

# Consumables & Accessories Catalogue

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## **SX Series** Stopped-Flow Spectrometers

Consumables

Accessories

Upgrades

Software



# Introduction

This catalogue features a comprehensive selection of consumable components, accessories and upgrades which cover the SX series of stopped-flow instruments. Twenty five years ago Applied Photophysics launched the SF17 stopped-flow. Over the years this has evolved through the SX17 and SX18 models, to the SX20 instrument that we sell today. Components common to all instrument models are listed but instrument specific components are also identified where appropriate, to help keep your stopped-flow in good working order.

## PRICE LIST

A corresponding price list is available on request in three currencies; UK Sterling, US Dollars or Euros.

## HOW TO ORDER

Please contact our Support team with your order requirement, either by phone or e-mail using the details at the bottom of this page. The team will then progress your order accordingly.

## MINIMUM ORDER VALUE

Applied Photophysics operate a minimum order policy of £200, \$300 or €300 for purchase orders. For orders less than this amount, payment will need to be taken by a debit or credit card. Unfortunately we are unable to accept payment by American Express.

## STANDARD SHIPPING

All orders are shipped using the FedEx International Priority service, unless agreed otherwise.

## EXPRESS SHIPPING SERVICE

If an order request is received before 12pm GMT and the item is in stock, on request the order will be processed for same day dispatch. This express shipping service requires an additional £20, \$30 or €30 surcharge. Support plan holders are entitled to this service free of charge as part of their plan.

## WE ARE HERE TO HELP

If you cannot find what you are looking for, or are uncertain which part you need, please contact the Support team with any enquiries you might have.

Telephone: +44 (0)1372 386537  
Toll-Free (from USA only): +1 800 543 4130  
Email Technical Support: [support@photophysics.com](mailto:support@photophysics.com)

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2.5mL Drive Syringe



2.5mL High temperature Drive Syringe



100µL Drive Syringe



250µL Drive Syringe



500µL Drive Syringe



1.0mL Drive Syringe

## Drive Syringes

### ALL MODELS STANDARD

All SX series instruments are fitted with 2.5mL purpose-built drive syringes as standard. These syringes feature PEEK (Polyetheretherketone) pistons for corrosion free operation over the 0-60°C temperature range and improved dead-time performance.

### ALL MODELS HIGH TEMPERATURE

Specialised 2.5mL drive syringes are available to allow for higher temperature stopped-flow operation.

### ASYMMETRIC MIXING

A range of other syringes are also available for asymmetric (1:2, 1:4, 1:5, 1:10 and 1:25) mixing experiments. Such syringes should also be combined with the relevant asymmetric mixing accessories where appropriate.

ASYMMETRIC MIXING SYRINGE COMBINATIONS	MIXING RATIO
250µL + 500µL; 500µL + 1.0mL	1 : 2
250µL + 1.0mL	1 : 4
100µL + 500µL; 500µL + 2.5mL	1 : 5
100µL + 1.0mL; 250µL + 2.5mL	1 : 10
100µL + 2.5mL	1 : 25

Note: HIGH PRESSURE MAY BREAK THE OPTICAL CELL! Please refer to the user manual before conducting asymmetrical mixing experiments.

DESCRIPTION	PART N°
2.5mL Standard Drive Syringe	AP/DS250
2.5mL High Temp Drive Syringe	AP/DS250HT
100µL Drive Syringe	AP/DS010
250µL Drive Syringe	AP/DS025
500µL Drive Syringe	AP/DS050
1.0mL Drive Syringe	AP/DS100
2.5mL Syringe Piston PEEK (Kloehn only)	AP/SP250K

# Stop Syringes

## ALL MODELS STANDARD

All SX series instruments are fitted with a 2.5mL stop syringe as standard. These syringes feature corrosion-free PEEK pistons.

Note: Some early models may require an extension to the side-mounted autostop mechanism for compatibility with the current model stop syringe. Please contact our Customer Support team to check compatibility.

## RAPID KINETICS STOP SYRINGE FOR ALL SX SERIES

A lower volume 1.0mL Hamilton stop syringe reduces stopping artefacts and provides improved trace definition for rapid kinetic measurements. This allows kinetic trace fitting from 1ms. This stop syringe is essential for optimum operation using the optional 5µL optical cell.

## ASYMMETRIC SEQUENTIAL MIXING STOP SYRINGE

The increased total drive volume often necessary in asymmetric sequential mixing (e.g. 1:5 followed by 5:1 mixing) experiments requires the use of a 5.0mL Hamilton stop syringe. More details of this technique are provided in the accessories section.

Note: A new redesigned brake assembly is now available for all SX17 and SX18 instruments that feature the side-mounted autostop. This shares all major components with the SX20 brake assembly and addresses an incompatibility with a modification to the older Hamilton syringe tip.

DESCRIPTION	PART N°
2.5mL Stop Syringe	AP/SS250
Side-mounted Autostop Extension Tubes	AP/SXASEX
5.0mL Stop Syringe	AP/SS500
1.0mL Stop Syringe	AP/SS100
2.5ml Syringe Piston PEEK (Kloehn only)	AP/SP250K



2.5mL Stop Syringe



Side-Mounted Autostop Extension tubes



Side-Mounted Autostop Extension Fitted to Instrument



1.0mL Stop Syringe



5.0mL Stop Syringe



1A



2A



3A



1B



2B



3B



4B



5B



6B



7B



8B



9B

## Flow Lines

### SINGLE MIXING REMOVABLE CELL

The single mixing removable cell sample handling unit (SHU) models feature three PEEK flow lines terminated with compression fittings to link the drive valves with the optical cell and the cell with the stop valve. The rigidity of PEEK tubing makes it ideally suited for this purpose.

DESCRIPTION	PART N°
Set A Single Mixing Removable Cell Flow Line Set	AP/SXFLX.R
1A Cell to Stop Valve	AP/SFPK20R
2A Left-Hand Valve to Cell	AP/SFPK25R
3A Right-Hand Valve to Cell	AP/SFPK15R

### SEQUENTIAL MIXING REMOVABLE CELL

All flow lines are connected to the various valves and connectors in the flow circuit using threaded fittings with the exception of those that connect to the optical cell face. These lines are attached to the cell using a pressure disk\*, which enables both inlet and outlet line to be tightened or loosened simultaneously. Blanking plugs are provided for sealing the sequential mixing circuit when not in use.

DESCRIPTION	PART N°
Set B Sequential Mixing Removable Cell Flow Line Set	AP/SXFLQ.R
1B Cell to Stop Valve	AP/SFPK20R
2B Valve F to Connector (connector included)	AP/SFPK19
3B Connector/Pre-Mixer to Cell	AP/SFPK16R
4B Valve C to Cell	AP/SFPK15R
5B Valve A to Pre-Mixer	AP/SFPK18
6B Valve B to Pre-Mixer	AP/SFPK17
7B Pre-Mixer to Connector	AP/SFPK22
8B Pre-Mixer	AP/SFPKPM
9B Blanking Plugs	AP/SFPKBP

Note: (\*) For more information on the Pressure Disk refer to the Miscellaneous Stopped-Flow Items section of this catalogue.

## SINGLE MIXING NON-REMOVABLE CELL

Single mixing non-removable cell SHU models feature four PEEK flow lines terminated with threaded fittings to link the drive valves with the optical cell and the cell with the stop valve. Older instruments not currently fitted with PEEK tubing require an adaptor fitted to the SHU backplate to accommodate the longer threaded fittings of these waste lines.

DESCRIPTION	PART N°
Set C Single Mixing Non-Removable Cell Flow Line Set	AP/SXFLX.NR
1C Left-Hand Valve to Cell	AP/SFPK25
2C Right-Hand Valve to Cell	AP/SFPK15
3C Cell Exit to Adaptor	AP/SFPK20
4C Adaptor to Autostop Entry	AP/SFPK21

## SEQUENTIAL MIXING NON-REMOVABLE CELL

Sequential mixing non-removable cell SHU models feature eight PEEK flow tubes, one four-way mixer and one straight adaptor. All the flow tubes are connected to the various valves and connectors in the flow circuit using threaded fittings. Instruments not currently fitted with PEEK tubing require an adaptor fitted to the SHU backplate to accommodate longer threaded fittings of waste lines.

DESCRIPTION	PART N°
Set D Sequential Mixing Non-Removable Cell Flow Line Set	AP/SXFLQ.NR
1D Valve F to Connector (connector included)	AP/SFPK19
2D Valve C to Cell	AP/SFPK15
3D Cell to Waste Line Adaptor*	AP/SFPK20
4D Waste Line Adaptor* to Stop Valve	AP/SFPK21
5D Connector/Pre-Mixer to Cell	AP/SFPK16
6D Valve A to Pre-Mixer	AP/SFPK18
7D Valve B to Pre-Mixer	AP/SFPK17
8D Pre-Mixer to Connector	AP/SFPK22
9D Pre-Mixer	AP/SFPKPM
10D Blanking Plugs	AP/SFPKBP

Note: (\*) Older SX17 and SX18 stopped-flow systems require a small adaptor to be fitted allowing for the use of the latest PEEK tubing set (line 4D). A full description of this adaptor is given in the Miscellaneous Stopped-Flow Items section of this catalogue.



1C



2C



3C



4C



1D



2D



3D



4D



5D



6D



7D



8D



9D



10D



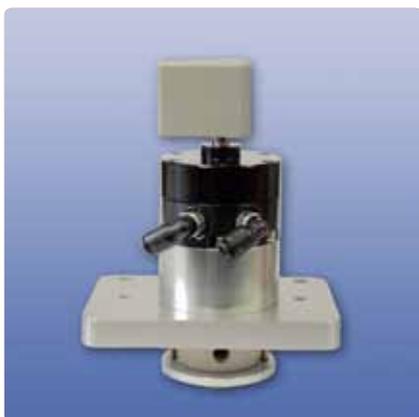
Standard Stop Valve

## Stop Valves

### SX20 AND SX18MV-R STANDARD

Current instruments feature a reinforced PEEK 180° stop valve, with plate-retained rotor for improved durability. This is much more resilient than previous versions, is less likely to corrode or be prone to sample leakage.

Note: Older SX17 and SX18 models may require an autostop upgrade (described below) for compatibility with this stop valve.



Autostop Upgrade

### SX17 AND SX18 AUTOSTOP UPGRADE

Stopped-flow models prior to the SX18MV-R models require a larger 40mm diameter pneumatic actuator mechanism for operation of this valve. The mechanism now has a notched spindle to make changing and aligning the valve much simpler compared to earlier designs.



SX17 and SX18 Brake Mechanism Upgrade

### SX17 AND SX18 NEW BRAKE MECHANISM UPGRADE

A new redesigned brake assembly is now available for all SX17 and SX18 instruments that feature the side-mounted autostop. This shares all major components with the SX20 brake assembly and addresses an incompatibility with a recent modification to the Hamilton stop syringe tip.

DESCRIPTION	PART N°
PEEK 180° Stop Valve	AP/SFSV
SX17 and SX18 Autostop Mechanism Upgrade	AP/SXASUG
SX17 and SX18 Brake Mechanism Upgrade	AP/SXQBUG



Drive Valves

## Drive Valves

### ALL SX SERIES MODELS STANDARD

The latest PEEK drive valves are suitable for all SX series stoppedflow models and feature improved durability and enhanced anaerobic performance compared with older Teflon designs. The valves are supplied complete with O-rings and control knob.

DESCRIPTION	PART N°
PEEK Right-Hand Drive Valve	AP/SFDVRH
PEEK Left-Hand Drive Valve	AP/SFDVLH

# Lamps

## ALL SX SERIES MODELS

Three 150W lamp options are available for all SX series models to suit individual experimental requirements. For instruments fitted with sealed (black) lamp housings, additional lamps can be supplied mounted on an extra lamp housing unit backplate and storage case. This allows for more rapid lamp changeovers and eliminates the need for lamp alignment following the lamp exchange. Please refer to the Lamp Housing Accessories and Fittings section (Page 19) for more details.



150W Instrument Lamps

## 150W OZONE-FREE XENON LAMP (STANDARD)

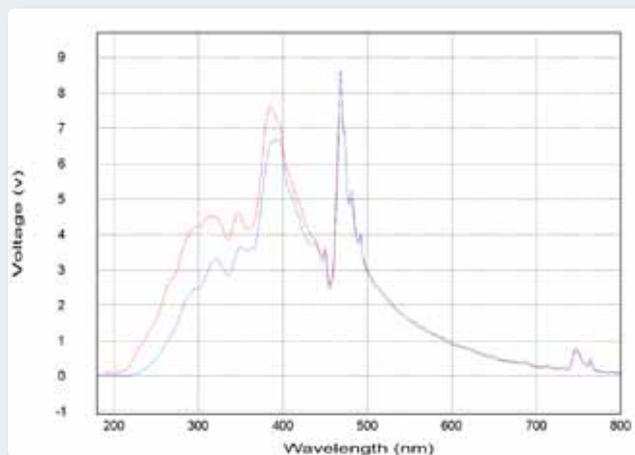
Instruments are normally supplied fitted with a 150W ozone-free xenon lamp unless requested otherwise. The ozone-free lamp is constructed of glass and does not emit below 240nm.

