xylem
Lab Solutions



Polarimeter Sample Tubes

GLASS, METAL AND SPECIALIST SAMPLE TUBES FOR YOUR POLARIMETER

Bellingham + Stanley

a xylem brand

Precision Measurement

Optical rotation for all kinds of applications

When plane-polarised light passes through an optically active substance or chiral compound, the plane of polarisation will rotate by an amount that is specifically related to the product through which it travelled.

As many chemical compounds display this chiral characteristic, the measurement of optical rotation using a polarimeter is commonplace within industries as a production control and quality assurance tool. Industries include:

- Sugar
- Food
- Chemical
- Pharmaceutical

Optical rotation is relative to the concentration of the sample and the length over which the measurement is taken and so it is common to quote a chemical's specific rotation based on all the affecting factors, including temperature and wavelength. Concentration and purity may also be calculated based on the measurements of optical rotation.



100 Years of Excellence

Who are Bellingham + Stanley?

In 1915, Leonard Bellingham and Frank Stanley were making their mark as pioneers in the development of high quality optical instruments. Over one hundred years later the company they founded is recognised as one of the world's leading manufacturers of refractometers and polarimeters.

At key stages in its history, Bellingham + Stanley® achieved notable advances in the fields of refractometry and polarimetry, producing innovative designs and breakthroughs in technology that are used extensively around the world to this day.
This tradition of excellence and innovation continues today at the purpose-built manufacturing site in Europe.

Continuous research and development means new designs continue to emerge, whilst rigorous testing and calibration procedures ensure instruments are manufactured to the high standards set by Leonard Bellingham and Frank Stanley over 100 years ago.

Xylem

Having been family owned for almost a century,
Bellingham + Stanley is now part of Xylem – a leading provider of laboratory instrumentation. Xylem Lab Solutions' instruments are relied upon every day across more than 150 countries for analysis, measurement and monitoring.

Customer Support

Bellingham + Stanley prides itself on first class customer service before, during and after each sale. Whether dealing directly with Bellingham + Stanley's knowledgeable customer service team, or indirectly through one of many approved distributors you can be certain of a level of service worthy of its 100 years heritage.

Verification & Calibration

On-site instrument verification contracts are available. This service can help keep your instrument delivering accurate results consistently. Service contracts with general maintenance and verification of instrument performance are performed using UKAS certified samples.

Bellingham + Stanley's commitment to quality and customer service ensures that customers throughout Europe and beyond can benefit from services via an approved local distributor. All verification, validation, commissioning and calibration of instruments is carried out using traceable standards.

Other Instrumentation

Bellingham + Stanley is a manufacturer of high quality digital refractometers and polarimeters used globally in industries including food & beverage, chemical, petrochemical, and pharmaceutical.



A Range of Sample Tubes

The importance of tube length

Optical rotation (the result from a polarimeter) is a linear function of the concentration of both the test substance and the path length of the solution (i.e. the tube length).

Specific rotation is the angular rotation obtained under standard measuring conditions:

Concentration | Tube length | Temperature | Wavelength

Tube length and importantly, the accuracy of the tube length is critical to the result whether results are declared as optical or specific rotation.

To learn more about polarimeters, optical rotation, specific rotation and how tube length affects the experimental reading, please read our *Technical Bulletin P001* by scanning the QR code.

Compatible with many polarimeter makes & models

Manufactured to the highest quality standards and compatible with ADP Polarimeters, ADS Saccharimeters and most other polarimeters from manufacturers around the world. Our glass tubes are manufactured from chemically robust SCHOTT® Borosilicate, whilst our metal tubes are manufactured from strong grade 316L Stainless Steel.

Further reading

Read more from our Technical Bulletin P001.pdf.

Standard Tubes

Glass tubes with plastic end caps suitable for a wide range of food, chemical and academic applications where temperature control is not required.

XPC Stainless Steel Tubes

XPC tubes are specifically designed for use with our ADP450 and ADP600 Series digital polarimeters featuring Xylem Peltier Control technology.

Low Volume Tubes

Short path length, narrow internal diameter stainless steel tubes ideal for rare, volatile or highly active samples applied by syringe or autosampler with or without XPC technology.

Specialist Tubes

Standard glass tubes featuring chemical resistant end caps and replaceable glands for use with corrosive samples including hydrochloric acid, with or without XPC technology.

