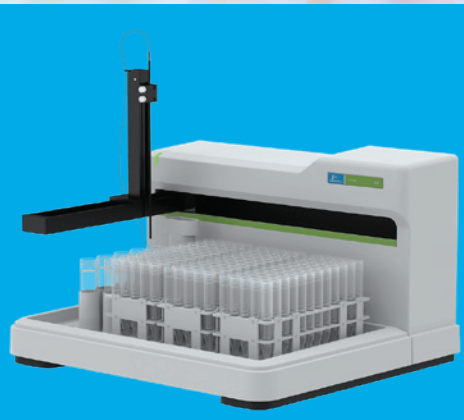
TECHNICAL NOTE

UV-Vis Spectroscopy



S23 Details and Assessment, Configuration and Installation SOP for UV-VIS Products

Introduction

The S20 Autosamplers were introduced in the summer of 2020 as replacements for the old S10 autosampler.

Proprietary crash detection which prevents damage from being caused to the autosampler probe if it comes into contact with a capped sample vial. This reduces the turnover and cost of consumables and ensures that your autosampler components are protected.

HIGHLIGHTS INCLUDE

- A chemically resistant sample tray which can be easily replaced if needed, without having to replace the whole autosampler.
- LED status lighting, which provides a visible indication of the autosampler state e.g. standby, running or error and ensures easy mitigation and diagnosis of issues.
- The S20 Series Autosampler Software allows users to preset specific parameters such as sampling speed, and autosampler peristaltic pump speed thereby limiting the amount of programming used by the respective software's, allowing users full flexibility in their sampling needs.
- Once set, the S20 Software can be closed. The autosampler will simply need a power cycle to retain the set parameters and offsets and does not require to be open in the background, thereby further simplifying analysis.
- Full control throughout all PKI spectroscopy software (Syngistix, UV Winlab™ and Spectrum FL).

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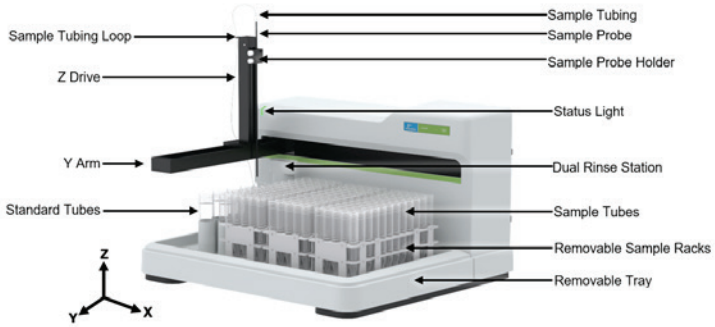
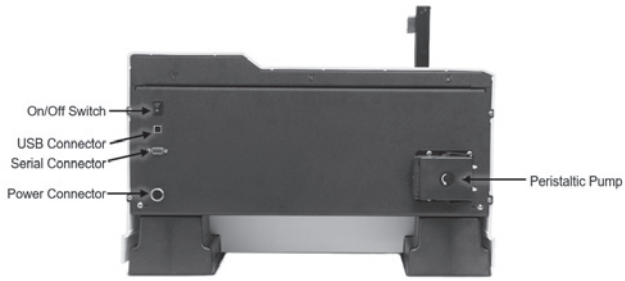
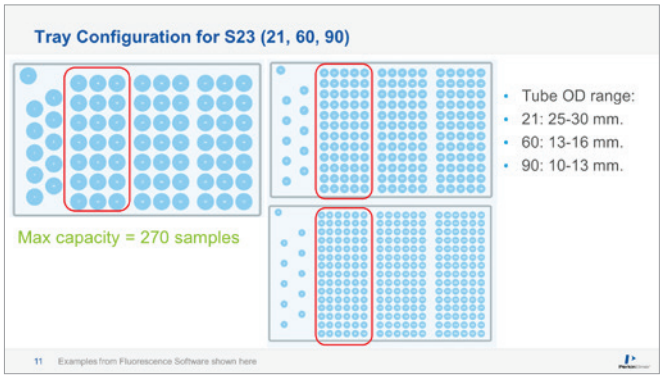




Six Tray Configurations (Taken from Spectrum FL):



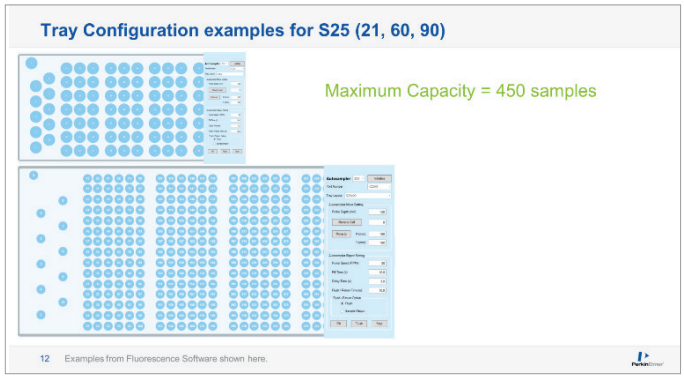


Figure 1. Five of the six configurations are shown here.