## 150W OZONE-PRODUCING XENON LAMP

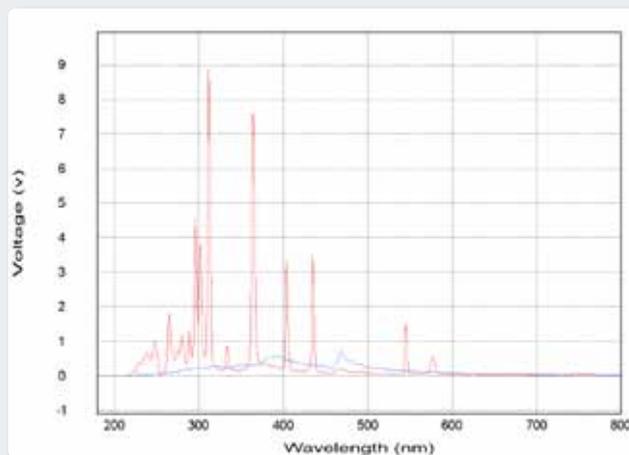
The ozone-producing xenon lamp is constructed of quartz and emits below 240nm as illustrated below on the left. This lamp is generally supplied for far UV absorbance applications.

## 150W XENON-MERCURY LAMP

The xenon-mercury lamp has strong mercury emission lines over the xenon spectrum at wavelengths of interest for specific applications in fluorescence and circular dichroism. The right picture below shows the output profiles for a xenon lamp (blue) and a xenon-mercury lamp (red).



150W Xenon (blue) vs 150W Ozone-Producing Xenon (red)



150W Xenon (blue) and 150W Xenon-Mercury (red)

DESCRIPTION	PART N°
150W Xenon Arc Lamp (ozone-free)	AP/LPXENO
150W Xenon Arc Lamp (ozone-producing)	AP/LPXEOB
150W Xenon-Mercury Arc Lamp	AP/LPXEHG
Replacement Deuterium Light Bulb (Hamamatsu only)*	AP/LPDE

Note: (\*) The UV Boosted Deuterium Light Source optional accessory is available to enhance operation of the Photodiode Array Detector accessory in the far UV region of the spectrum. Full description of this option is given in the Accessory Upgrades section of this catalogue.



W1



W2



W3



W4



W5



W6



W7



W8



W9



F1



F2



F3



S1



S2



S3

## Miscellaneous Stopped-Flow Items

### WATERBATH TUBING, CONNECTORS, SEALS AND FIXTURES

N°	DESCRIPTION	PART N°
W1	Waterbath External Connector (male/female pair)	AP/WBSC
W2	Waterbath Internal Tubing (30cm)	AP/WBTB
W3	Flexible Hose Clamp (2 pack)	AP/TBCL
W4	Small Diameter Drive Syringe Sleeves (5 pack)	AP/WBDSS
W5	Waterbath Window	AP/WBW
W6	Waterbath Quadring	AP/WBQR
W7	Thorsmann Grommets (Drive Syringe Seals) (4 pack)	AP/WBTG
W8	Luer Fittings (4 pack)	AP/WBLF
W9	External Temperature Probe Gland	AP/WBPG

### FLOW CIRCUIT FITTINGS

N°	DESCRIPTION	PART N°
F1	SX17 and SX18 PEEK Waste Line Adaptor	AP/SXFLAD
F2	Pressure Disk	AP/SFPD
F3	Collars for Inlet Flow Lines into Pressure Disk (Pair)	AP/SFICL
F3	Collars for Waste Flow Line into Pressure Disk (Pair)	AP/SFOCL

### SCREWS AND FUSES

N°	DESCRIPTION	PART N°
S1	2.5mm Thumb Screw	AP/TS25
S1	3.0mm Thumb Screw	AP/TS30
S2	SHU Screw Set	AP/SFSS
S3	SX17 and SX18 Fuse Set (220/110V)	AP/SXFS220/110
S3	SX20 Fuse Set (220/110V)	AP/SXFS220/110

## PNEUMATIC FITTINGS

Nº	DESCRIPTION	PART Nº
P1	Autostop Pressure Tubing Connector Elbow	AP/SFASE
P1	Autostop Pressure Tubing Connector Straight	AP/SFASS
P2	Armoured Hose Adapter	AP/TBAHA
P3	6mm SHU Pressure Tubing Connector T	AP/TBCT6
P3	6mm SHU Pressure Tubing Connector Elbow	AP/TBCE6
P4	6mm Pneumatic Tubing (1m)	AP/TB6
P5	Pressure Release Valve	AP/TBPRV

## TOOLS

Nº	DESCRIPTION	PART Nº
T1	Metric Hexagonal Key Set	AP/TLHK
T2	Ball Driver 2mm; 2.5mm; 3mm; 4mm; 5mm	AP/TLBD(Xmm)
T3	Flow Line Fitting Tool	AP/TLFL
T4	Lamp Alignment Tool (Sealed Lamp Housing)	AP/TLSLH
T5	Extended 3mm Hexagonal Key	AP/TLEHK3

## MISCELLANEOUS

Nº	DESCRIPTION	PART Nº
M1	Hardcopy User Manual	AP/SXUM
M2	Stop Valve to Waste Receptacle Tube	AP/SFWRT
M3	Set of Cell Block Blanking Plugs (4 pack)	AP/SXBP
M4	Set of O-Rings	AP/SXOR
M5	Copper Leaf Trigger	AP/SFTR

Note: Other stopped-flow components are listed elsewhere in this catalogue. If you cannot find the component you need, please contact our Customer Support team for further details.



P1



P2



P3



P4



P5



T1



T2



T3



T4



T5



M1



M2



M3



M4



M5



SX20 Standard Service Pack



2.5mL Drive Syringe



2.5mL Stop Syringe



Stop Valve



RH & LH Drive Valves



Luer Fittings



Set of O-Rings



Water Bath Quadrings



Copper Leaf Trigger



Thorsmann Grommets

## Service Packs

These service packs are used by Applied Photophysics service engineers when completing a preventative maintenance service. However, they can also be purchased by users wishing to service the instrument themselves or to keep as a comprehensive stock of spares to cover emergencies. The packs are an economical and convenient alternative to purchasing individual components.

Each service pack includes a complete set of replacement flow lines for the corresponding instrument. However, replacement valves and syringes for the sequential mixing mode are omitted. An additional service pack is available which includes the two extra valves and syringes required for a complete service of a sequential mixing instrument.

### STANDARD SINGLE & SEQUENTIAL MIXING SERVICE PACK:

- ▶ 2 Standard 2.5mL Drive Syringes
- ▶ 1 Standard 2.5mL Stop Syringe
- ▶ 1 Stop Valve
- ▶ 2 Drive Valves (Left-Hand & Right-Hand)
- ▶ 4 Luer Fittings
- ▶ 1 Set of O-Rings (including drive valve screw washers and bleed screw washer)
- ▶ 2 Water Bath Quadrings (seal for SHU Waterbath Front Plate),
- ▶ 1 Copper Leaf Trigger
- ▶ 1 PEEK Tubing Kit\*
- ▶ 4 Thorsmann Grommets (SHU Waterbath syringe seals)

Note: (\*) For information on relevant tubing kits please refer to the Flow Lines section of this catalogue.

### ADDITIONAL SEQUENTIAL MIXING SERVICE PACK:

To complement the standard sequential service pack, which contains two drive valves and drive syringes, this pack includes:

- ▶ 2 additional Standard 2.5mL Drive Syringes
- ▶ 2 additional Drive Valves (Left-Hand and Right-Hand)

DESCRIPTION	PART N°
SX18MV-R/SX20 Single Mixing Service Pack	AP/SXSVPX.R
SX18MV-R/SX20 Sequential mixing Service Pack	AP/SXSVPQ.R
SX17 and SX18 Single Mixing Service Pack	AP/SXSVPX.NR
SX17 and SX18 Sequential Mixing Service Pack	AP/SXSVPQ.NR
Additional Sequential Mixing Service Pack	AP/SXSVPQA

# Support Plans

Maintaining your system in peak condition is our top priority. We design and manufacture all our instruments and have over 40 years of experience providing comprehensive service solutions to our customers. This detailed understanding enables us to deliver instrument reliability, accuracy of your research results and, as a result, complete peace of mind.



The key benefits of our support plans are as follows:

- ▶ Priority support
- ▶ Confidence in your research results
- ▶ Extended instrument lifetime
- ▶ Reduced cost of ownership
- ▶ Access to online resources

## SUPPORT PLAN OPTIONS

The three tiers give you the opportunity to choose the appropriate support plan for your instrument according to operational demands, frequency of use, and your budget.

### PREMIUM SUPPORT PLAN

This most comprehensive support plan features an annual PM service visit and unlimited callout visits to protect against additional costs and delays resulting from instrument downtime.

### STANDARD SUPPORT PLAN

This most popular support plan that delivers dependable operation and priority support for your system by offering a comprehensive preventative maintenance service visit. The support plan recognises that instrument use will vary from one lab to another by offering 12, 24 and 36 month coverage with one PM visit.

### BASIC SUPPORT PLAN

An entry level plan offering cost effective protection against unscheduled repairs through a free factory repair service and discounted call out visits as well as other value adding benefits.

Note: Please contact our Customer Support Department for more details.

	Premium	Standard	Basic
Scheduled Preventative Maintenance (PM) Visit	✓	✓	✗
PM Service Pack (includes all sample handling unit consumables)	✓	✓	✗
Emergency Callout Visit	✓	✗	✗
Priority Technical and Applications Support	✓	✓	✓
Free Factory Repair Service	✓	✓	✓
Discounted Consumables, Accessories and Spares	✓	✓	✓
Discounted Additional Visits for Service and Training	✓	✓	✓
Free Pro-Data Software Updates	✓	✓	✗
Access to Online Resources	✓	✓	✓
Priority Shipping Service	✓	✓	✓



Sample Handling Unit



Mini Solenoid Valve



Solenoid Valve



Transducer Shelf Assembly

## Kinetic Sample Handling Unit

New sample handling units (SHUs) are available as an upgrade for older instruments. The latest generation of single or sequential mixing SHUs features:

- ▶ Removable Cell Cartridge designed for rapid cell change
- ▶ Simpler flow circuit arrangement
- ▶ Alternative cell options for additional optical pathlengths and improved dead time

The drive syringes, flow lines and optical cell are surrounded by a thermostat bath. The flow circuit is chemically inert. It is constructed of glass (syringe barrels), silica (optical detection cell), PEEK (sample flow circuit tubing and drive valves) and Teflon (syringe piston seals).

### STANDARD MIXING OPERATION

CHARACTERISTICS	VALUE
Number of view ports	Two transmission/emission; dedicated emission
Cell volume (standard cell)	20µL
Optical path (transmission)	2mm and 10mm
Cell volume (optional cell)	5µL
Optical path (transmission)	1mm and 5mm
Dead time (standard cell)	1.1ms (1:1 mix); 1.6ms (10:1 mix)
Maximum final reagent flow rate	18.5µL/ms (1:1 mix)
Typical reagent volume per shot	50µL of each reagent (1:1 mix)
Drive ratios using appropriate syringes	1:1; 2.5:1; 5:1; 10:1; 25:1

### SEQUENTIAL MIXING OPERATION \*

CHARACTERISTICS	VALUE
Age time range	15ms to over 1,000s (continuously variable)
Age time selection	Directly from control software (no hardware reconfiguration required)
Calculated dead time	Recorded with each drive
Calculated age time	Recorded with each drive
Drive profiles	Recorded with each drive
Drive volumes	Recorded with each drive

### DESCRIPTION

### PART N°

Single Mixing Sample Handling Unit	AP/SXSHUX
Sequential Mixing Sample Handling Unit	AP/SXSHUQ

Note: (\*) Single mixing sample handling units may be upgraded for sequential mixing capability. Full details are provided in the Accessory Upgrades section of this catalogue.

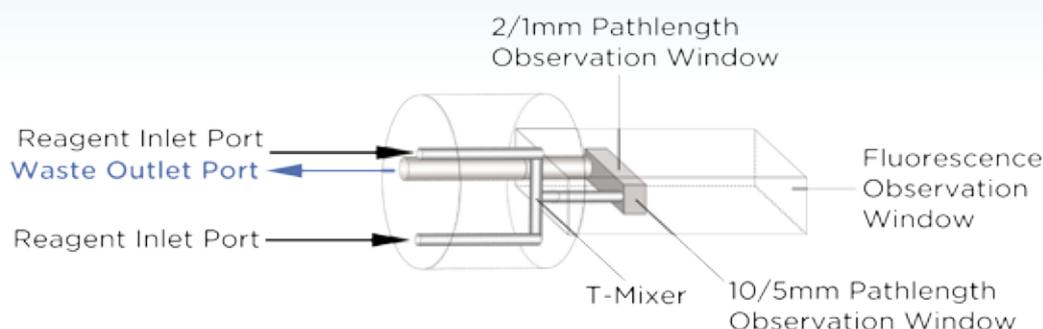
## KINETIC SAMPLE HANDLING UNIT SPARES

### DESCRIPTION

### PART N°

Mini Solenoid Valve (Single)	AP/SFMSN
Solenoid Valve	AP/SFSN
Three Mini Solenoid Valve Assembly	AP/SFMSN3
Transducer Shelf Assembly Pre-SX18MV-R	AP/SFTS

## Stopped-Flow Optical Cells



### SX20 AND SX18MV-R

The SX20 and SX18MV-R models feature a removable cell cartridge system allowing the use of different optical cells to be fitted according to experimental requirements with a minimum of work.