Funnel Flow Tubes

Funnel flow tubes with water-jacket or XPC technology for semi-automated continuous measurement in the sugar industry.



Standard Sample Tubes

The most common polarimeter tube

Standard glass tubes feature nylon (plastic) end caps with a choice of filling style and are ideal for non-corrosive samples in food, sugar, chemical, and academic applications.

- Cost effective tubes for passive samples
- Centre fill or cup options
- Ideal for academia, food and general applications



Code	Tube Description	Length	Volume	
35-46 35-47	**Glass with centre fill** – for easy filling and placement of ADP temperature sensor	100 mm 200 mm	5 ml 10 ml	
35-57 35-58	**Glass with cup fill** funnel shaped centre fill for viscous samples	100 mm 200 mm	5 ml 10 ml	

Specification	
Tube Material	Glass (SCHOTT® Borosilicate)
End Cap Material	Nylon 66
Collar Size	30 mm (ICUMSA® Standard)
Internal Diameter	8 mm
Window Material	Silica
Transmission	300-900 nm
Coupling (tube/collar)	Epoxy Resin

Spare Parts	Code
Window (Cover Glass)	35-60
Washers	35-64
XPC Adaptor	N/A
End Cap	35-68
Seals & Install Tool	N/A

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For downloads and detailed technical information view this product online by scanning the QR code.

XPC Stainless Steel Tubes

For precision temperature control

These special XPC tubes are specifically designed for use with our ADP digital polarimeters incorporating XPC technology. XPC technology provides rapid Peltier temperature control of the sample without the need for a cumbersome and costly water bath.

Importantly, these tubes are able to accept the addition of a sample temperature probe without causing interference with the measurement light beam and so are recommended for use with ADP450 and ADP600 Series polarimeters.

- Highly precise Class A tubes
- Removable cups for easy filling
- Highly conductive for use with XPC technology



Code	Tube Description	Length	Volume
35-90 35-91	**Metal with twin fill and removable cup** for use with XPC compatible polarimeters	100 mm 200 mm	3.2 ml 6.4 ml



Specification	
Tube Material	Stainless Steel
End Cap Material	Stainless Steel
Collar Size	30 mm (ICUMSA® Standard)
Internal Diameter	6.35 mm
Window Material	Silica
Transmission	300-900 nm
Coupling (tube/collar)	Screw Thread

Spare Parts	Code
Window (Cover Glass)	37-540
Washers	37-541
XPC Adaptor	35-95, 35-96
End Cap	37-543
Seals & Install Tool	N/A

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Specialist Sample Tubes

For hazardous samples



Polarimeter tubes designed to withstand some of the most corrosive samples, such as hydrochloric acid, required to be measured or used as a solvent in a polarimeter. The tubes are available in 100 mm or 200 mm tube lengths with either straight or cup shaped centre fill sample entry. Straight centre fill tubes are supplied with a pack of rubber bungs to prevent corrosive vapours escaping the tube during transfer or measurement. Cup centre tubes have a PEEK adaptor that supports the temperature sensor when it is placed in the sample.

Premium tubes for aggressive samples

- Replaceable tube/end cap glands
- PEEK end caps for samples containing HCl

Code	Tube Description	Length	Volume	
35-12 35-13	**Glass with PEEK end and Centre fill** for use with samples containing hydrochloric acid (HCl)	100 mm 200 mm	5 ml 10 ml	
35-14 35-15	**Glass with PEEK end and Cup fill** for use with samples containing hydrochloric acid (HCl)	100 mm 200 mm	5 ml 10 ml	

Specification	
Tube Material	Glass (SCHOTT® Borosilicate)
End Cap Material	PEEK
Collar Size	30 mm (ICUMSA® Standard)
Internal Diameter	8 mm
Window Material	Silica
Transmission	300-900 nm
Coupling (tube/collar)	Rubber (Replaceable)

Spare Parts (PEEK)	Code
Window (Cover Glass)	35-60
Washers	35-64
XPC Adaptor	35-99, 35-96
End Cap	35-23
Seals & Install Tool	35-21

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Low Volume Flow Tubes

For precious samples and automation

Sample entry and exit is via UNF 28 female threads and PTFE pipe connectors, one with a Luer Swagelok® fitting for sample application using a syringe. Sample may be syringed into or pumped through the tube as part of an automated sampling system. Low volume, short path length tubes