S20 Series Specifications:

Dimensions	Width (cm)	Depth (cm)	Height (cm)	Weight (kg)
S23	57	53	45	9.5
S25	79	53	45	13.6
Enclosure S23	55.6	49.8	50.5	5.0
Enclosure S25	76.8	49.8	50.5	5.5
Probe Arm Speed	User-adjustable up to 330 mm/sec			
Pump Flow Rate	User-adjustable up to 80 mL/min			
Communication	USB, serial RS-232			
Power Requirement	100-240 VAC, 47-63 Hz, 1.07 Amps			
Built-in Diagnostics	Yes			

Rack Type	Rack Capacity	Tube Outer Diameter (mm)	Tube Height (mm)
3 by 7	21-Position	28	115
5 by 12	60-Position	17	100
6 by 15	90-Position	13	100

Shipping Kits:

There are two kits that will ship with the S20 autosamplers when ordering either the S23 kit **(N4100043)** or the S25 kit **(N4100044)**. The first kit is detailed below and includes the autosampler itself along with the LAMBDA® 365+ specific parts.

N4100043 Kit for S23 autosampler **(N0830015)** ship with the following components:

Part Number	Part Description	Qty
N0830015	System Autosampler S23 - 3 Rack 100 - 240v	1
N4101052	Flow Cell	1
N4101054	Tubing Kit For Cell	1
N4101055	Tubing Kit For In-Built Sipper	1
B0199034	Violet/Violet Tubing 2.06 mm Id	1
N0811956	Carbon Support Probe 1.0 mm Id	1
N0830022	Fitting Kit (Required For Probe Fitting)	1

N4100044 Kit for S25 autosampler **(N0830025)** ship with the following components:

Part Number	Part Description	Qty
N0830025	System Autosampler S25 - 5 Rack 100 - 240v	1
N4101052	Flow Cell	1
N4101054	Tubing Kit For Cell	1
N4101055	Tubing Kit For In-Built Sipper	1
B0199034	Violet/Violet Tubing 2.06 mm Id	1
N0811956	Carbon Support Probe 1.0 mm Id	1
N0830022	Fitting Kit (Required For Probe Fitting)	1

NOTE: *Also included B0193160 - 1.14 mm ID Red/Red/Red Tubing. For tubing connections between the autosampler probe, flow-through cell and peristaltic pump.*

The second kit is included with the autosampler itself and is detailed below:

Part Number	Part Description	Qty
N0811361	Usb Cable	1
N0831034	Usb Flash Drive S20 Utility And User Guide	1
N0811381	Power Supply: Autosampler S20 Series, Power Cords (Usa/Japan, Europe, Uk, Australia Pin Types)	One Of Each Cord Type And One Power Supply
N0777547	Carbon Support Probe 0.5 mm Id	1
B0193234	Sample Tube W/ Screw Cap (50 ml) - Flat Bottom	10 Tubes
N0777167	Sample Tubes (15 ml)	1 Rack (60 Tubes)
N0830026	60 Position Sample Rack (For 15 ml Tubes)	1
N0831033	Rinse And Waste Tygon Tubing S20 Series	1
N0830022	Fitting Kit	1
N0831031	Peripump Tubing Id Pharmx 3.2 mm	1
N0831030	Peripump Tubing Id Pharmx 2 mm	2
B0104344	Narrow Neck Bottle 2000 ml w/o Cover	2
N0831032	Dual Rinse Station	1

An example shipping list for an S23 is shown below:

Line No.	Order Line No.	Qty	Part No.	Description
1	10	1	N4100043	KIT- S23 AUTOSAMPLER FOR L365+
				Consisting of
2	11	1	B0199034	2.06 mm ID Tubing, Ppl/Ppl/Ppl, Pkg. 12
3	12	1	N0811956	Carbon Fiber Sample probe, 1.0 mm ID
4	13	1	N0830015	S23 Three Rack Autosampler, Dual Rinse
5	14	1	N0830022	Probe Fitting Kit for S20 Series
6	15	1	N4101052	Flow-Through Cell 15.0 mm 420 µl, Quartz
7	16	1	N4101054	Auto Sipper Tube Connection Kit
8	17	1	N4101055	Front Plate Tube Connect Kit L365 Sipper

NOTE: *Shipping kit items may have a different description from those listed above due to common part numbers being used for prior revisions.*

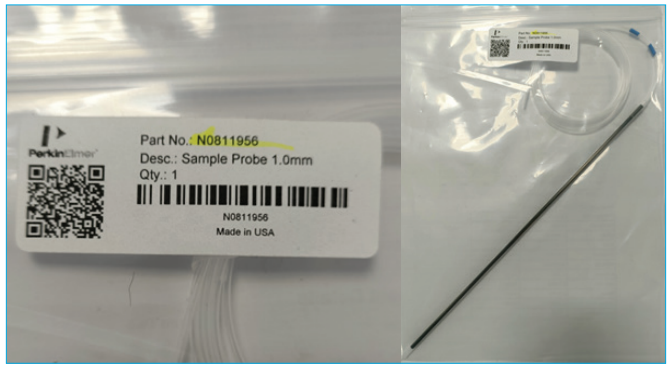
B0199034 – 2.06 mm ID Tubing Ppl/Ppl/Ppl. Pkg. 12 (Violet/Violet Tubing 2.06 mm ID)

B0193160 – 1.14 mm ID Tubing Red/Red/Red. Pkg. 12 (Red/Red Tubing 1.14 mm ID)

- Used with tubing connection kit to make fittings with flow-through cell inlet and outlet tubing.
- Used for connections with peristaltic pump.