#### 20 $\mu$ L CELL

The standard stopped-flow cell feature 2mm and 10mm optical pathlengths and the dead time of 1.1ms

#### 5 $\mu$ L CELL

The optional rapid kinetics cell feature 1mm and 5mm optical pathlengths and the reduced dead time of 0.5ms

Note: To optimise performance, the 5 $\mu$ L cell must be operated with the optional 1mL stop syringe provided with the cell.



Cell in Removable Cartridge



Optical Stopped-Flow Cell

DESCRIPTION	PART N°
20 $\mu$ L Stopped-Flow Cell Only	AP/SXOC20
5 $\mu$ L Stopped-Flow Cell Only	AP/SXOC5
20 $\mu$ L Stopped-Flow Cell & Removable Cartridge	AP/SXOC20.R
5 $\mu$ L Stopped-Flow Cell & Removable Cartridge	AP/SXOC5.R
Replacement Cartridge Only	AP/SXRC
5 $\mu$ L Stopped-Flow Cell, Removable Cartridge & 1mL stop syringe	AP/SXRK

## Equilibrium Sample Handling Unit

The Equilibrium Sample Handling Unit is a highly flexible accessory that enables temperature controlled measurements using a standard cuvette. It can be attached either directly to the monochromator or via the standard fibre optic light guide and coupled with Absorbance/Fluorescence PMT or PDA detectors.

DESCRIPTION	PART N°
Equilibrium Sample Handling Unit	AP/SXESHU



Equilibrium Sample Housing Unit



Lamp Power Supply



Anode Electrical Cable



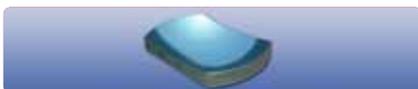
Cathode Electrical Cable



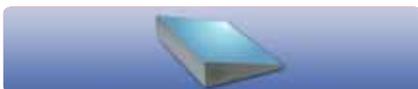
Earth Strap



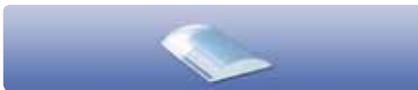
Sealed Lamp Housing



O1



O2



O3

## 150W Arc Lamp Power Supply

The current generation lamp power supply features a built in “safe start” igniter unit which minimises any possibility of damage to sensitive electronic equipment and a silent fan which reduces vibrations. An LCD screen is provided to display the lamp age.

Note: This unit is available as a replacement for older, less stable power supply units and also eliminates the need for an external lamp igniter.

CHARACTERISTICS	VALUE
Type	150W Xe arc
Ignition	“Safe-Start” - lower RFI
Stability	-0.001AU (peak-to-peak, lamp dependent)
Light source warm-up - %max. intensity	95% after 0.5hr; 98% after 1.0hr (conditions dependent)
30min drift (after 1 hour operation)	<1%
Mains Supply	Universal ( 83 – 245V )

DESCRIPTION	PART N°
150W Arc Lamp Power Supply	AP/SXPSU
Pair of Electrical Cables	AP/CBSXPSU
Earth Strap	AP/ES(Xm)*

Note: (\*) Standard Earth Strap lengths are 0.4m, 0.6m and 1.0m.

## Sealed Lamp Housing

The current model sealed lamp housing features:

- ▶ Simple user-friendly lamp alignment mechanism
- ▶ Built-in nitrogen purge connector for operations with ozone-producing lamps (optional)
- ▶ Rear-mounted lamp stabilising magnet assembly (optional) for improving lamp signal stability

DESCRIPTION	PART N°
Sealed Lamp Housing	AP/SXSLH

### SEALED LAMP HOUSING OPTICS

The three optical components common to all Applied Photophysics lamp housings are available for replacement of aged or damaged items.

N°	DESCRIPTION	PART N°
O1	Concave Reflector Mirror	AP/SLHCM
O2	Wedge Reflector Mirror	AP/SLHWM
O3	D-Lens	AP/SLHDL

Note: The lamp housing can be serviced during a standard PM service visit by Applied Photophysics engineers.

# Lamp Housing Accessories and Fittings

## DIRECT LAMP HOUSING TO PDA LIGHT GUIDE COUPLER

The lamp housing light guide coupler provides an improved signal to noise level for photodiode array detection. The direct coupling is up to three times more efficient than the zero order position of the monochromator.

DESCRIPTION	PART N°
Lamp Housing/PDA Light Guide Coupler	AP/SXPDADC



Lamp Housing/PDA Coupler

## ADDITIONAL LAMP MOUNTING PLATE

For applications requiring use of two different lamps for optimum performance, an additional lamp mounting plate and protective storage case is available. This allows lamps to be switched in less than one minute without the need for realignment checks.

DESCRIPTION	PART N°
Lamp Mounting Plate & Storage Box	AP/SLHMPB



Lamp Mounting Plate &amp; Storage Box

Note: For different lamp options refer to the Lamps section of this catalogue.

## LAMP HOUSING FITTINGS AND TOOLS

A range of purpose-designed tools, connectors and optics is available for Applied Photophysics lamp housings.

N°	DESCRIPTION	PART N°
L1	Lamp Alignment Tool (Sealed Lamp Housing)	AP/TLSLH
L2	Stabilising Magnet (Sealed Lamp Housing)	AP/SLHSM
L3	See-Through Alignment Port Blanking Plug (Sealed Lamp Housing)	AP/SLHBP
L4	Electrical Terminals (Sealed Lamp Housing)	AP/SLHET
L5	Electrical Terminals (Cream Lamp Housing)	AP/CLHET
L6	Lamp Alignment Mirror (Cream Lamp Housing)	AP/CLHAM



L1



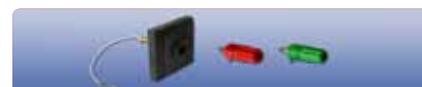
L2



L3



L4



L5



L6



Monochromator

## Monochromator

The current model software controlled grating monochromators feature:

- ▶ Continuously variable bi-lateral entrance/exit slit mechanisms
- ▶ Stepper motor drive and wavelength selection controlled from the workstation

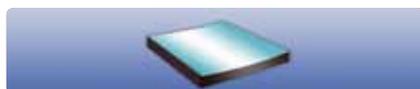
CHARACTERISTICS	VALUE
Optical layout	Symmetrical Czerny-Turner
Dispersive medium	Diffraction grating
Slits	Bilateral - infinitely variable up to 5mm
Dispersion	4.65nm/mm
Minimum wavelength step	0.1nm
Rate of change when setting to new wavelength	1500nm/min
Standard wavelength range (detector limited)	200 to 850nm

DESCRIPTION	PART N°
Monochromator blazed 1200	AP/MN1200
Monochromator blazed 600	AP/MN600

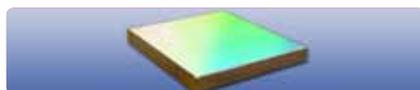
Note: Monochromator optics are prone to age over time due to exposure to high intensity UV light. Applied Photophysics offers a factory based optical service to restore optical performance.



M1



M2



M3



M4



M5



M6

## Monochromator Optics and Spares

A range of spare parts is available for monochromator service and repairs.

N°	DESCRIPTION	PART N°
M1	First/Last Mirror	AP/MNFM
M2	Concave Reflector Mirror	AP/MNCFM
M3	Grating BLAZED 1200	AP/MNG1200
M3	Grating BLAZED 600	AP/MNG600
M4	Slit Dial	AP/MNSD
M5	Optical Rail Securing Screw	AP/ORSS
M6	Entrance/Exit Flange Seal	AP/MNFS

# Light Conditioning Accessories and Fittings

## MONOCHROMATOR FILTER HOLDER/LIGHT GUIDE COUPLER

The accessory was designed to assist researchers with specific light conditioning requirements. The coupler features a simple two clip holder for arbitrary size filters.

DESCRIPTION	PART N°
Monochromator Filter Holder /Light Guide Coupler	AP/MNFH



Filter Holder/Light Guide

## LIGHT GUIDES

Light output from the monochromator is coupled to the optical cell of the stopped-flow sample handling unit via a high quality spectro-sil light guide.

N°	DESCRIPTION	PART N°
L1	Light Guide Standard 0.5m	AP/LGST05
L2	Light Guide Emission Mono 0.5m	AP/LGSM05
L3	Light Guide Photodiode Array 0.5m	AP/LGPDA05



Light Guide

Note: Longer light guides are available on request.

STANDARD	PDA (OLD STYLE)	EMISSION MONO	
			Cell Block End
1 x 5mm slit	1 x 7mm slit	1 x 7mm slit	
			Accessory End
1 x 5mm slit	3mm round	1 x 7mm slit	

Light Guides Fittings Chart



Fluorescence Detector



Fluorescence Detector Housing and Electronics



PMT Detector Cable

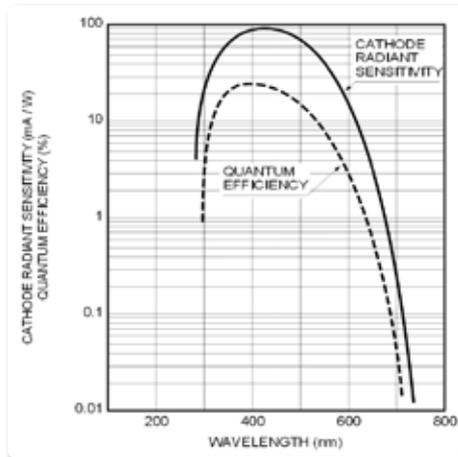
# Fluorescence Photomultiplier Tubes

SX instruments are supplied with a Hamamatsu R6095 PMT as standard. This photomultiplier has a wide detection range (300-650nm) but may be limited at more extreme fluorescence wavelengths. PMTs more sensitive to outer limits can be purchased for improved analysis in these spectral regions.

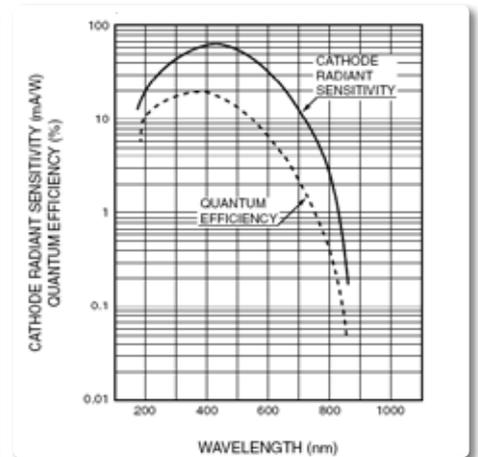
For extended detection range the following tubes are available:

- ▶ R374 photomultiplier tube. Suitable for 185-850nm
- ▶ R2228 photomultiplier (extended red) tube. Suitable for 300-900nm

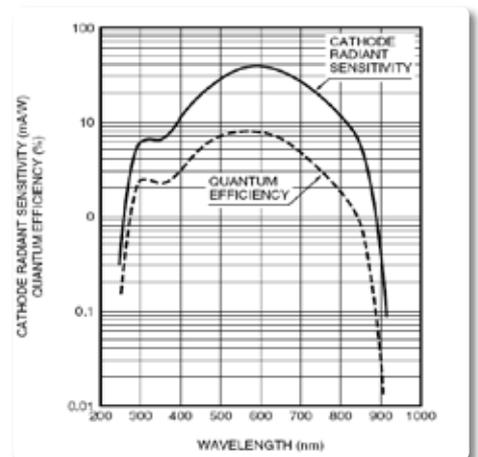
DESCRIPTION	PART N°
R6095 Fluorescence PMT (tube only)	AP/PMT.R6095
R374 Fluorescence PMT (tube only)	AP/PMT.R374
R2228 Fluorescence PMT (tube only)	AP/PMT.R2228
Fluorescence PMT Housing (no tube or electronics included)	AP/SXFDH
Fluorescence PMT Electronics (no tube or housing included)	AP/SXFDE
PMT Detector Cable	AB/CBPMT



R6095 PMT. Typical Spectral Response



R374 PMT. Typical Spectral Response

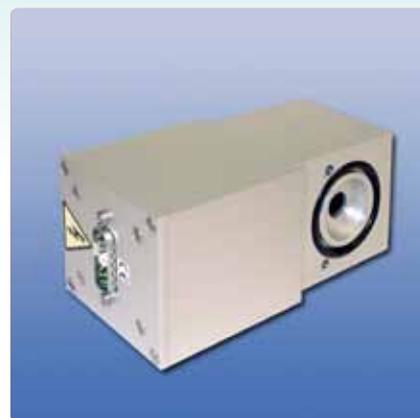


R2228 PMT. Typical Spectral Response

# Absorbance Photomultiplier Tubes

The R928 photomultiplier tube is fitted as standard on SX instruments and provides high sensitivity for UV to near IR in the spectral response range of 185-900nm. The R7154 high sensitivity solar blind photomultiplier tube providing high sensitivity in the spectral response range of 160-320nm can also be supplied on request.

Note: Photodiode Array absorbance detector is fully described in the Accessory Upgrades section of this catalogue.



