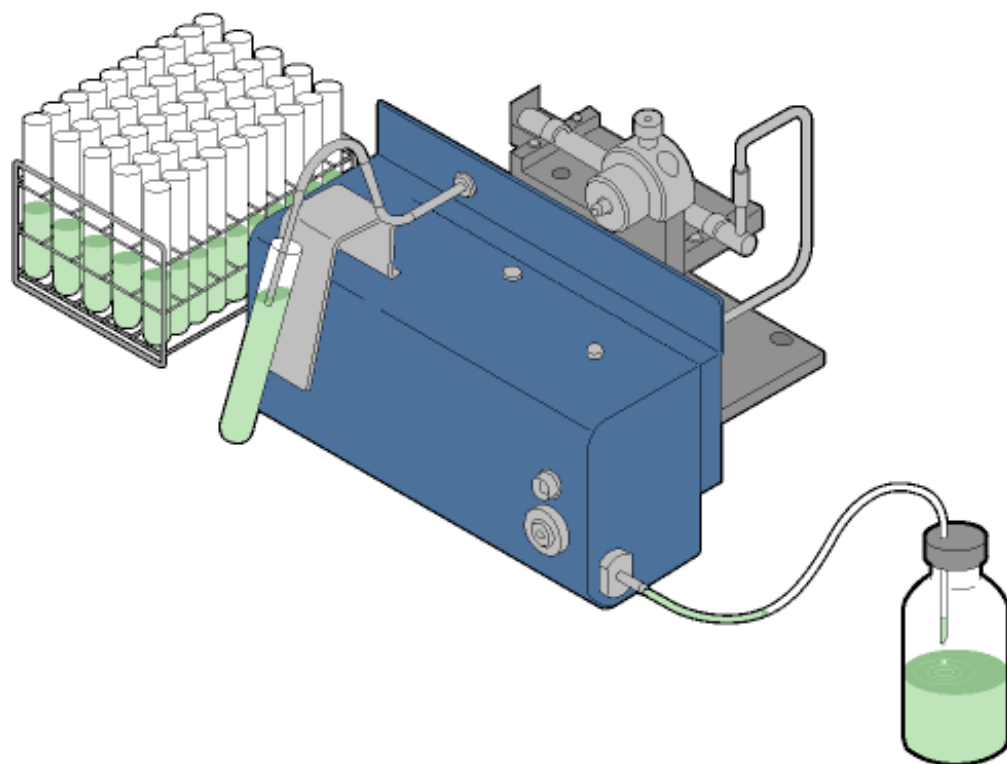


Ultimate flexibility 4 --- Sample holder

SHP-201 Sipper at room temperature

SHP-201P Peltier sipper under temperature control by Peltier elements

Quick and easy measurements of multiple samples



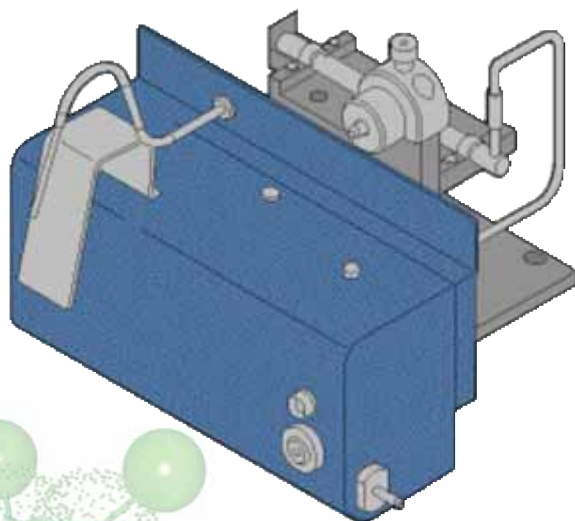
Ultimate flexibility 4 --- Sample holder