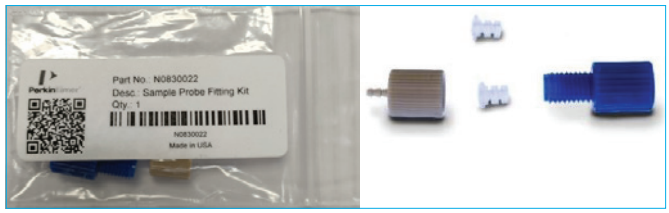
N0811956 – Carbon Fiber Sample Probe, 1.0 mm ID (Carbon Support Probe 1.0 mm Probe Fitting)

The 1.0 mm sample probe is shipped as default with the S20 autosampler kit for L365+.



N0830022 – Probe fitting kit for S20 series (Fitting Kit (Required for Probe Fitting)

- Can be used as fittings for connections between the flow-through cell inlet and outlet tubing, the sample probe and/or the peristaltic pump.

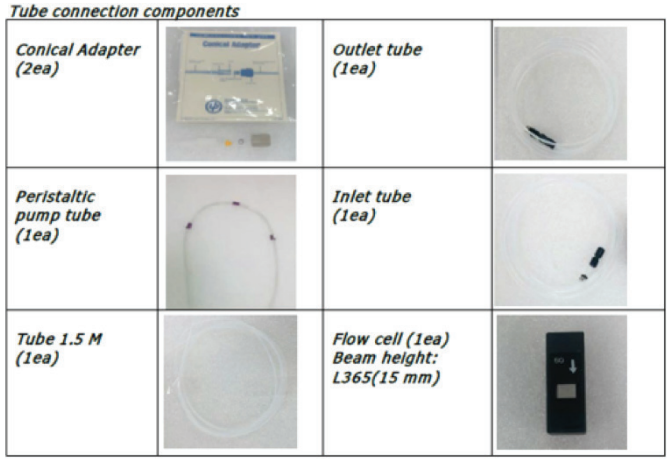


N4101052 – Flow-Through Cell 15.0 mm 420 µL, Quartz (Flow Cell)

N4101054 – Auto Sipper Tube Connection Kit (Tubing Kit for Cell)

- Includes the below parts.
- Tubing and conical adapters necessary for connecting the sample probe to the flow-through cell.
- Inlet & outlet tubing are compatible with additional flow-through cells described in figure 2.
- LAMBDA 365+

Tube connection components



- Flow-through cell part number: N4101052

N4101055 – Front Plate Tube Connect Kit L365 Sipper (Tubing Kit for In-Built Sipper)

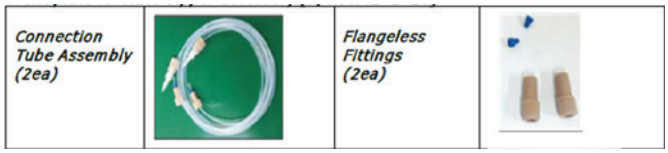


Table 1: Flow-through Cells

Material	Description	Light Path	Center Height	Outside Dimensions	Volume	Part No.
Quartz SUPRASIL	For use with LAMBDA 365/465	1 mm	15 mm	35 X 12.5 X 12.5 mm	62 µL	B0631085
Quartz SUPRASIL	For use with LAMBDA 365/465	10 mm	15 mm	35 X 12.5 X 12.5 mm	390 µL	B0631084
Quartz SUPRASIL	For use with LAMBDA 365/465	10 mm	15 mm	35 X 12.5 x 12.5 mm	160 µL	B0631087

N4103018	Cell qtz suprasil ft 390 ul 10 mm pl pkg1	1
N4103019	Cell qtz suprasil ft 160 ul 10 mm pl pkg1	1

Installing the S20 autosampler with a LAMBDA 365+.

NOTE: *Make sure that the autosampler is switched off and that the power supply is disconnected until the S20 has been connected to the LAMBDA 365+.*

1 Peristaltic Pump Configuration

The peristaltic pump tubing is pre-installed on the pump. There are three types of tubing available but the one that comes pre-installed is the 'Tan Pharmed tubing', PN: N0831030, Peripump Tubing ID PHARMX 2x2 mm. Figure 3 shows the tubing options available for the S20 series.

	S20 Series Peripump PHARMX Kit	32-0854-044	**N0831030**
	S20 Series Peripump VITON KIT	32-0855-044	**N0831040**
	S20 Series Peripump TYGON Kit	32-0856-044	**N0831039**

Figure 2: Compatible peristaltic pump tubing options for the S20 series.