Absorbance Detector

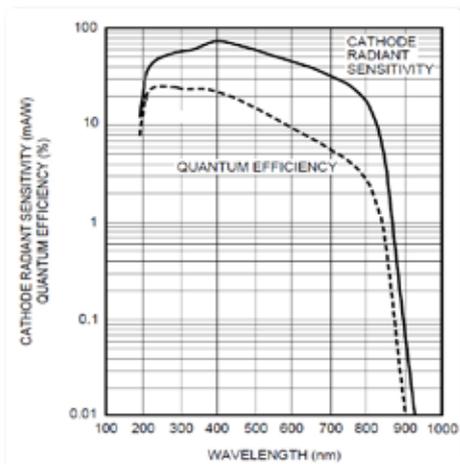


Absorbance Detector Housing and Electronics

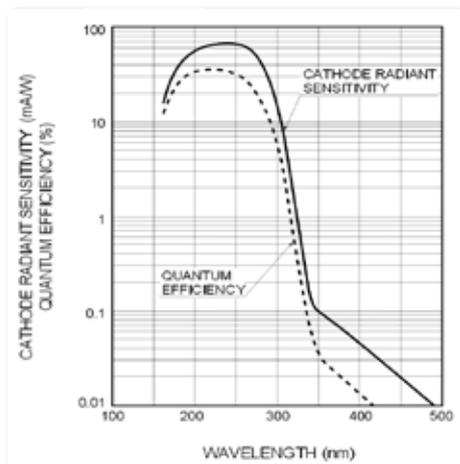


PMT Detector Cable

DESCRIPTION	PART N°
R928 Absorbance PMT (tube only)	AP/PMT.R928
R7154 Absorbance PMT (tube only)	AP/PMT.R7154
Absorbance PMT Housing (no tube or electronics included)	AP/SXADH
Absorbance PMT Electronics (no tube or housing included)	AP/SXADE
PMT Detector Cable	AP/CBPMT



R928 PMT. Typical Spectral Response



R7154 PMT. Typical Spectral Response



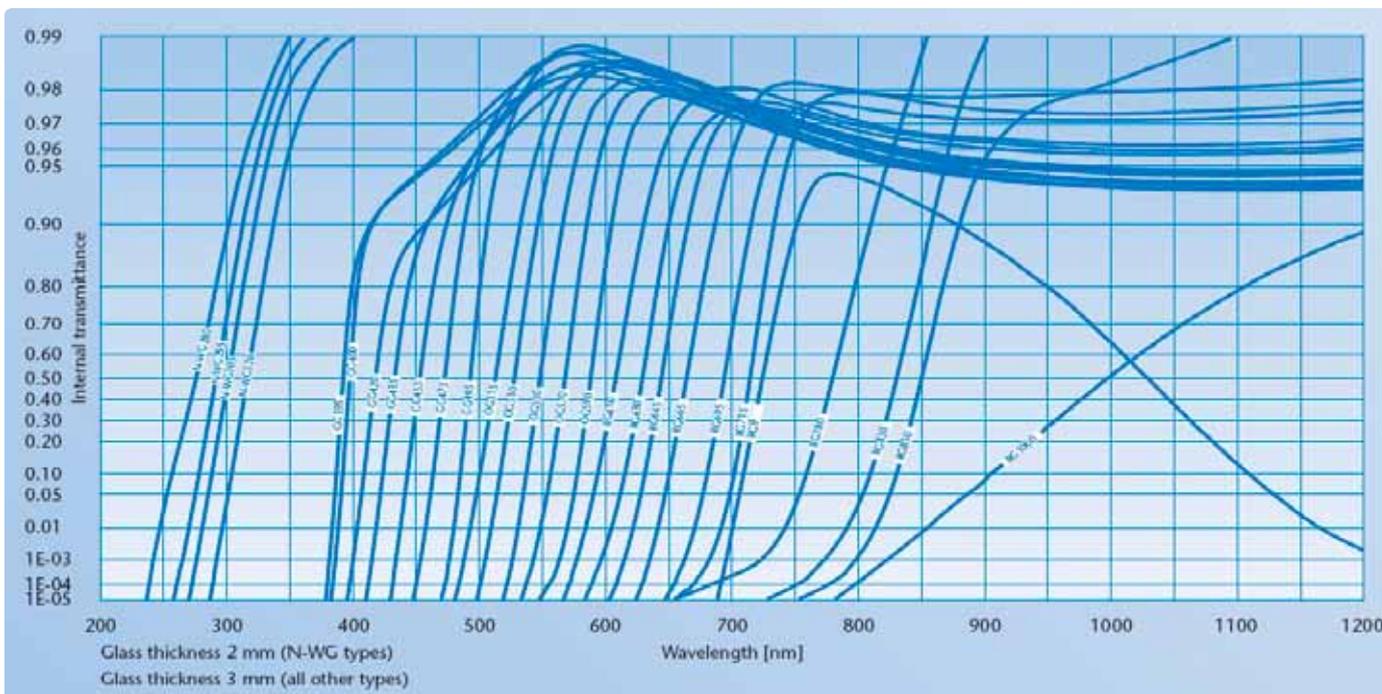
Filters in Storage Box

## Filters and Fittings

### LONG PASS FILTERS

A range of Schott manufactured glass cut-off filters are available from 200nm up to 850nm. The performance specifications of these filters are displayed graphically below. These filters have a diameter of 25mm and a typical depth of 3mm.

RANGE OF AVAILABLE FILTERS							
WG295	WG305	WG320	WG335	WG345	WG360	GG375	GG395
GG400	GG420	GG435	GG455	GG475	GG495	OG515	OG530
OG550	OG570	OG590	RG610	RG645	RG665		



DESCRIPTION	PART N°
Filters Cut-off Fluorescence (Various Values)	AP/LF( $\lambda$ )
Filters Cut-off Fluorescence (Set of 10 in Storage Box)	AP/LFSK
Filter Storage Box	AP/FSB

Note: The above listed filters are available immediately from our stock. If you need filters with other cut-off wavelengths, please contact our Customer Support Department for assistance.

## BANDPASS FILTERS

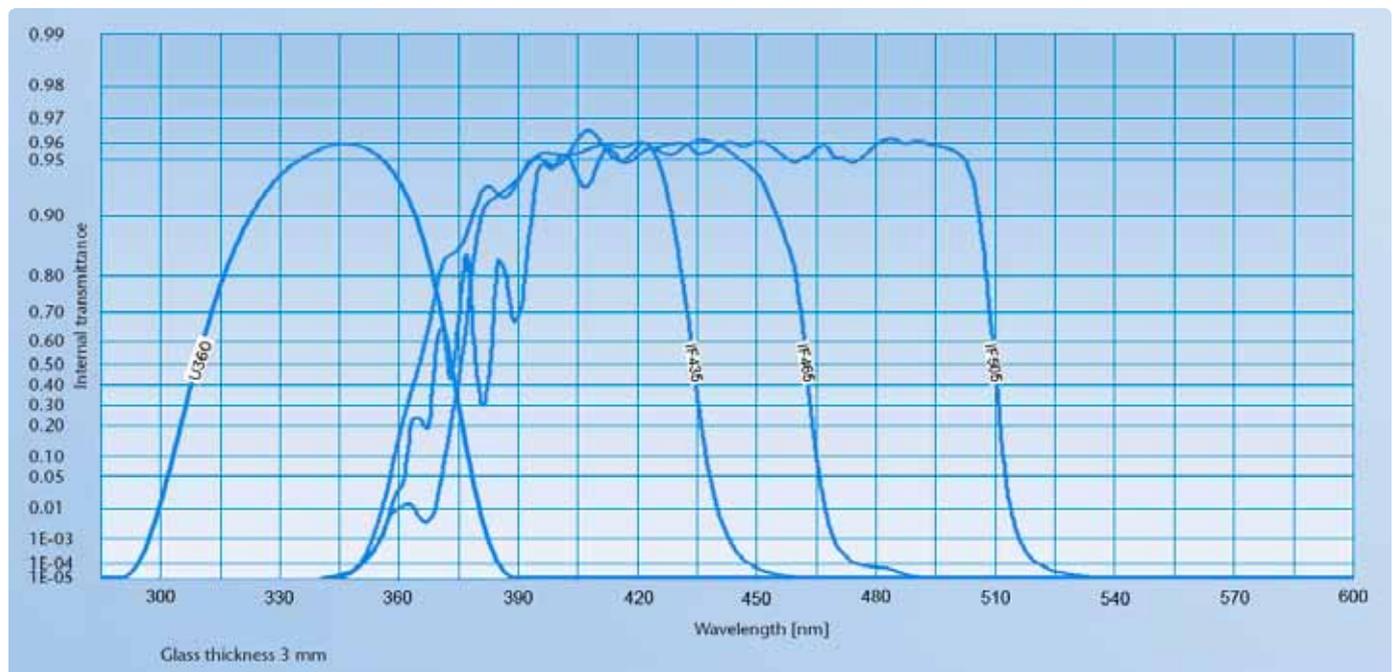
A range of interference filters is available immediately from our stock. The performance specifications of these filters are displayed graphically below.

DESCRIPTION	PART N°
Filter Interference IF435	AP/BF435
Filter Interference IF465	AP/BF465
Filter Interference IF510	AP/BF510
Filter	Interference

Note: The above listed filters are available immediately from our stock. If you need filters with other cut-off wavelengths, please contact our Customer Support Department for assistance.



Interference Filters



## FILTER HOLDER

Our circular filter holders secure the filters in place and can be used in conjunction with instruments featuring the removable cell cartridge option. A filter is held in position by a circular spring clip.

DESCRIPTION	PART N°
Filter Holder & Retaining Clip	AP/SFFH



Filter Holder & Clip



Brake Shoes



SX17 and SX18 Brake Mechanism



Quench Flow Adapter



PolyScience Programmable Waterbath Circulator

## Sequential Mixing

### BRAKE MECHANISMS

Sequential mixing experiments may require the use of a stop syringe brake assembly to deliver consistent pre-mix drive volumes. The brake mechanism provides friction to the stop syringe piston via a pair of brake shoes designed for 2.5mL and 5.0mL stop syringes.

A new redesigned brake mechanism assembly is now available for all instruments fitted with side-mounted autostop units to replace its old screw-on version. The new assembly shares its parts with the latest stopped-flow models allowing for a better compatibility with the current stop syringe models.

DESCRIPTION	PART N°
5.0mL Stop Syringe Brake Shoes	AP/SFSSBS50
2.5mL Stop Syringe Brake Shoes	AP/SFSSBS25
StopSyringeBrakeMechanismUpgrade(SideMountedAutostop)	AP/SXQBUG

## Quench Flow Adapter

### SX20 AND SX18MV-R ONLY

SX20 and SX18MV-R instruments can be fitted with a Quench-Flow adapter. The adapter is fitted in a few minutes in place of the standard stopped-flow cell/cartridge. It includes a milli-second dead-time mixer connected to a detachable flow line (for sample recovery). In combination with the sequential-mixing capability option, this accessory enables quench-flow operation - i.e. rapid-mixing of reagents; incubation for a (user selected) period (15ms to 1000s) followed by rapid-quenching of the reaction and sample recovery.

DESCRIPTION	PART N°
Quench-Flow Adapter	AP/SXQF

## Temperature Control

To maintain a constant temperature of the flow circuit contents throughout stopped-flow experiments, a thermostated circulator may be used. Suitable silicon tubing and Legris snap connectors are available for user-friendly interfacing between the circulator and Sample Handling Unit. In addition, certain models of the circulators may be controlled from the Pro-Data software via a serial or USB communication cable. The experimental temperature is recorded by the built-in temperature probe of the Sample Handling Unit.

DESCRIPTION	PART N°
PolyScience Circulator (240V)	PS/240
PolyScience Circulator (120V)	PS/120

## Asymmetric (Ratio) Mixing

### IN-LINE PRESSURE REGULATOR

When performing asymmetric mixing experiments it is essential to reduce the drive pressure supplying the drive ram to prevent damage to the flow circuit. Fitting an in-line pressure regulator to the sample handling unit provides full control of the drive pressure for consistent stopped flow performance. The regulator, supplied with the required tubing and fittings, is fitted by simply pushing the tubing into the pressure inlet port, at the back of the SHU, for the left hand drive ram.



Pressure Regulator

### ASYMMETRIC MIXING TIE-BAR

The asymmetric mixing tie-bar prevents the appearance of a small gap between the drive ram and the drive syringe piston during asymmetric mixing experiments. The release of the drive pressure causes the larger diameter syringe, as the path of least resistance, to relax further than the smaller volume syringe. The presence of a clamp ensures that both syringes relax to an equal extent with no gap formation.



Tie Bar

DESCRIPTION	PART N°
In-line Pressure regulator	AP/INPR
Asymmetric Mixing Tie-Bar	AP/AMTB

Note: For the list of syringes available to use in sequential mixing experiments please refer to the Consumables section of this catalogue.

## Miscellaneous Accessories

### NON-RETURN VALVE

The non-return valve accessory is used to reduce the effect of back flow from the waste side of the flow circuit. All models require a special non-return valve containing waste tube adaptor that screws directly into the stop valve.



Non-Return Valve (NRV)



Pre SX18MV-R NRV Adapter



SX20 & SX18MV-R NRV Adapter

DESCRIPTION	PART N°
Non-Return Valve	AP/SFNRV
Pre SX18MV-R Non-Return Valve Adapter	AP/SFNRV.NR
SX20 and SX18MV-R Non-Return Valve Adapter	AP/SFNRA

Note: For SX20 and SX18MV-R models, the standard waterbath adapter will NOT accommodate a non-return valve and will have to be replaced with the purpose-designed adapter shown on the right.