SHP-201 Sipper at room temperature

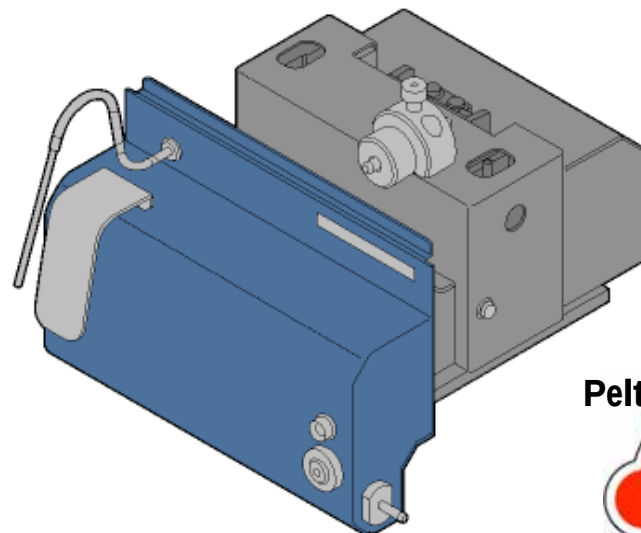
SHP-201P Peltier sipper under temperature control by Peltier elements

Quick and easy measurements of multiple samples

Use of built-in ultra micro-pump enables automated sampling for high throughput measurements.



Flow cell: 100 mm pathlength
Minimum sample volume: 5 mL



Flow cell: 100 mm pathlength
Minimum sample volume: 5 mL
Temperature: 15 ~ 40°C
Accuracy of temperature: $\pm 0.2^{\circ}\text{C}$

Ultimate flexibility 4 --- Sample holder

SHP-201 Sipper at room temperature

SHP-201P Peltier sipper under temperature control by Peltier elements

Quick and easy measurements of multiple samples

Flow cell

Pathlength is
100 mm.

Nozzle

Sample is
sucked
through this
nozzle.

Built-in ultra micro-pump



Drain port

This port is connected to the drain tube
to drain solution to the waste solution
bottle.