- Various methods of sample application
- For precious, rare or volatile samples



Code	Tube Description	Length	Volume	
35-73	**Low volume metal tube** - for low volume, highly active or automated readings	10 mm	0.2 ml	
35-72	**Low volume metal tube** - for low volume, highly active or automated readings	25 mm	0.5 ml	
35-71	**Low volume metal tube** - for low volume, highly active or automated readings	50 mm	1.0 ml	

Specification	
Tube Material	Stainless Steel
End Cap Material	Stainless Steel
Collar Size	30 mm (ICUMSA® Standard)
Internal Diameter	5 mm
Window Material	Silica
Transmission	300-900 nm
Coupling (tube/collar)	M4 Screws

Spare Parts	Code
Window (Cover Glass)	35-80
Washers	35-81
XPC Adaptor	35-97
End Cap	N/A
Slotted Lid	37-016

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XPC Funnel Flow Tubes

For semi-automated analysis of sugar

XPC Funnel flow-through tubes are specifically designed for use in the sugar industry where many samples are required to be taken repeatedly and at speed. Manufactured using 316L stainless steel, this tube is designed for use with instruments featuring Peltier temperature control or with those adopting automatic temperature compensation (ATC).

- Funnel tubes for rapid sample throughput
- For sugar analysis using ATC or XPC technology



Code	Tube Description	Length	Flush
35-92	**XPC Metal funnel flow** with anti-syphon	100 mm	150 ml
35-93	**XPC Metal funnel flow** with anti-syphon	200 mm	150 ml



Specification	
Tube Material	Stainless Steel
End Cap Material	Stainless Steel
Collar Size	30 mm (ICUMSA® Standard)
Internal Diameter	6.35 mm
Window Material	Silica
Transmission	300-900 nm
Coupling (tube/collar)	Screw Thread

Spare Parts	Code
Window (Cover Glass)	37-540
Washers	37-541
XPC Adaptor	35-99, 35-96
End Cap	37-543
Slotted Lid	37-016, 017

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For downloads and detailed technical information view this product online by scanning the QR code.

Water-Jacketed Funnel Tubes

For use with a water-bath in the sugar industry

Water-jacketed funnel flow-through tubes combine our high precision sample tube with an outer jacket so that temperature can be controlled using a water-bath.

Water-jacketed funnel tubes are ideal for use in the sugar industry where a traditional approach to the rapid measurement of many samples is required, such as those in the tare house.

- Funnel tubes for rapid sample throughput
- Meets traditional sugar analysis methods
- For sugar analysis using a water-bath



Code	Tube Description	Length	Flush
36-57	**Water-bath compatible tube** with anodised aluminium outer water-jacket	100 mm	150 ml
36-58	**Water-bath compatible tube** with anodised aluminium outer water-jacket	200 mm	150 ml



Specification	
Tube Material	Stainless Steel
End Cap Material	NYLON
Collar Size	30 mm (ICUMSA® Standard)
Internal Diameter	8 mm
Window Material	Silica
Transmission	300-900 nm
Coupling (tube/collar)	Screw Thread

Spare Parts	Code
Window (Cover Glass)	35-62
Washers	35-66
XPC Adaptor	N/A
End Cap	N/A
Slotted Lids	37-011, 012

View this online

For downloads and detailed technical information view this product online by scanning the QR code.

Digital Polarimeters



A range of polarimeters to suit your needs

Bellingham + Stanley manufactures high quality digital polarimeters for use in a variety of applications. ADP600 Series polarimeters are Peltier temperature controlled polarimeters designed to meet the needs of the most demanding applications within the chemical and pharmaceutical industries. ADP600 Series polarimeters are ideal instruments for scientists wishing to research the characteristics of chiral compounds.

The ADP600 Series polarimeters vary by wavelength of measurement, including the highly sensitive ultra-violet region and all feature an integral METHODS system, high definition touchscreen and are capable of measuring to 4 decimal places.

ADP400 Series polarimeters offer measurement to 3 decimal places and come packed full of features normally reserved for high-end instrumentation and is available with or without Bellingham + Stanley's patented XPC temperature control technology.

Common software is present throughout Bellingham + Stanley's range of polarimeters and refractometers, through coloured accents to METHODS systems and key commands, making it easier to learn, adapt, and train others. Choose to make Bellingham + Stanley standard in your lab or factory and benefit from joined-up thinking across instruments including digital polarimeters and refractometers.