The peristaltic pump tubing adapters on channel 3 need to be reversed to connect the outlet tube of the S20 flow-through cell. The procedure to do this is detailed below:

1. Release the pressure shoe of Channel 3 by squeezing the levers and pulling gently to the left.

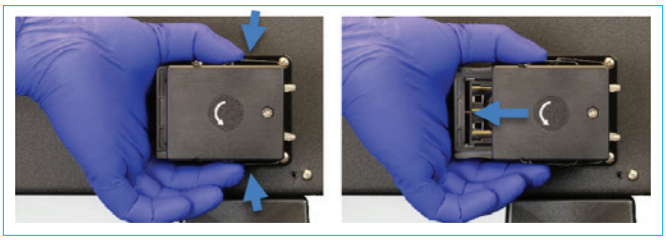


Figure 3: Releasing the pressure shoe.

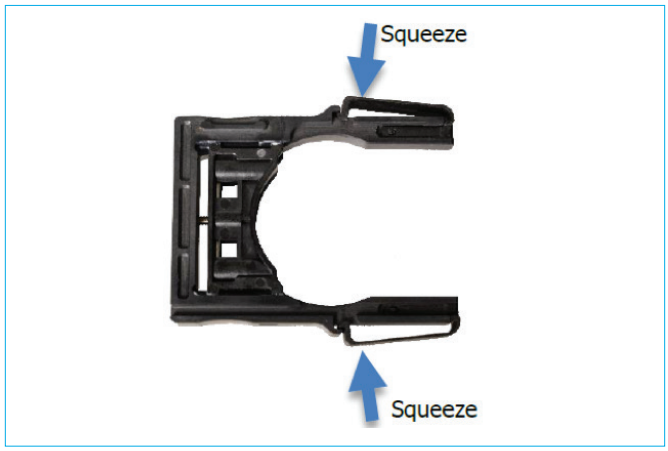


Figure 4: Pressure shoe.

2. If the pressure shoe moves a few centimeters and then gets stuck, move your hand to the end of the pressure shoe and continue pulling.

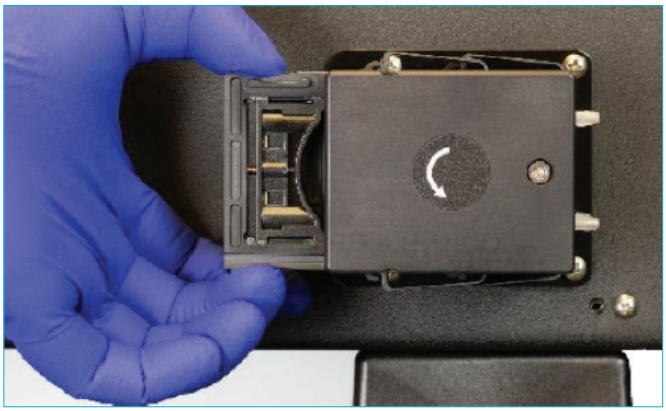


Figure 5: need figure info

3. Lift the end of the tube straight up.

Figure 6: Removing the peristaltic pump tube.

4. Remove the fitting from both ends of the peristaltic pump tube.

Figure 7: Removing the fitting from the peristaltic pump tube.

5. 'Flip' the fitting and plug the larger end of into the tube.

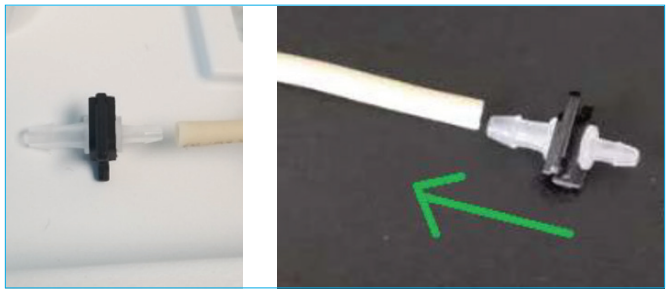


Figure 8: Reinstalling the fitting.

6. Reinstall the tube by sliding the clips on the end of the tube into the slots in the pump. It is easiest to begin with the end underneath the pump; stretch the tube slightly to reach the slot on the top of the pump.

7. At the outlet of the pump, connect a section of the Purple/Purple tube (B0199034). This section of tube can be cut to an appropriate length. We will connect the outlet tube of the flow-through cell to this section of tube using an appropriate connector of which there are several options (conical adapter, probe fitting kit, etc.).

2 Plumbing the Rinse Station

The rinse tubing should be connected to the rinse station and peristaltic pump as per the configuration in Figure 9. The top 3 positions of the peristaltic pump are designated as 'IN', and the bottom 3 positions are designated as 'OUT'.

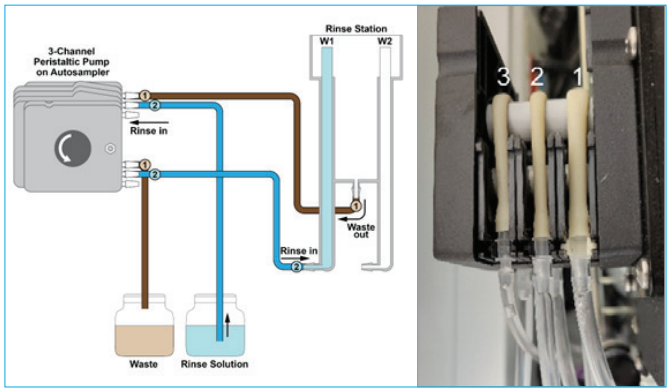


Figure 9: Single rinse tubing arrangement.