Purging Manifold & 3-Way Valves

## Anaerobic Operation

### PURGING MANIFOLD

The anaerobic accessory equips all SX series with a high performance bench-top anaerobic capability. Anaerobic conditions are maintained using the purging manifold that forms the main part of the accessory. This unit mounts over the lower section of the drive syringes and is purged with a steady stream of nitrogen to maintain an oxygen-free environment in the region between the syringe-pistons and the syringe-barrels. This prevents oxygen diffusion across the syringe-tips and contamination of the sample.



Anaerobic Accessory fitted to SHU

### THREE-WAY VALVES

Three-way valves are also provided to enable anaerobic samples to be introduced to the sample handling unit without coming into contact with the outside environment (air). A full protocol for anaerobic sample introduction is provided.

DESCRIPTION	PART N°
Anaerobic Purging Manifold (Including 10 Three-Way Valves)	AP/AN
Anaerobic Three-Way Valves Pack of 10	AP/AN3V

## Glove Box Installation

For the most challenging anaerobic measurements some users prefer to mount the instrument sample handling unit inside a nitrogen environment glove box. Applied Photophysics provides tailor-made interface solutions for glove box installations which typically involve a longer cable set and fibre-optic light guide.

Note: Please contact our Customer Support Department for more details.



# Electronics and Cables

The contemporary electronics rack contains a number of plug-in modules that provide the communication, control and data acquisition elements of the stopped-flow instrument. This fully modular design also allows for rapid diagnostics and repairs often without losing the basic system functionality.



## ELECTRONICS SUPPLY MODULES

Provides steady +12V and +5V supply to the electronics.

## USB MODULE

Provides a communication between the electronics and the software.

## CONTROL MODULE 1

Controls the motorised functions of the instrument such as the monochromators.

## KSHU MODULE

Controls stopped-flow related functions of the instrument such as the SHU Autostop mechanism and drive rams. Provides the software with temperature data and trigger events.

## PMT MODULE

Exists in single and dual channel versions and controls the Absorbance and Fluorescence PMT detectors.

## PDA MODULE

Controls the Photodiode Array detector.



Monochromator Cable



KSHU Cable



PMT Detector Cable



PDA Detector Cable

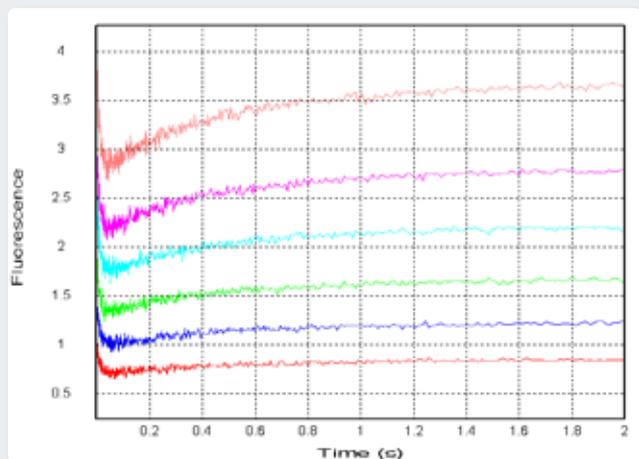
MODULES	PART N°	CORRESPONDING CABLES	PART N°
Electronics +12V Supply Module	AP/EMSM12	n/a	n/a
Electronics +5V Supply Module	AP/EMSM5	n/a	n/a
USB Module	AP/EMUSB	non-specific USB printer cable	n/a
Control Module 1M1	AP/EMSXCM1M1	Monochromator Cable	AP/CBMN
KSHU Module	AP/EMKSHU	KSHU Cable	AP/CBKSHU
PMT Module (1 Channel)	AP/EMPMTSC	PMT Cable	AP/CBPMT
PMT Module (2 Channels)	AP/EMPMTDC	PMT Cable	AP/CBPMT
PDA Module	AP/EMPDA	PDA Cable	AP/CBPDA

# Scanning Emission Monochromator

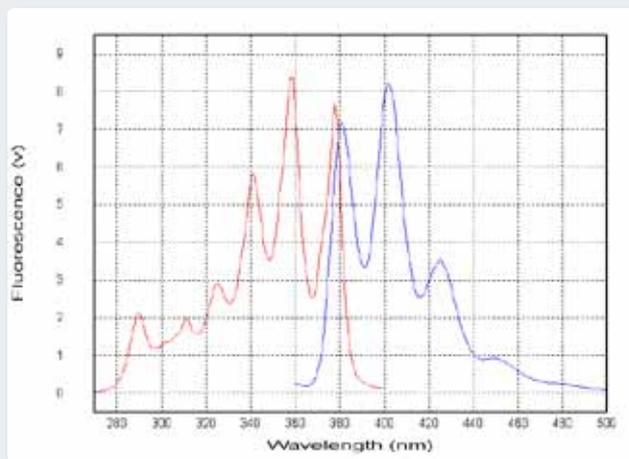
This accessory comprises a second programmable monochromator and a light guide to connect the cell-block to the second mono as pictured below. In this configuration, the detected emission wavelength can be selected by setting the second monochromator directly from the Pro-Data control software. This also enables automated acquisition of time-resolved emission and steady-state emission spectra.



Typical component layout for the Scanning Emission Monochromator accessory



Lysozyme refolding kinetic traces for 340nm to 400nm collected at 10nm intervals. Logarithmic timebase



Excitation and emission spectra of Anthracene

## DESCRIPTION

Scanning Emission Monochromator  
 Scanning Emission Monochromator for Systems with LED Light Sources  
 SX Series Control Module 1 M1  
 Optical Rail Second Tier 530mm (includes rail spacers)  
 Optical Rail Second Tier 650mm (includes rail spacers)  
 Optical Rail 530mm  
 Optical Rail 650mm  
 Optical Rail End Block  
 Optical Rail Spacer

## PART N°

AP/SXSM  
 AP/SXSMLLED  
 AP/EMSXCM1M1  
 AP/OR2T530  
 AP/OR2T650  
 AP/OR530  
 AP/OR650  
 AP/OREB  
 AP/ORSP

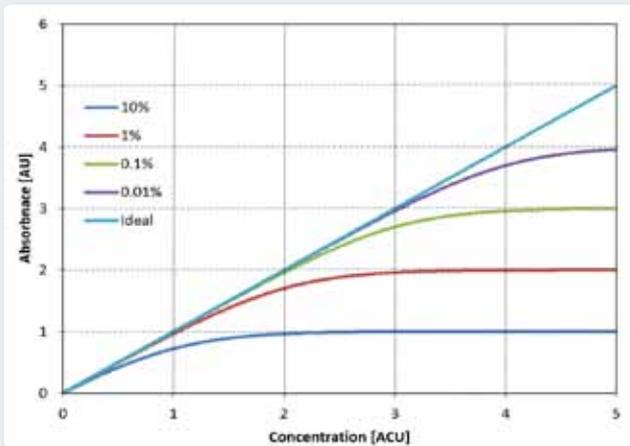
# Scanning Monochromator for Far UV Measurements

This option consists of a second programmable monochromator and a coupling unit such that the two monochromators can be connected in series as shown in the figure. The double-monochromator configuration removes stray light error when recording absorbance kinetics in the far-UV wavelength region (<250nm) thus improving photometric accuracy.

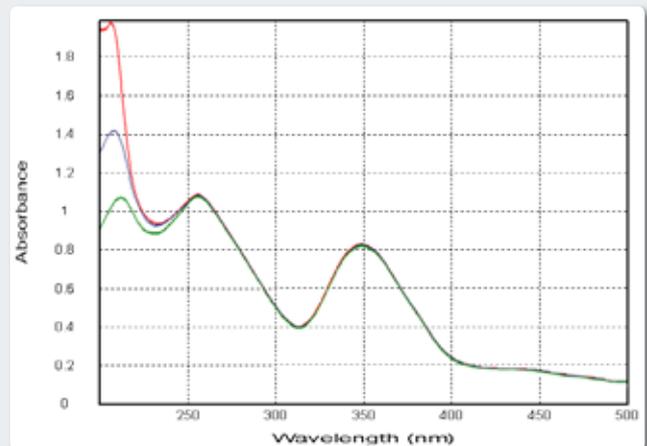
Note: The second monochromator is identical to that used with option SM (see opposite) and so purchasing either of these options can, with the addition of only minor components, provide the functionality of the other.



Typical component layout for the far-UV Absorbance Operation accessory.



Deviation from linear Beer-Lambert relationship between absorbance and concentration of analyte with increasing amount of stray light



Potassium Dichromate spectrum obtained using standard instrument configuration (green), ozone producing Xe lamp (blue) and far-UV Absorbance Operation accessory (red)

DESCRIPTION	PART N°
Scanning Monochromator for Far UV Measurements	AP/SXAM
Monochromator Coupler	AP/SXMNC
SX Series Control Module 1 M1	AP/EMSXCM1M1
Optical Rail 880mm	AP/OR880
Optical Rail 1000mm	AP/OR1000



Sequential mixing SHU

## Sequential Mixing

The sequential (or double) mixing accessory is specifically designed to study the reactivity of intermediate and transient species.

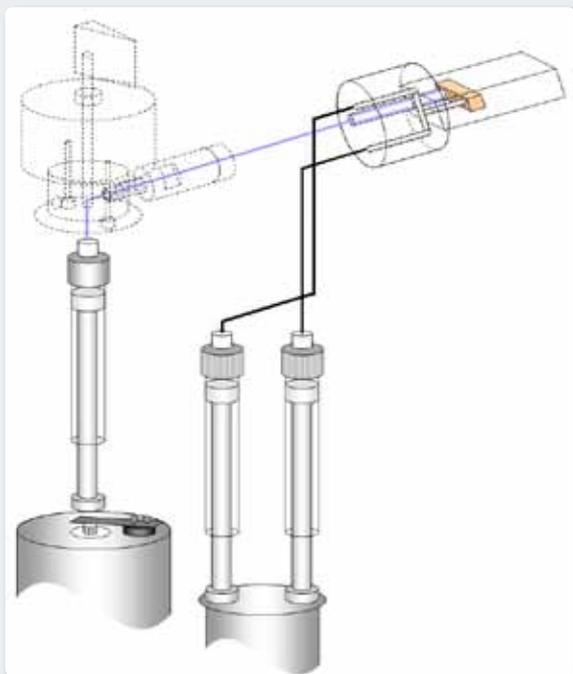
Asymmetric, double mixing experiments are also fully supported.

This accessory equips the sample handling unit with two drive rams (and 4 syringes). The first drive mixes two reagents (A and B) into an aging loop and, after a user defined aging period, a second drive mixes the aged solution with a third reagent (C) in the stopped-flow cell.

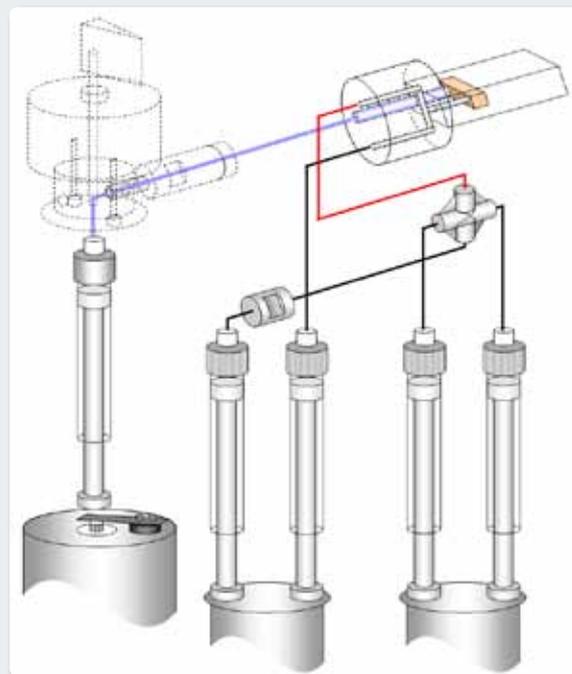
Note: Single mixing SHUs may be upgraded for sequential mixing functionality during a visit from an Applied Photophysics engineer or on return of the SHU to the factory.

The major features of the sequential functionality are:

- ▶ Compatibility with all signal detection modes
- ▶ Built-in drive ram transducers providing full information with each experiment including: drive profiles, calculated age time, drive volume per syringe, and a measurement of the dead-time
- ▶ Aging times are reproducible to within 1ms
- ▶ No hardware reconfiguration is required when switching between short and long aging times
- ▶ The required aging time is set up in the software in the range 15ms to 1000s



Flow circuit of a single mixing sample handling unit



Flow circuit of a sequential mixing sample handling unit configured for sequential mixing experiments

### DESCRIPTION

Sequential Mixing Accessory

### PART N°

AP/SXSQ

## LED Light Source

The new LED light source offers a stable and high intensity light source alternative to the standard Xenon arc lamp and monochromator. The accessory features a single universal power supply and a customer-defined range of narrow bandwidth LEDs in the UV-Vis spectral range.

The LEDs are especially suitable for fluorescence experiments demanding greater sensitivity but may also be used in absorbance measurements. The LEDs are simple to fit, require no alignment and have an extended lifetime in excess of 5000h.