Quartz Control Plates



Certified Reference Materials

Bellingham + Stanley offer a choice of Quartz Control Plates (QCP) for verifying and calibrating polarimeters. QCPs are made to the highest standard and may be supplied with optional UKAS Certificates of Calibration showing traceability to PTB (the Physikalisch-Technische Bundesanstalt National Methodology Institute).

UKAS is the United Kingdom Accreditation Service (UKAS). Its purpose is to assess and accredit organisations that provide certification, testing, inspection & calibration services. UKAS is recognised globally through the ILAC Mutual Recognition Arrangement.

When used with an ADP polarimeter manufactured by Bellingham + Stanley, a thermal block may be used to provide mechanical contact to the instrument's external temperature sensor, allowing the use of quartz temperature compensation for added accuracy.

For added performance, an XPC adaptor is also available for use with Peltier temperature controlled Bellingham + Stanley polarimeters that incorporate XPC technology.

As part of Good Laboratory Practice, it is recommended that Quartz Control Plates are sent to our UKAS laboratory at regular intervals determined by the user's own Standard Operating Procedure for inspection and recertification.

View this online
For downloads and detailed technical information view this product online by scanning the QR code.

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UKAS
CALIBRATION
0834

Keeping In Line With Strict Regulations

What is "Regulation 21 CFR Part 11"?

FDA Regulation Title 21 CFR Part 11 (also known as 21 CFR 11) Electronic Records/Electronic Signatures, is the part of the Code of Federal Regulations that establishes the United States Food and Drug Administration (FDA) regulations on electronic records and electronic signatures. Specifically, 21 CFR 11 defines the requirements for submitting documentation in electronic form and the criteria for approved electronic signatures.

Who needs to comply?

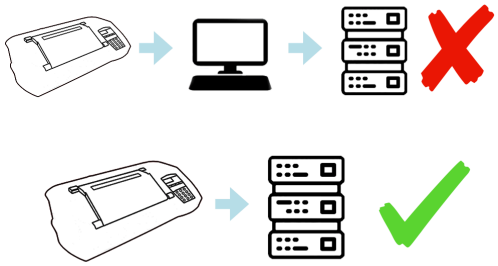
All FDA-regulated industries, which includes pharmaceutical, production of medical devices, food & beverage manufacturers and cosmetics companies, must comply with 21 CFR 11. Computer systems (including analytical instruments with onboard computers) which store or produce data to make quality control decisions, or reporting data for the FDA must comply with 21 CFR 11. This includes any laboratory results used to determine quality, safety, strength, efficacy, or purity. In manufacturing environments, this includes data used to make decisions related to product release and product quality.

Bellingham + Stanley has designed a selection of its instruments to help customers easily comply to regulations. The ADP digital polarimeters offer a wealth of benefits for users working in industries with strict procedures and processes.

Key benefits

- Compliance without an intermediate PC
- Server synchronised clock to prevent data tampering
- Multi-reading PHR Method for batch measurement
- Print to Secure PDF with custom header
- Electronic signatures including multi-verification (Submitter > Reviewer >> Approver)
- XML output strings with encryption & MD5 check for easy connection to LIMS/Server
- Configurable users enforcing unique login & signatures
- Full instrument configuration audit trail
- Full validation documentation, service & support

"By removing the need for an intermediate PC, our 21 CFR 11 compliant polarimeters can deliver great performance simply and efficiently."





Read more online

Read our blog to learn how our products can help you comply to regulation 21 CFR Part 11.

Selection Guide

Features	Standard	Specialty PEEK	XPC	Low Volume	XPC Funnel	Water-Jacket
Lengths (mm)	100/200	100/200	100/200	10/25/50	100/200	100/200
Bore (mm)	8	8	6.35	5	6.35	8
Tube Material	Glass	Glass	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
End Cap Material	Nylon 66	PEEK	Stainless Steel	Stainless Steel	Stainless Steel	Nylon 66
Window Size	15	15	10	20	10	22
UV/Vis/NIR Transmission	●	●	●	●	○	○
Manual Sample Input	●	●	●	●	–	–
Automated Sample Input	–	–	–	●	–	–
Semi-automated Sample Input	–	–	–	●	●	●
Rare Samples	–	–	–	●	–	–
High Rotation Samples	–	–	–	●	–	–
Replaceable Glands (Glass/End Cap)	–	●	–	–	–	–
Hydrochloric Acid	–	●	–	–	–	–
XPC Compatible (XPC adaptor available)	–	●	●	●	●	–
Direct Sample/Temp Sensor Interface*	●	●	●	–	–	–

Note: Stainless Steel is 316L unless otherwise stated.