Use the pre-cut Tygon tubing **(N0831033)** supplied with the S20 to connect the rinse station to the peristaltic pump.

Figure 10: Pre-cut Tygon tubing shipped with S20.

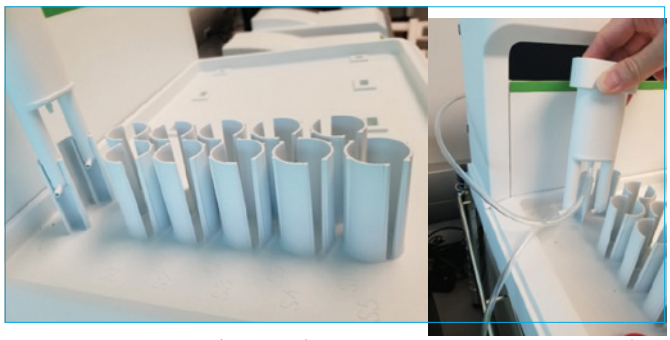


*Figure 11: The rinse station **(N0831032)** is mounted into the station holder. Two of the three short lengths of Tygon tubing connect the rinse station to the peristaltic pump.*

The two pieces of short Tygon are attached to the peristaltic pump as follows:

1. Rinse station: Waste out – Channel 1, IN.
2. Rinse station: Rinse in – Channel 2, OUT.

Cut an appropriate length of the long Tygon tubing to connect 'Channel 1 OUT' to one of the supplied narrow neck bottles **(B0104334)**. This will act as the waste reservoir for the rinse solution.

Cut another length of the long tubing to connect to 'Channel 2 IN'. This tube is for the rinse solution for the autosampler.

This generates 4 pieces of tubing (connections) with 2 more required for Channel 3, which is reserved for the sample probe and the flow-through cell.

3 Installing the Sample Probe

The correct configuration for the connection of the LAMBDA UV-Vis and FL instruments is described as the 'Pump after cell' configuration and is not described in depth in the user guide shipped with the S20. Figure 12 details this configuration where the probe is directly connected to inlet tube of the flow-through cell. The outlet tube of the flow-through cell is connected to Channel 3 IN of the peristaltic pump.

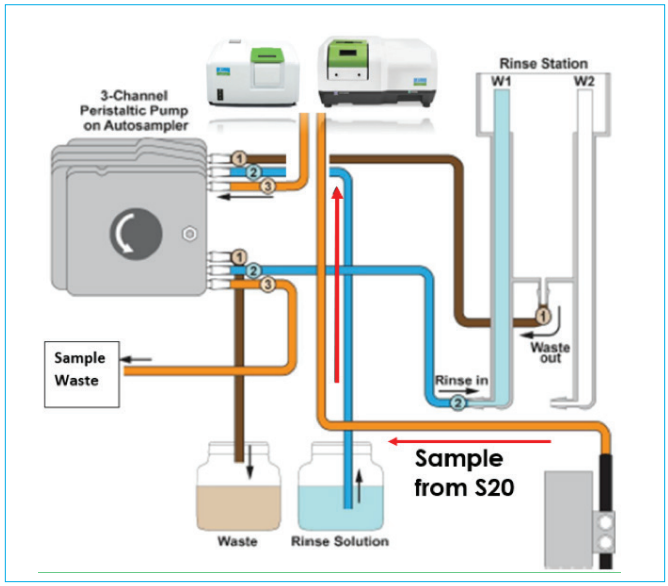


Figure 12: Pump after cell configuration flow diagram.

***NOTE:** To prevent contamination, wear gloves when handling the probe.*

1. Shut down and unplug the autosampler, if necessary.
2. Raise the slider on the Z-drive to its highest position.
3. Route the sample tubing through the loop on top of the Z-drive, as shown in figure 13.
4. Loosen the two thumbscrews on the Z-drive slider.
5. Guide the probe straight down through the sample holder into the Z-drive slider.

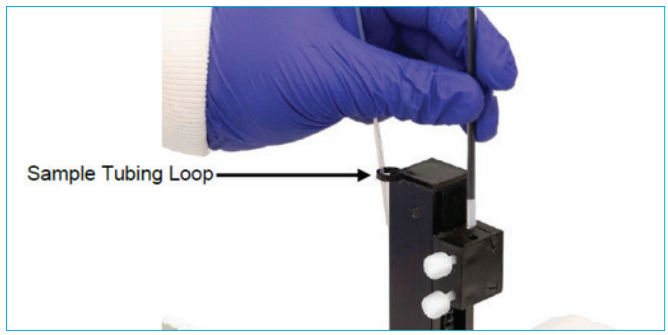


Figure 13: Installing the sample probe.