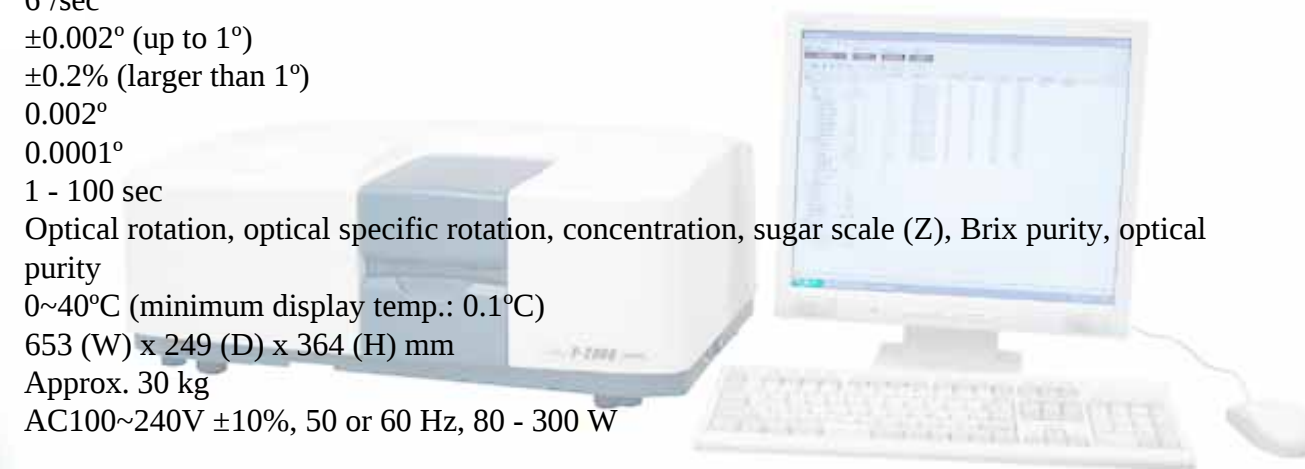


Hardware specifications

High speed, precision and accuracy

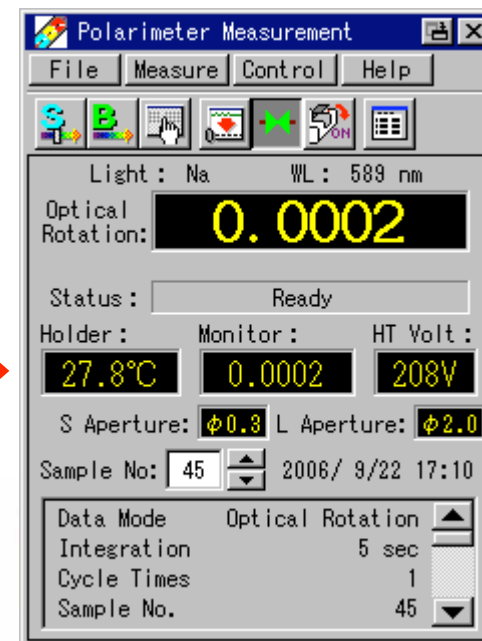
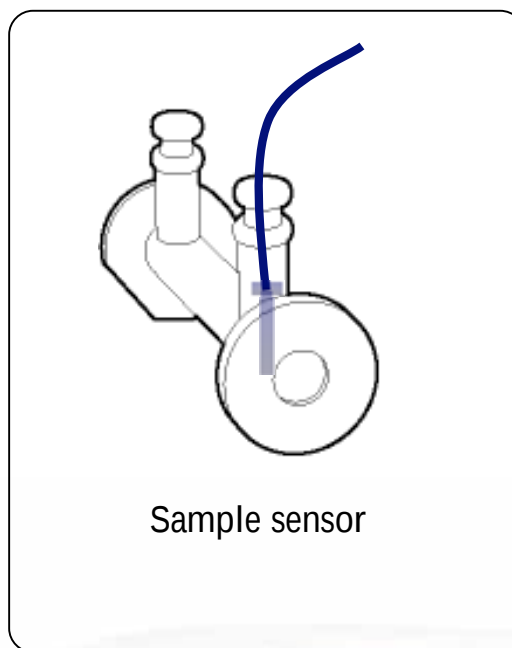
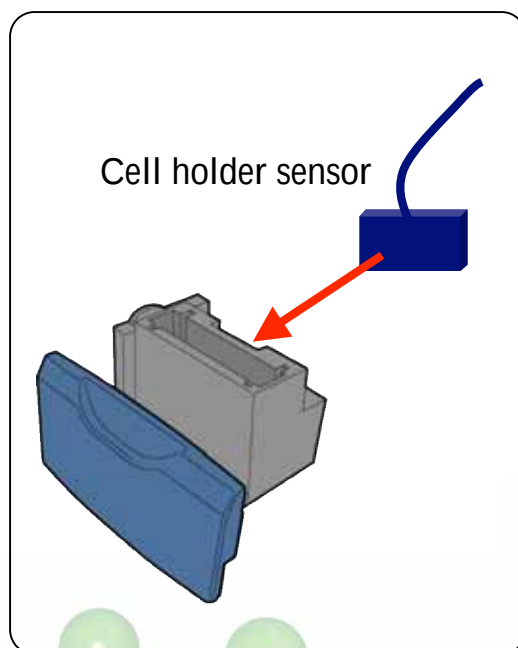
The P-2000 offers a response speed as fast as six degrees per second to provide reproducible data for each measurement with a resolution of 0.0001° . A wide dynamic range of up to $\pm 90^\circ$ enables the system to measure chiral compounds over a broad range of concentrations. The sample chamber is equipped with an integrated temperature probe; the current temperature is constantly updated on the instrument control screen.

Principle	Automatic digital polarimeter with symmetric angular oscillation using the optical-null balance method
Light source	Tungsten-Halogen lamp (WI), Sodium lamp (Na), Mercury lamp (Hg) (Up to two light sources can be installed.)
Wavelength	880, 633, 589, 578, 546, 436, 405, 365, 334, 325, 313, 302, 296, 280, 254 nm
Aperture	1.8, 3 and 8 mm diameters
Angular range	$\pm 90^\circ$
Response speed	$6^\circ/\text{sec}$
Measurement accuracy	$\pm 0.002^\circ$ (up to 1°) $\pm 0.2\%$ (larger than 1°)
Repeatability	0.002°
Resolution	0.0001°
Integration time	1 - 100 sec
Readout modes	Optical rotation, optical specific rotation, concentration, sugar scale (Z), Brix purity, optical purity
Temperature measurement range	$0\sim 40^\circ\text{C}$ (minimum display temp.: 0.1°C)
Dimensions	653 (W) x 249 (D) x 364 (H) mm
Weight	Approx. 30 kg
Power requirement	AC100~240V $\pm 10\%$, 50 or 60 Hz, 80 - 300 W



Temperature control

Two temperature sensors for temperature control and monitoring are built in the basic unit as standard.