● standard feature
○ optional extra
– unavailable on mode

Industry	Standard	Speciality PEEK	XPC	Low Volume	XPC Funnel	Water-Jacket
Academia	●	○	●	●	–	–
Food	●	–	●	–	–	–
Sugar	○	–	●	–	●	●
Chemical	○	●	●	●	–	–
Flavours & Fragrance	–	–	●	●	–	–
Pharmaceutical	○	●	●	●	–	–
Research	○	●	●	●	–	–

● Recommended
○ Sample dependant
– Not recommended

Spare Parts Guide

Polarimeter Accessories & Optional Extras

All of our polarimeter tubes and accessories are built to the highest manufacturing standards and designed to withstand many measurements under laboratory conditions. However, once in a while you may need to replace parts, or have a need for optional extras. The table below can help you select the correct part for your tube.

Polarimeter Tube	Window Cover Glass	End Caps	Washers	Seals & Install Tool	XPC Adaptor	Slotted Lids
Standard 100 mm	35-60	35-68	35-64	N/A	N/A	N/A
Standard 200 mm	35-60	35-68	35-64	N/A	N/A	N/A
Special Metal 100 mm	35-60	35-20	35-64	35-21	N/A	N/A
Special Metal 200 mm	35-60	35-20	35-64	35-21	N/A	N/A
Special PEEK 100 mm	35-60	35-23	35-64	35-21	35-99	N/A
Special PEEK 200 mm	35-60	35-23	35-64	35-21	35-96	N/A
XPC 100 mm	37-540	37-543	37-541	N/A	35-95	N/A
XPC 200 mm	37-540	37-543	37-541	N/A	35-96	N/A
Low Volume	35-80	N/A	35-81	N/A	35-97	37-016
XPC Funnel 100 mm	37-540	37-543	37-541	N/A	35-99	37-016
XPC Funnel 200 mm	37-540	37-543	37-541	N/A	35-96	37-017
Water-Jacket 100 mm	35-62	35-88	35-66	N/A	N/A	37-011
Water-Jacket 200 mm	35-62	35-88	35-66	N/A	N/A	37-012

Spill Kit & Rubber Stoppers

These specialist pads are capable of absorbing and retaining most acids and caustics in the event of an accidental spillage within the instrument chamber. Contains 20 preformed, 100% polypropylene pads for use with ADP polarimeters.

Rubber stoppers that help prevent spills during tube transfer are also available for centre fill tubes.

Temperature Sensors

Replacement Hastelloy® temperature sensors for ADP polarimeters are available.

Slotted Lids

Slotted lids provide convenient entry and exit ports for low volume or funnel flow tubes as well as providing stability during measurement. Lids are easily exchanged following the quick install guide.

Code	Spare Part
37-531	Spill Control Kit (Qty 20)
37-190	ADP Temperature Sensor – Hastelloy®
37-514	ADP600 (Pre-XPC) Temperature Sensor – Stainless Steel With Plug
37-011	Slotted lid, 4-hole, for 100 mm water-jacket funnel tube
37-012	Slotted lid, 4-hole, for 200 mm water-jacket funnel tube
37-016	Slotted lid, 2-hole, for 100 mm XPC funnel tube and all LV tubes
37-017	Slotted lid, 2-hole, for 200 mm XPC funnel tube

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

Bellingham + Stanley is part of Xylem Lab Solutions and is a leading provider of refractometers, polarimeters and density meters.

Xylem Lab Solutions' global brands have been leaders in the laboratory instrumentation market for decades, and are relied upon every day across more than 150 countries. Working in true partnership with our clients, we listen, learn and adapt to individual needs, offering deep application expertise built upon our long history of innovation in instruments and services. Our solutions for analysis, measurement and monitoring help enable many of today's modern laboratories and industrial processes, and provide our customers the trusted and high performing solutions they need to succeed.

Xylem Lab Solutions is part of Xylem Inc., a global company focused on solving the world's most challenging and fundamental water issues. As accurate analysis is crucial to the water industry, Xylem Lab Solutions taps its diverse product brands for leadership in that field and beyond, providing the best laboratory and field monitoring instrumentation across a wide variety of industries.

For more information on how Xylem can help you, go to www.xylem.com

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