6. Adjust the probe so that the tip of the probe is level with the bottom of the Y arm.

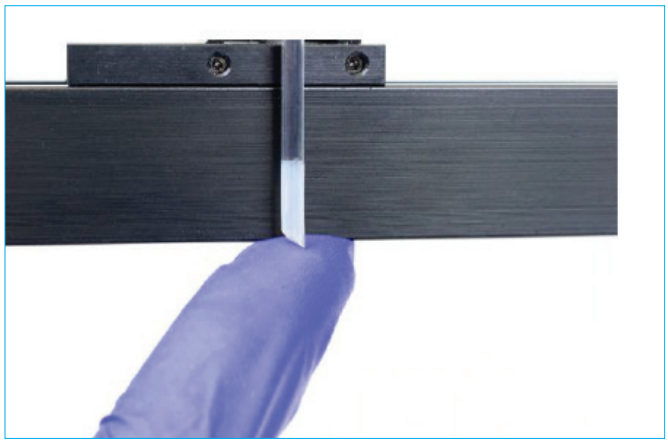


Figure 14: Adjusting the sample probe.

7. Tighten the thumbscrews **(N0831035)**.

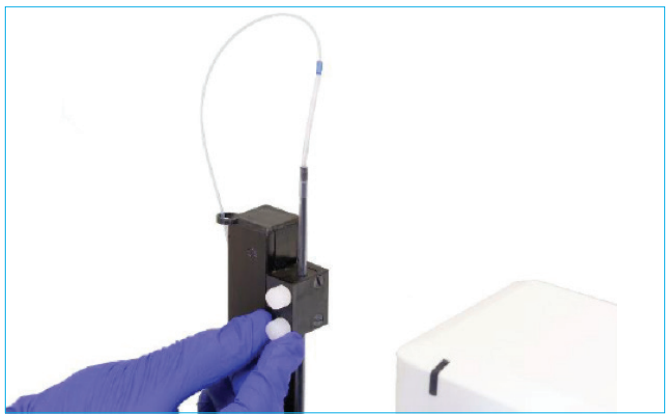


Figure 15: Tightening the sample probe thumbscrews.

8. Always position the sample tubing so that it does not pull on the probe. The tubing should naturally curve away from the probe so that it won't rub or get caught. Be sure to check that the tubing will not be stretched and will not snag on an obstacle when the probe is moved to the far corner sample positions.

CAUTION – Never attempt to move the sample probe by hand during operation. The autosampler may be damaged if the probe or autosampler arm are moved by hand when the autosampler is under system control. Turn off the autosampler if you need to manually move the arm or the sample probe.

4 Connecting Flow-Through cell to the S20 Autosampler

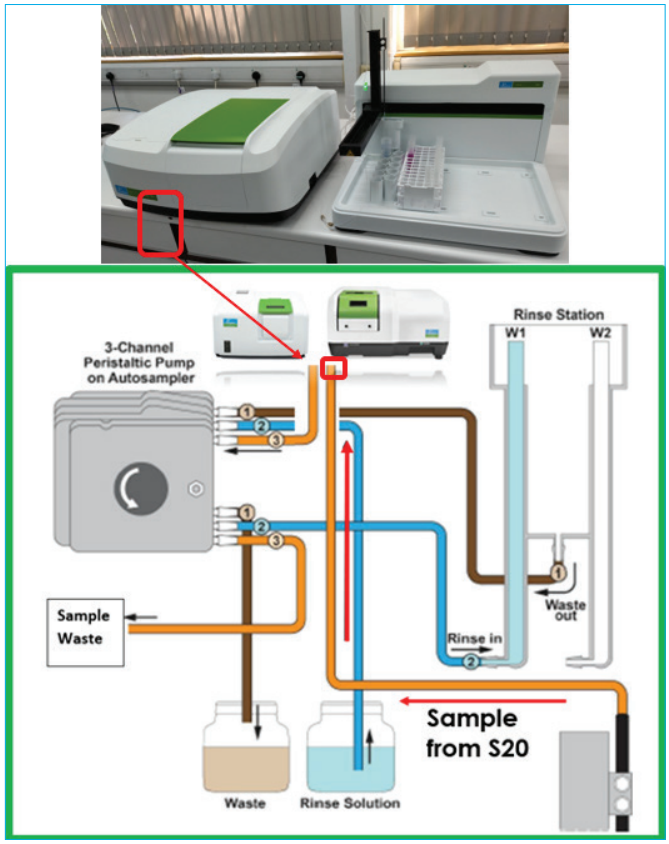
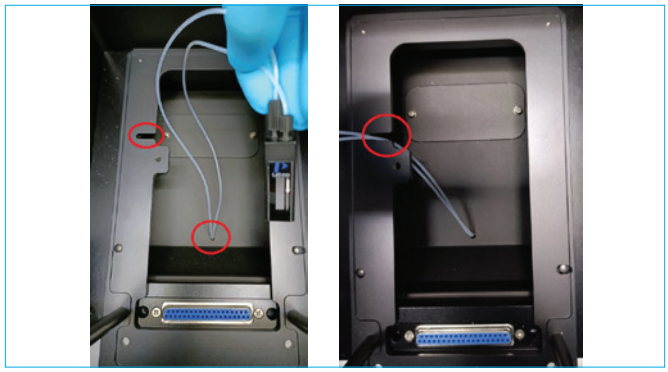


Figure 16: The sample probe tubing is coupled directly to the inlet tube of the flow-through cell.