For regulated laboratories

NIST traceable standard plate for validation

NIST traceable standard plates are optionally available. (Both plus and minus rotation values are available) Rotation plate is supplied with the certificate.

Standard plate (+2°)

Standard plate (-2°)

Standard plate (+17°)

Standard plate (-17°)

JASCO
Rotatory Plate Certificate

Name : Rotatory Plate
Model No. : QPA-211
Serial No. : *****

$D = 2.20 \pm 0.2 \%$

Equation for
Temperature Compensation : $\alpha_D = + 0.000145(20-t) \pm 0.05\%$
Measurement Temperature : 21.5 C deg

Instrument : P -2200
Operator :
Test Date : January, 31, 2006

I, the undersigned, hereby certify that the value is obtained by utilizing an internationally recognized standard under ISO-9000 certified quality system.

JASCO Corporation



Wavelength extension kit

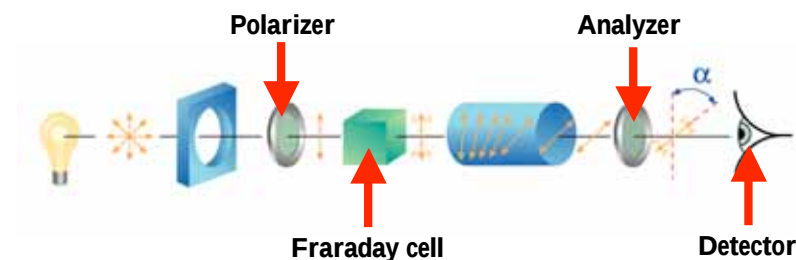
The wavelength extension kit enables measurements in NIR and UV region.

Wavelength extension kit includes

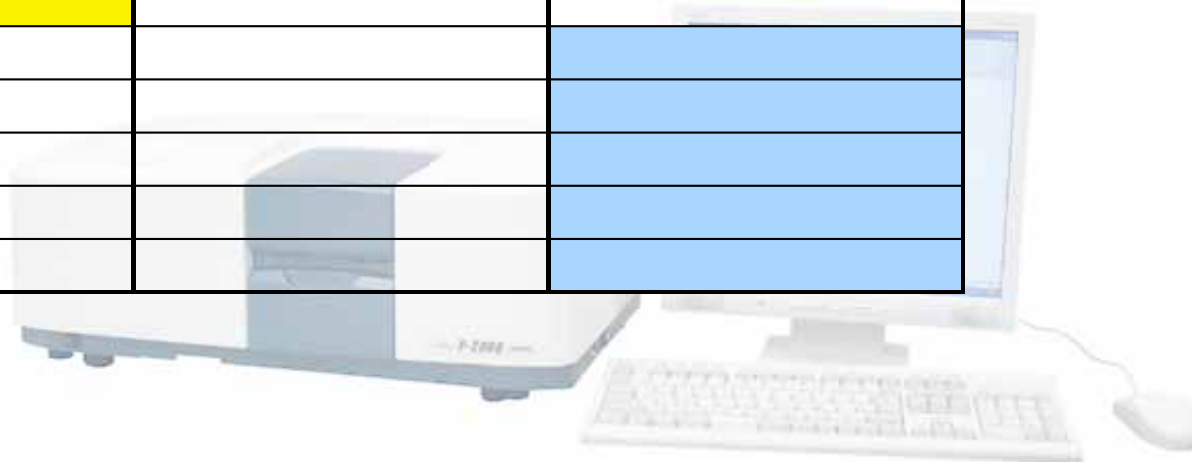
-Glan-Taylor polarizer

-Quartz Faraday cell

-Photomultiplier Tube R928



Light Source	WI (Tungsten-Halogen lamp)	Na (Sodium lamp)	Hg (Mercury lamp)
880 mm			
334 mm			
325 mm			
313 mm			
302 mm			
296 mm			
280 mm			
254 mm			





P-2000 Digital Polarimeter

"build-it-yourself"