LED Light Source

The list of available LEDs is as follows ( $\lambda$ , nm (bandwidth, nm)):

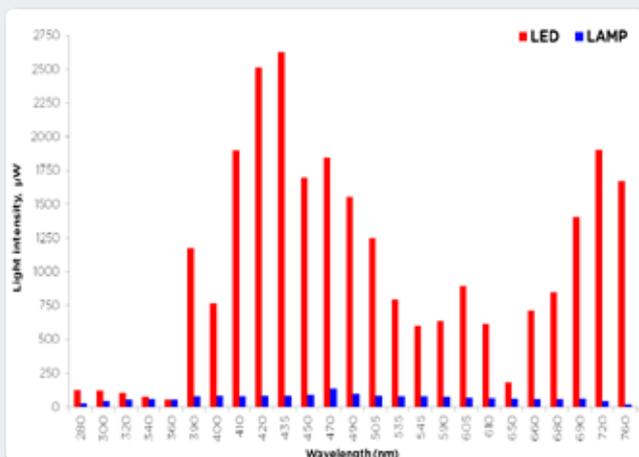
280 (11), 300 (10), 320 (10), 340 (10), 360 (21), 390 (13), 400 (16), 415 (16), 420 (16), 435 (19), 450 (20), 470 (20), 490 (28), 505 (28), 535 (34), 572 (21), 590 (15), 610 (15), 625 (17), 650 (20), 660 (20), 665 (20) 680 (20).

In order to trim the LED bandwidths the following shortpass filter assemblies are available from stock ( $\lambda$ , nm):

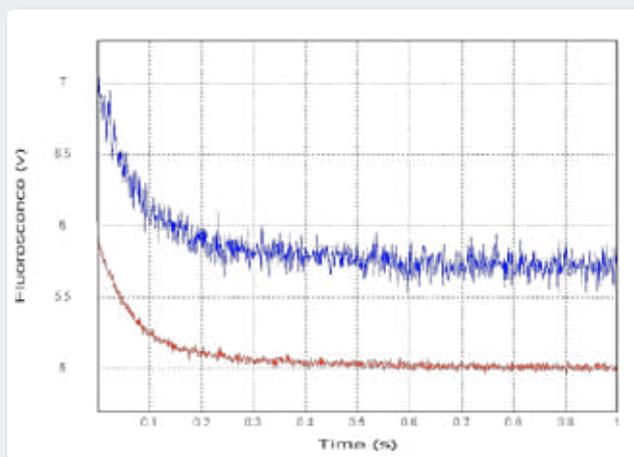
400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750.



LED Light Source fitted to the instrument



Overlaid intensity measurements of each LED compared to an equivalent wavelength and bandwidth output from the standard xenon light source



Overlaid fluorescence kinetic traces for the reaction of N-bromosuccinimide quenching of tryptophanamide. 280nm LED (red) compares favourably with the standard xenon light source (blue) obtained with 1mm monochromator slit setting

DESCRIPTION	PART N°
LED Light Source Starter Kit	AP/LEDSK
LED Light Source Fluorescence Kit	AP/LEDFK
LED (Xnm)	AP/LED(Xnm)
Optical Density Filters for LEDs (OD 0.0, OD1.0 and OD2.0)	AP/LEDOD(X)
Shortpass Filter Assembly for LEDs (Xnm)	AP/LEDSF(Xnm)



Dual channel acquisition module & detector cable

## Dual Channel Detection

The accessory comprises an additional detection channel and detector cable to enable measurement of simultaneous absorbance and fluorescence signals using a single stopped-flow drive.

Note: Dual Channel Detection is a requirement for the Dual Fluorescence and Fluorescence Polarisation accessories.

DESCRIPTION	PART N°
Dual Channel Detection Accessory	AP/SXDD



Additional Fluorescence PMT

## Dual Fluorescence Detection

The accessory comprises an additional fluorescence detector to enable simultaneous fluorescence detection at two emission wavelengths. Both detectors are mounted directly onto the cell block (right). Alternatively, one of the fluorescence detectors can be mounted on a second (emission) monochromator allowing for the emission wavelength to be selected directly from the Pro-Data control software.

The major features of the Dual Channel Fluorescence Detection accessory are:

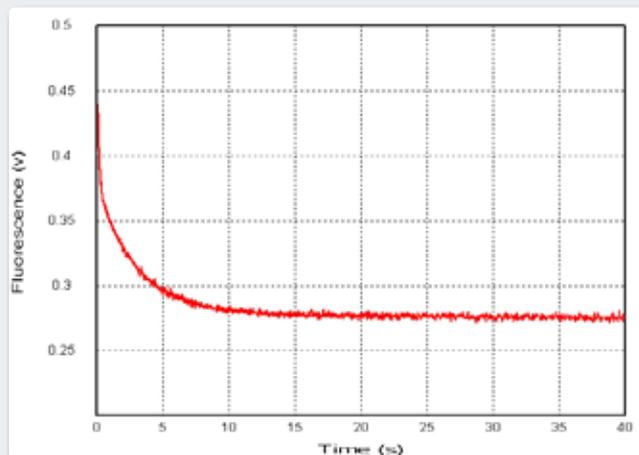
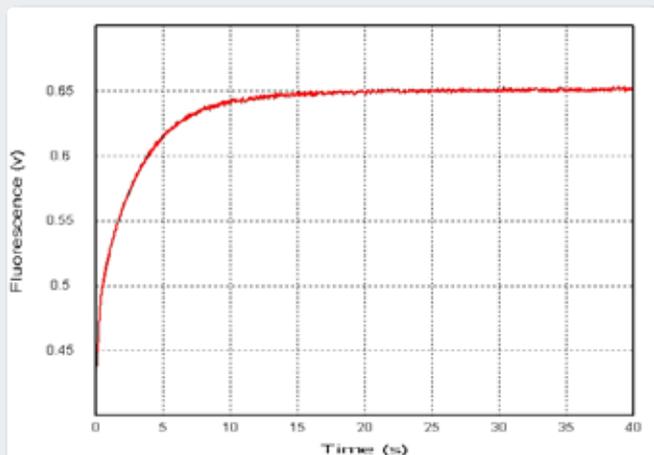
- ▶ Simple mounting to the SHU cell block/emission mono
- ▶ No need for hardware reconfiguration while switching back to single channel mode
- ▶ A variety of available cut-off and interference filters are available
- ▶ Possibility to use the option in tandem with the scanning monochromator for emission spectra recording



Accessory fitted to the instrument

Note: The Dual Channel Fluorescence Detection accessory requires pre-installation of the Dual Channel Detection accessory listed above.

DESCRIPTION	PART N°
Dual Channel Fluorescence Detection Accessory	AP/SXDF



The kinetic traces collected simultaneously at two different wavelengths using Dual Channel Fluorescence Detection

# Fluorescence Polarisation / Anisotropy

The fluorescence polarisation/anisotropy accessory is an easy to fit, dual channel, T-format fluorescence polarimeter with a movable calcite input polariser. G-factor determination is controlled from the software and both kinetics and spectra may be acquired in polarisation, anisotropy, total emission and voltage modes, and with full post-acquisition conversion between data modes as required.

The major features of the accessory are:

- ▶ T-format dual channel detector
- ▶ Calcite excitation polariser
- ▶ DPUV sheet collection polarisers
- ▶ Filter holders built into collection pieces allowing reduction of scattered light
- ▶ Filter holder built into excitation assembly, for additional flexibility with respect to wavelength selection and rejection
- ▶ Straightforward instrument set-up with no optimisation required
- ▶ Robust construction ensures consistent polariser alignment
- ▶ Compatibility with standard Xe and LED light sources

Note: The Fluorescence Polarisation/Anisotropy accessory requires pre-installation of the Dual Channel Fluorescence Detection accessory listed opposite. LED version of the Fluorescence Polarisation/Anisotropy accessory is also available.



Fluorescence Polarisation/Anisotropy accessory



Accessory fitted to the Instrument

## DESCRIPTION

Fluorescence Polarisation/Anisotropy Accessory (Xe Light Source)

## PART N°

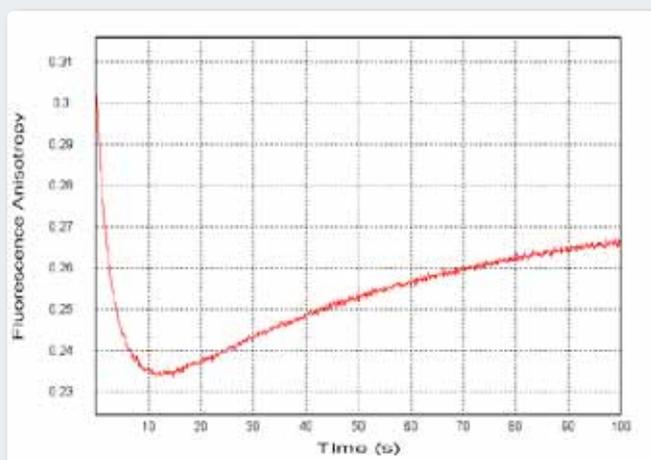
AP/SXFP

Fluorescence Polarisation/Anisotropy Accessory (LED Light Source)

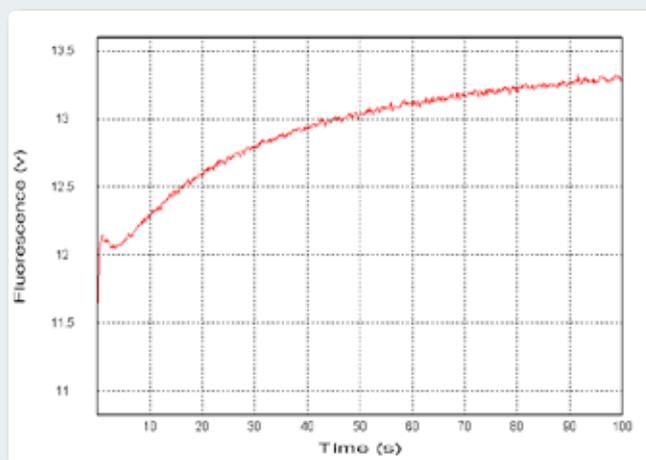
AP/SXFPLED

Fluorescence Polarisation/Anisotropy Accessory LED Adaptor

AP/SXFPAD



Kinetic trace for Phloxine B binding to bovine serum albumin obtained by using the Fluorescence Polarisation/ Anisotropy accessory



Total Fluorescence trace for Phloxine B binding to bovine serum albumin obtained by using the Fluorescence Polarisation/Anisotropy accessory



Photodiode Array Detector



Accessory fitted to the instrument

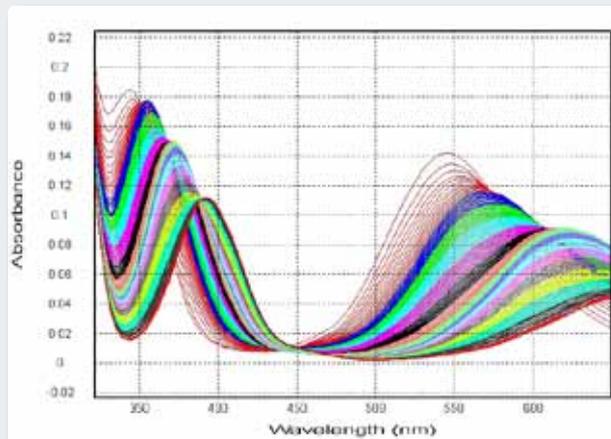
## Photodiode Array Detector

The photodiode array accessory enables sets of time-resolved absorbance spectra to be acquired from a single stopped-flow drive. The accessory is a self-contained spectrograph which can be configured in a few seconds without the need to realign or recalibrate the instrument. The latest model PDA accessory is directly mounted to the SHU cell block for improved sensitivity.

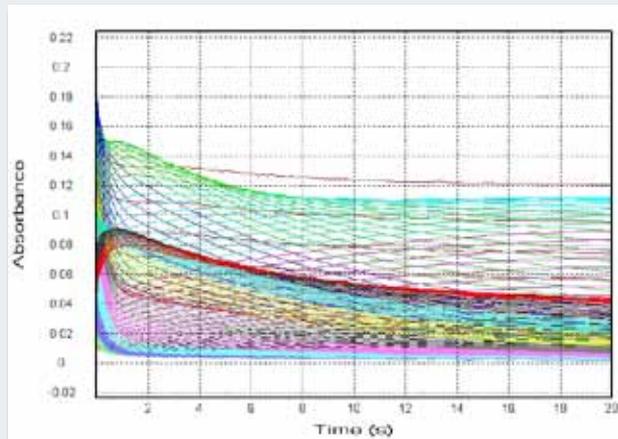
The major features of the photodiode array accessory are:

- ▶ 256 array that acquires up to 16000 spectra per drive
- ▶ The minimum 0.65ms integration time may be increased to improve sensitivity
- ▶ Two wavelength ranges are available: PDA-UV (190-725nm\*) and PDA-Vis (330-1100nm)
- ▶ User selectable digital oversampling and software-based gain control
- ▶ Sequential-mixing mode is supported
- ▶ Simple global analysis of data is available with the Pro-KIV software

Note: (\*) The UV detection range of the PDA-UV accessory with standard Xe lamp is limited to 285nm and be extended to 200nm by using the UV Boosted Deuterium Light Source accessory.