NOTE: *Before cutting any tubing from either the sample probe or the inlet/outlet tube of the flow be sure that there is sufficient tubing for the Autosampler probe to move freely and without obstruction.*

Flow cell installation:

1. Remove the cell holder to reveal the space to route the inlet and outlet tubing for the flow-through cell. There is a space to the side of the compartment where the tubing can be routed once the cell holder is reinstalled.



2. Reinstall the single cell holder taking care not to pinch the tubing. (You may choose to wait to do this until all tubing is hooked up. This will allow you to pull tubing through the bottom of the instrument to give you more to play with while hooking the tubing up.)

3. The inlet tubing to the flow cell will come out the bottom of the instrument. Cut a few centimeters of peristaltic pump tubing (1.14 mm ID red/red/red). Fit this flow cell tubing into one end of the piece of red/red/red peristaltic pump tubing and the probe tubing from the autosampler into the other end of the piece peristaltic pump tubing as shown in Figure 17.

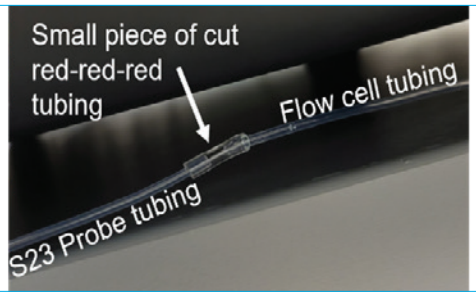


Figure 17: Connection between the probe tubing and Flow cell inlet tubing (under the instrument) is made using a small piece of red/red/red tubing.

Connecting the Flow-Through Cell Outlet to the Peristaltic Pump

1. The outlet tubing from the flow cell will also come out the bottom of the instrument. Connect this tubing directly into the peristaltic pump tubing (1.14 mm ID red/red/red) as seen in Figure 18.

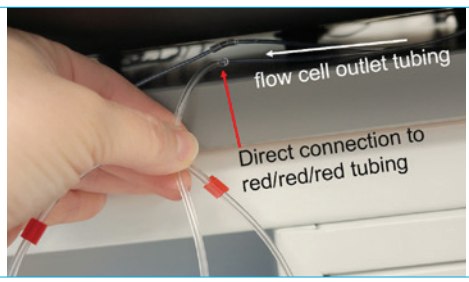


Figure 18: Union between sample probe and flow-through cell inlet tube.

2. To extend this tubing to the pump you will have to connect multiple pieces together. To do this, cut a small piece (few centimeters) of purple/purple (2.06 mm ID) peristaltic pump tubing. Connect the red/red/red peristaltic pump tube (1.14 mm ID) to another red/red/red peristaltic pump tube using that small piece of cut purple/purple peristaltic pump tubing.
3. This second red/red/red peristaltic pump tubing gets connected directly to the full purple/purple peristaltic pump tubing that was installed onto Channel 3, IN of the peristaltic pump during section 1, Peristaltic pump configuration, above.

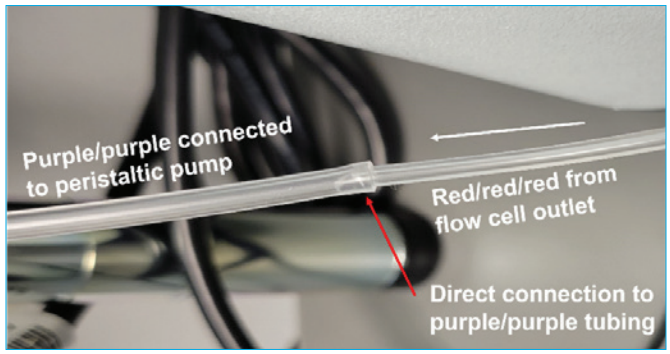
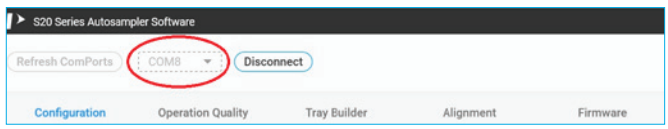


Figure 19: Red/Red/Red tubing coming from connection with the flow cell outlet tubing gets connected directly into the Purple/Purple tubing connected to Channel 3, IN (right).

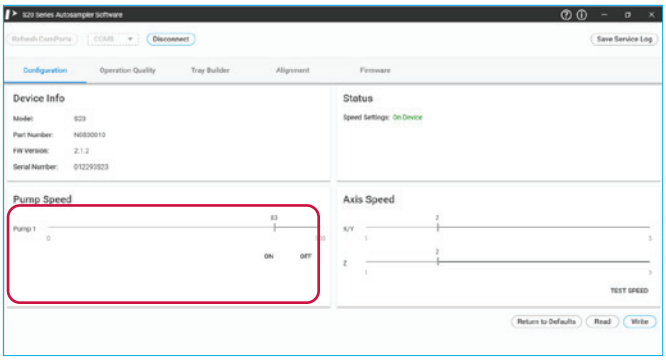
5 Software Installation and Configuration

NOTE: *The S20 software, installation files and user guides are all stored on the USB included with the shipping kit (N0831034).*

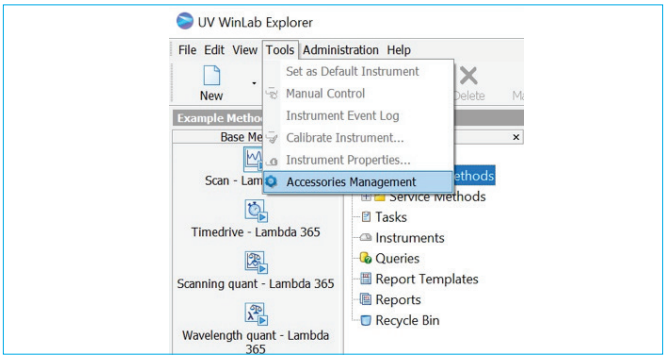
1. Be sure to select and install the autosampler configuration during the installation of UV Winlab or modify the installation to install the autosampler accessory.
2. Install the S20 autosampler software from the USB that ships with the autosampler. This software can be used to perform the autosampler qualification as well as modify certain parameters of the autosampler such as the peristaltic pump speed.
3. The COM port assigned to the autosampler can also be confirmed in the S20 software, COM 8 is assigned in the below example.



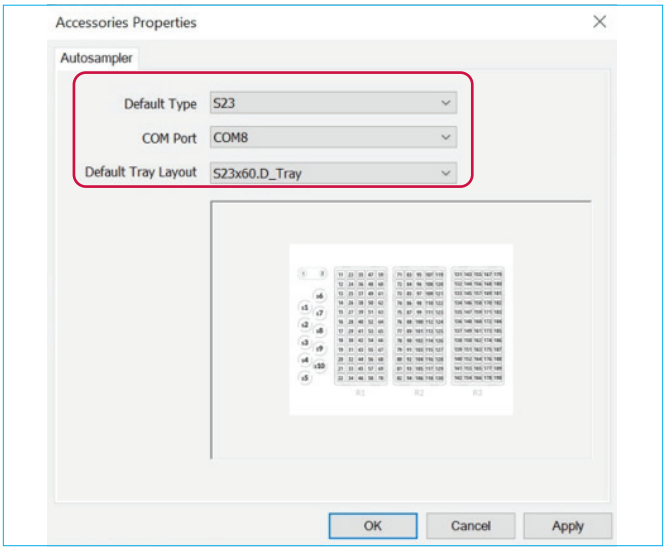
NOTE: *The S20 software can also be used to adjust parameters such as the pump speed which can be optimized as per the requirement of the application being used. For further details regarding the S20 software please consult the S23/S25 Autosampler guide supplied on the USB from the shipping kit (N0831034).*



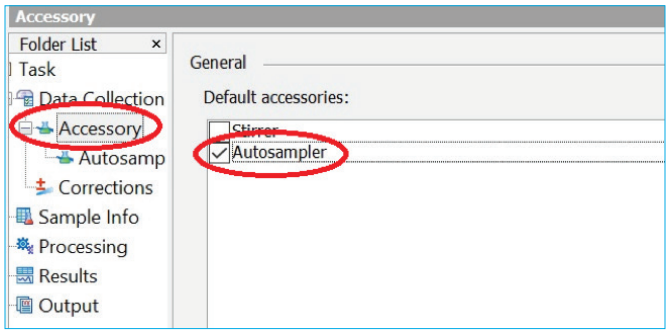
4. Proceed to UV Winlab software and select the 'Tools' tab and then the 'Accessories Management' tab.



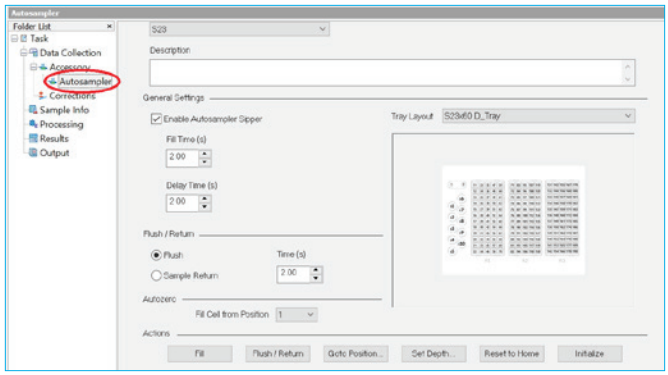
5. This will open the 'Accessories Properties' window and will allow you to select the correct COM port for the autosampler.



6. Once the correct COM port has been you will be able to take control of the autosampler after selecting it in the 'Accessories' tab of the Method or Task you are working with.



7. Parameters set in the 'Autosampler' tab (fill time, delay time, flush/sample return time and autozero sample position), will be saved as default for the method. This allows the relevant column to be set as default in the sample list to use the values for the parameters entered in the 'Autosampler' tab.



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