Time-resolved spectra for the acid hydrolysis of the complex cation [Ni(en)3]2+ acquired from a single stopped-flow drive with the photodiode array accessory



Kinetic traces for the acid hydrolysis of the complex cation [Ni(en)3]2+ acquired from a single stopped-flow drive with the photodiode array accessory

DESCRIPTION	PART N°
Photodiode Array Detector Accessory (UV)	AP/PDADMUV
Photodiode Array Detector Accessory (Visible)	AP/PDADMVIS
High Sensitivity Photodiode Array Detector Upgrade (including PCB replacement)	AP/PDADMUG.1
High Sensitivity Photodiode Array Detector Upgrade (without PCB replacement)	AP/PDADMUG.2
PDA Direct Mount Deuterium Light Source Brackets	AP/PDADM2

## High Sensitivity PDA Upgrade

Applied Photophysics has recently introduced a new photodiode array detector delivering higher sensitivity than older models.

The new PDA features a detector that is mounted directly to the cell block of the sample handling unit rather than via a fibre-optic light guide common to older instruments. This improved-efficiency coupling provides a significant improvement of light throughput which results in lower noise than on older fibre-optic coupled models and increased sensitivity.

Users of older models of PDA may benefit from these developments in the form of an affordable upgrade that transplants the existing PDA spectrometer into the new detector housing.

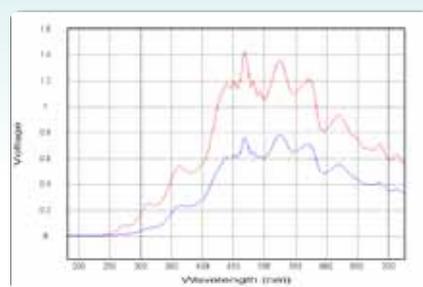
The key benefits of the upgrade are:

- ▶ Higher sensitivity from direct coupling
- ▶ Lower noise from lower gain settings
- ▶ Improved performance at shorter wavelengths
- ▶ Compatibility with xenon, deuterium and LED light sources
- ▶ Simple to install
- ▶ Low cost upgrade option for older PDA models
- ▶ New 16000 spectra per drive with latest software

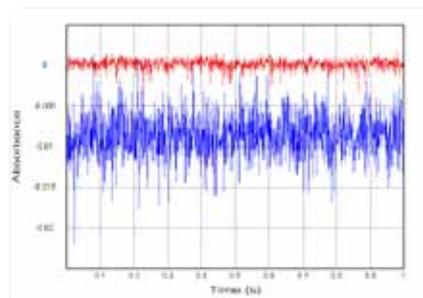
Note: An additional modification of the sample handling unit may be required for pre-2001 SX instruments (SX17 and SX18 models).

### UPGRADE PROCEDURE

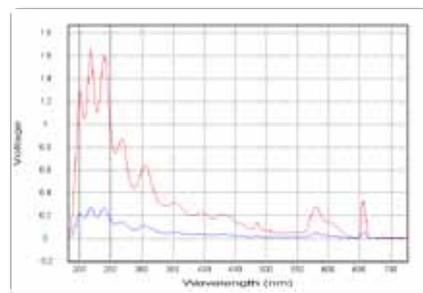
The PDA upgrade is best carried out at the same time as a PM service by an Applied Photophysics engineer. The upgrade involves transplanting the Zeiss photodiode array unit from the old detector housing to the new direct mounted PDA housing. The new housing is fitted with the latest PDA detector electronics (which can be reused from older PDAs supplied from 2008 onwards). The upgraded PDA is compatible with the existing Electronics Unit PDA module.



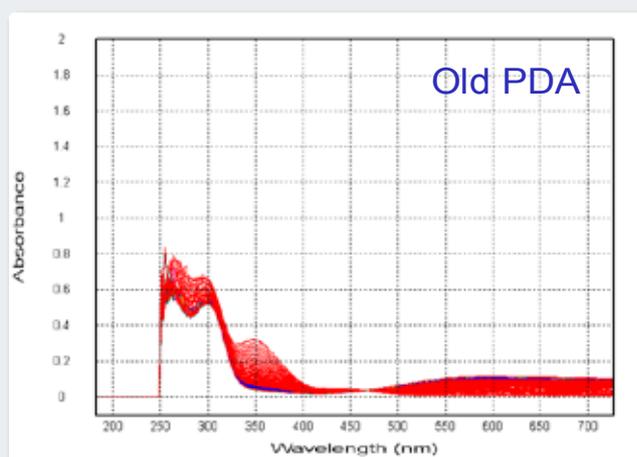
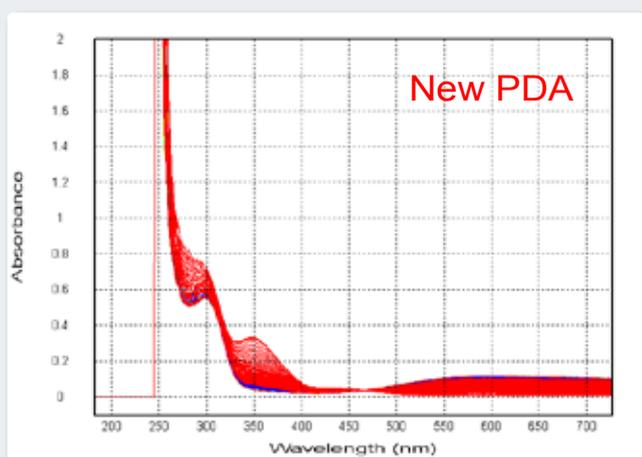
New (Red) and old (Blue) PDA signal traces in the visible range acquired under identical experimental conditions



New (Red) and old (Blue) PDA kinetic traces acquired at 350nm under identical experimental conditions



New (Red) and old (Blue) PDA signal traces in the UV range acquired under identical experimental conditions



Time-resolved spectra for formation of peroxychromic acid by the reaction of hydrogen peroxide with potassium dichromate acquired from new (left) and old (right) PDA units under identical experimental conditions showing improved signal accuracy at the UV end by countering stray light problems.



UV Boosted Deuterium Light Source

## UV Boosted Deuterium Light Source

Designed to compliment the UV photodiode array detector accessory, the boosted deuterium light source allows collection of time-dependent spectra in the far-UV wavelength region. The accessory allows operation between the range 200-400nm compared with 285-725nm when using the standard xenon light source. The accessory comprises a deuterium lamp housing, which is mounted directly on to the cell block, and a standalone deuterium lamp power supply.

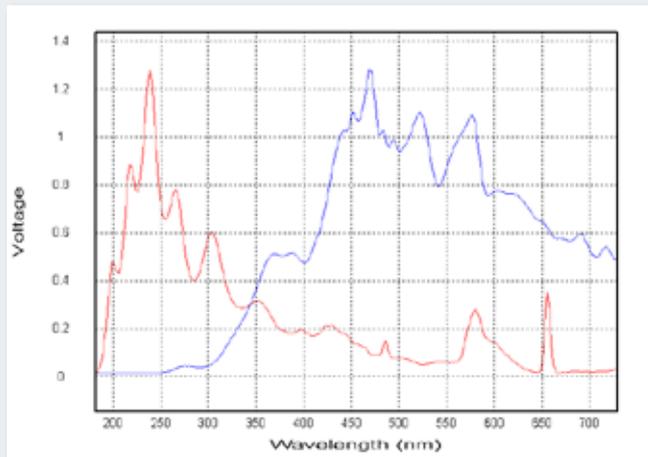


Accessory fitted to the Instrument

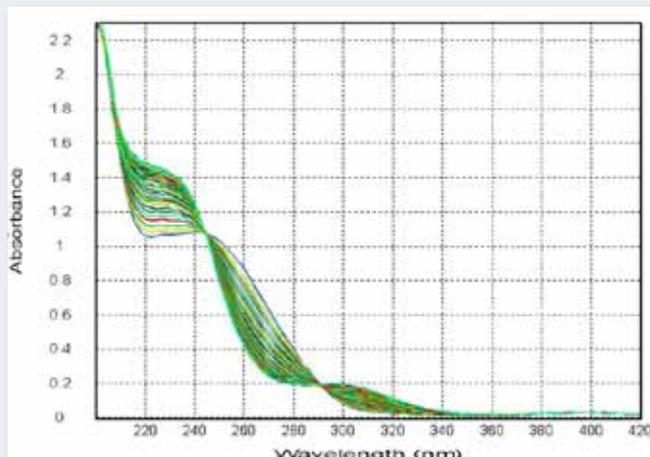
The major features of the UV Boosted Deuterium Light Source accessory are:

- ▶ Simple mounting to the SHU cell block
- ▶ Simple and rapid reconfiguration between xenon and deuterium light sources
- ▶ Pre-aligned lamps
- ▶ Ozone-free operation

DESCRIPTION	PART N°
UV Boosted Deuterium Light Source Accessory	AP/SXUV
Replacement Deuterium Light Bulb (Hamamatsu only)	AP/LPDE
PDA Direct Mount Deuterium Light Source Brackets	AP/PDADMD2



Standard Xenon (blue) and Deuterium (red) lamp spectra (following optimisation of PDA gain)



Time-resolved spectra for transformation of Dimethyl Isothiuronium monitored in the range 200–420nm with deuterium light source accessory

# Conductivity Meter Accessory

The Conductivity Meter accessory enables the measurement of conductivity using the stopped-flow technique.

The accessory is comprised of several components. The conductivity cell is mounted in the standard interchangeable cell cartridge and contains a mixer directly upstream of a conductivity electrode.

The e-corder is a data acquisition unit that processes the signal from the isoPod into a signal that can be interpreted by the Chart software on the PC.

The conductivity isoPod is the compact signal conditioner used for continuous monitoring of solution conductivity and connected to both the e-corder and the conductivity cell.

The key benefits of the accessory are:

- ▶ Simple and rapid reconfiguration since the cell is fitted into interchangeable cell cartridge (all SX18MV-R and SX20 instruments)
- ▶ Fast sampling rate (ms)
- ▶ High sensitivity
- ▶ Wide signal range (0-2mS/m)



Conductivity cell mounted into standard SX20 cell cartridge



e-Corder and isoPod units

DESCRIPTION	PART N°
Conductivity Meter Accessory	AP/SXCM



Kinetics of hydrolysis of ethyl acetate (0.01M NaOH; 0.1M EtOAc) shown in the "Chart" software window



SX Pro-Data Electronics Unit



Monochromator Control Electronics Removed



PMT Electronics Upgraded



KSHU Control Electronics Removed

## SX Pro-Data Electronics and Windows Software Upgrade

The Pro-Data upgrade provides a convenient method of modernising the operation and functionality of older Applied Photophysics stopped-flow systems. The Pro-Data offers comprehensive electronics upgrade and all-new instrument control, data acquisition and data handling software running under Windows 7/8.

### THE UPGRADE INCLUDES:

- ▶ Electronics Unit and all associated interface hardware needed for the upgrade
- ▶ USB PC interface
- ▶ Pro-Data software suite compatible with Windows 7/8
- ▶ Pro-K global data analysis software
- ▶ Full service of the sample handling unit including all flow circuit consumables
- ▶ Comprehensive 12-month warranty on the upgrade

Although most users tend to prefer supplying a PC and monitor for local Windows and keyboard familiarity, Applied Photophysics can also supply a Pro-Data ready PC.

A two-day visit by an Applied Photophysics engineer is necessary for completing the upgrade. During the time on site the engineer will provide comprehensive training for all users.

### PRO-DATA ELECTRONICS FEATURES

A compact Electronics Unit replaces all of the existing control electronics and mains power in the monochromator(s), sample handling unit and detectors providing the following benefits:

- ▶ Much improved speed and responsiveness of electronics provide better instrument control
- ▶ Latest surface mount technology and digital signal processing result in enhanced reliability and performance
- ▶ New 16-bit A/D conversion on all channels with automatic gain control allows data collection at optimum resolution without signals being lost outside of the detection range
- ▶ Dual-channel synchronous data acquisition as standard allows fluorescence polarisation, FRET and simultaneous absorbance/fluorescence measurements to be collected
- ▶ Modular, rack-mounted electronics permit simple servicing and upgrading by users
- ▶ Simpler, neater cabling and just one power switch

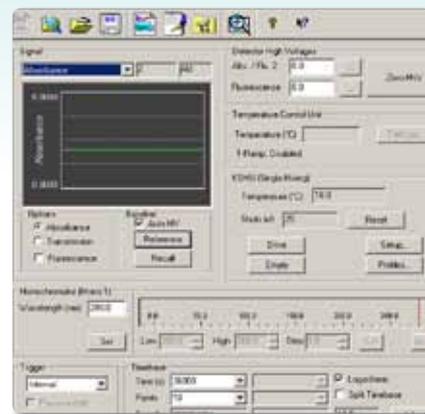
PRO-DATA SOFTWARE FEATURES

The Pro-Data instrument control and data acquisition software is modern and extremely simple to use. Some of the key benefits offered by the software include:

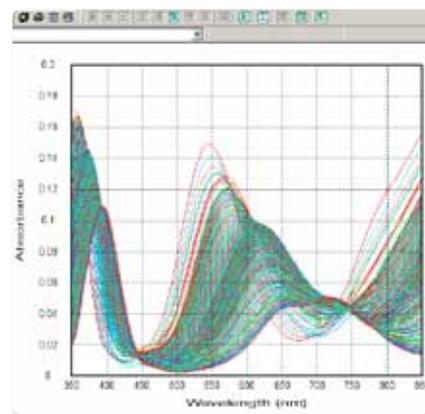
- ▶ Drag-and-drop experiment template set-up
- ▶ More flexible data acquisition modes
- ▶ Faster PDA scanning: up to 1000 spectra per second
- ▶ Logarithmic data acquisition over a wide range of timescales
- ▶ Extensive self-test and diagnostic utilities
- ▶ Pro-Data viewer for data visualisation and analysis can be installed on multiple PCs
- ▶ Robust software architecture in common with other APL software products
- ▶ Direct exchange of SX data with Pro-KIV and other 3rd party software applications
- ▶ Full compatibility with old RISC-OS files

Note: Full Pro-Data upgrade brochures are available on request.

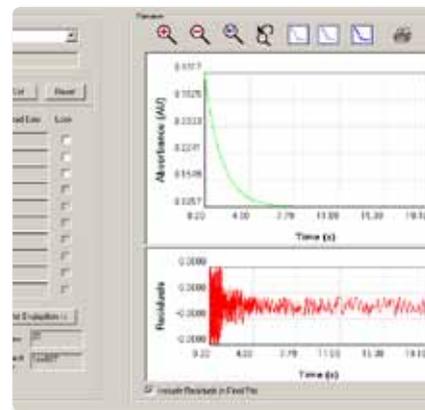
DESCRIPTION	PART N°
SX Pro-Data Upgrade Basic Configuration	AP/SXPDUG
SX Pro-Data Upgrade Second Monochromator	AP/SXPDUG2M
SX Pro-Data Upgrade Second Fluorescence Detector	AP/SXPDUG2F
SX Pro-Data Upgrade Photodiode Detector	AP/SXPDUGPDA



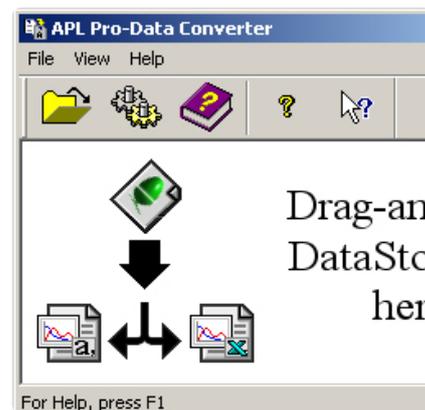
Main SX Pro-Data Control Software



SX Pro-Data Viewer Software



Pro-Data Viewer Fitting Dialogue



Pro-Data Converter



USB Interface Module and Cable

## SX Pro-Data USB Communications Upgrade

The current Applied Photophysics range of instruments are equipped with a USB communications interface, which allows for straightforward connectivity with modern PCs. Some older Windows-based instruments were fitted with a fibre-optic communications interface, which is not compatible with Windows 7/8. The Pro-Data USB communications upgrade addresses this, providing full compatibility with the latest PC hardware running Windows 7/8.

There are a number of advantages to the upgrade:

- ▶ Full 32-bit and 64-bit Windows™ 7/8 compatibility
- ▶ Improved system performance on multi-core PCs
- ▶ Simpler USB interface for greater flexibility
- ▶ Extensive range of compatible PCs
- ▶ Possibility of running the instrument from portable and laptop PCs
- ▶ Compatibility with latest software developments

DESCRIPTION	PART N°
SX Pro-Data USB Communications Upgrade	AP/SXUSBUG

# Pro-KIV Kinetic Global Analysis and Data Simulation Software

Pro-Kinetic IV (Pro-KIV) is the latest version of our user friendly analysis package that enables global fitting to multi-wavelength kinetic data sets such as data recorded on a photodiode array detector. Pro-KIV simultaneously (globally) fits each kinetic trace in the data set to the proposed reaction model. This provides more robust reaction rate determination and allows the study of more complex reaction mechanisms.

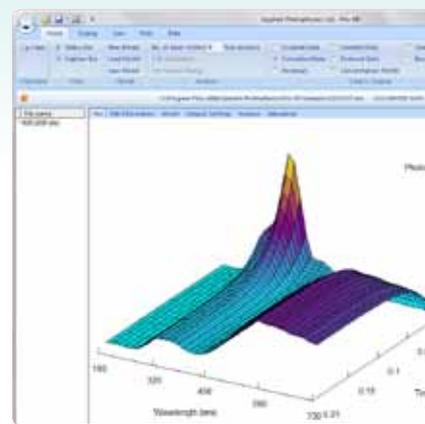
The major features of the Pro-KIV software are:

- ▶ Fits multi-wavelength or single wavelength kinetic data
- ▶ Includes singular value decomposition (SVD) for spectral component prediction and removal of random noise if required
- ▶ Easy-to-use reaction model editor
- ▶ Robust fitting with no limit to the complexity of the reaction model
- ▶ Calculates best-fit spectra and concentration vs. time profiles of all reaction components
- ▶ A wealth of tools for rapid assessment of the fitted data in kinetic, spectral, 2D and 3D formats
- ▶ Powerful data simulation tools for exploring kinetics and testing data analysis methodology

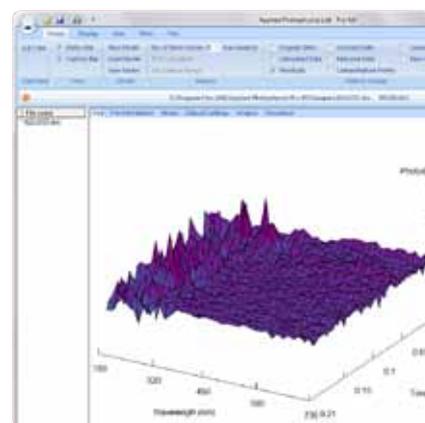
Pro-KIV includes a wealth of tools for viewing data and rapidly assessing the quality of fitted data. 3-D and 2-D representations of spectra-kinetics datasets are available following their transfer to Pro-KIV.

Pro-KIV also enables Singular Value Decomposition (SVD) of the dataset. This single-mouse click operation provides a model-free assessment of the number of spectrally distinct reaction components present in the reaction and, by isolating those components that contribute only random noise to the data, enables the user to remove noise elements and improve data quality.

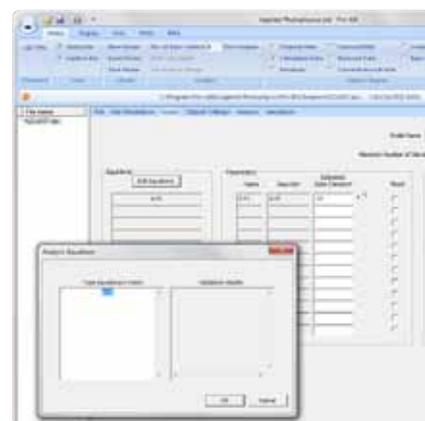
Pro-KIV is available for use with all Applied Photophysics Kinetic instrumentation and includes three software licenses.



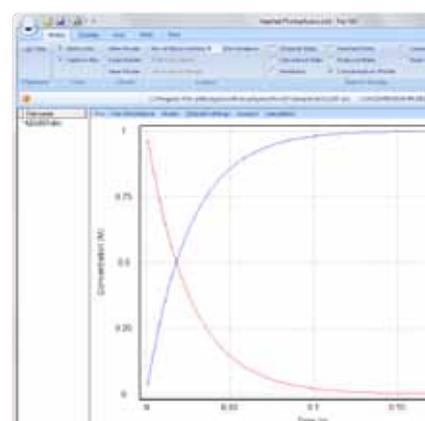
3D plot of multi-wavelength kinetic data



3D plot of residuals



Reaction model editor



Calculated concentration profiles

DESCRIPTION	PART N°
Pro-KIV Global Analysis and data Simulation Software	AP/SWPROK4
Additional Licence	AP/SWPROK4A



Chirascan CD Spectrometer

### CHIRASCAN CIRCULAR DICHROISM SPECTROMETER

Chirascan and Chirascan-plus qCD are the world's most advanced circular dichroism (CD) spectrometers. They are widely used in the study of the higher structures of bio-macromolecules, such as proteins and DNA, and how these structures change on interaction with other molecular entities. Their many innovative features provide the scientist with easy-to-use, productive tools that deliver circular dichroism spectra of a quality and on a timescale that has until recently been impossible.



CD Stopped-flow accessory

### CHIRASCAN - A VERSATILE RESEARCH PLATFORM

The following range of accessories is available, ensuring the researcher can be confident of a highly effective and future-proof spectrometer that can be adapted as research interests evolve:

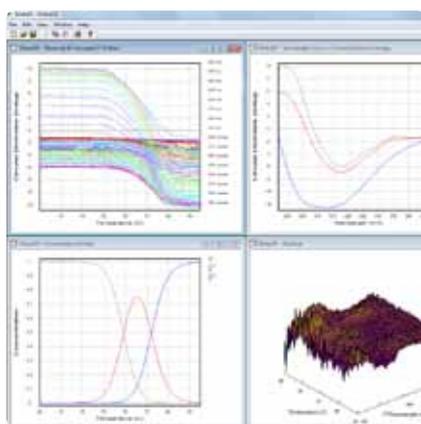
- ▶ CCD Fluorescence Detector or Scanning Emission Monochromator
- ▶ Circularly Polarised Luminescence
- ▶ Fluorescence Polarisation
- ▶ High Shear Couette Cell for Linear Dichroism Measurements
- ▶ CD Stopped-flow Accessory
- ▶ Integrating Sphere
- ▶ Extended Near-IR Detection Range (1700nm)
- ▶ Optical Rotatory Dispersion
- ▶ Single or Multi-cell Peltier-controlled Cell Holders
- ▶ Low Temperature Cryostat
- ▶ Titrator
- ▶ Magnetic Circular Dichroism
- ▶ Fluorescence Detected Circular Dichroism



Chirascan-auto CD Spectrometer

### CHIRASCAN-AUTO CIRCULAR DICROISM SPECTROMETER

The Chirascan-auto qCD is a convenient and economical means of boosting the productivity and accuracy of your CD research. The Chirascan-auto combines the accuracy and ease-of-use of an automated high throughput sample handling system with the speed and sensitivity of the Chirascan-plus spectrometer to provide the world's most sophisticated CD instrument. Typical applications include the influence on protein conformation of temperature, pH, ionic strength, detergent, mutation and ligand binding.



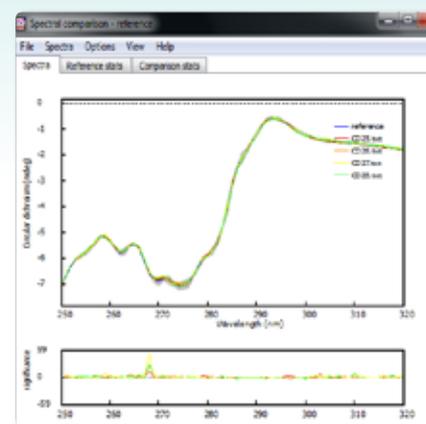
Global 3 analysis software

### GLOBAL 3 MULTI-WAVELENGTH TEMPERATURE-DEPENDENT ANALYSIS SOFTWARE

The Global 3 global analysis software is specifically tailored for fitting multi-wavelength spectroscopic data measured as a function of temperature. This software package is typically used in protein thermal melt studies and automatically calculates multiple thermal melt points ( $T_m$ ), transition van't Hoff enthalpies, concentration profiles and distinctive spectra of reaction species. The software can be seen as a powerful alternative to the DSC technique allowing for simultaneous collection of structural and thermodynamic data from a single experiment.

## qBiC

The qBiC biocomparability software provides a convenient quantitative solution to spectral comparability using a range of statistical methods. The software delivers a rapid and reliable means of determining whether a spectrum is identical to a defined reference spectrum and is designed to analyse hundreds of data files generated by the Chirscan-auto.



qBiC biocomparability software

## DichOS (DICHROISM OPTICAL STANDARD)

DichOS is a new, non-chemical, multi-point CD calibration standard that eliminates the compromises and assumptions associated with conventional, single-point, chemical calibrations. It is a radically different approach to calibration of CD spectrometers and paves the way for the measurement of absolute CD values, enabling quantitative comparison of spectra measured on different instruments or at different times and, ultimately, to traceable calibration methods.



DichOS optical standard

## RX2000 RAPID MIXING STOPPED-FLOW UNIT

The RX2000 provides the means to measure stopped-flow rapid reaction kinetics using any UV-visible spectrometer, fluorometer or CD spectropolarimeter. This high performance, cost effective unit enables reactions to be studied that are at least a thousand fold faster than those accessible manually.

The accessory can also be paired with a pneumatic drive for an increased productivity and greater accuracy of the results.



RX2000 stopped-flow mixing unit

## LKS80 NANOSECOND LASER PHOTOLYSIS SPECTROMETER

Applied Photophysics has been supplying laser flash-photolysis instruments since 1973. The experience gained during this period has resulted in the LKS80 spectrometer which offers both ease of use and flexibility, including special configurations such as combined stopped-flow and/or flow-flash systems. The LKS80 is used to study the reactions of very short-lived species, such as free radicals or excited state species.



LKS80 signal shown on the screen of Agilent Infinium digitiser

**Headquarters:**

**Applied Photophysics Ltd,**

21 Mole Business Park, Leatherhead, Surrey, KT22 7BA, UK

**USA Office:**

**Applied Photophysics Inc,**

100 Cummings Center, Suite 440-C, Beverly, MA 01915, USA

Tel (UK): +44 1372 386 537

Tel (USA): +1 978 473 7477

Fax: +44 1372 386 477

Applied Photophysics was established in 1971 by  
The Royal Institution of Great Britain

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