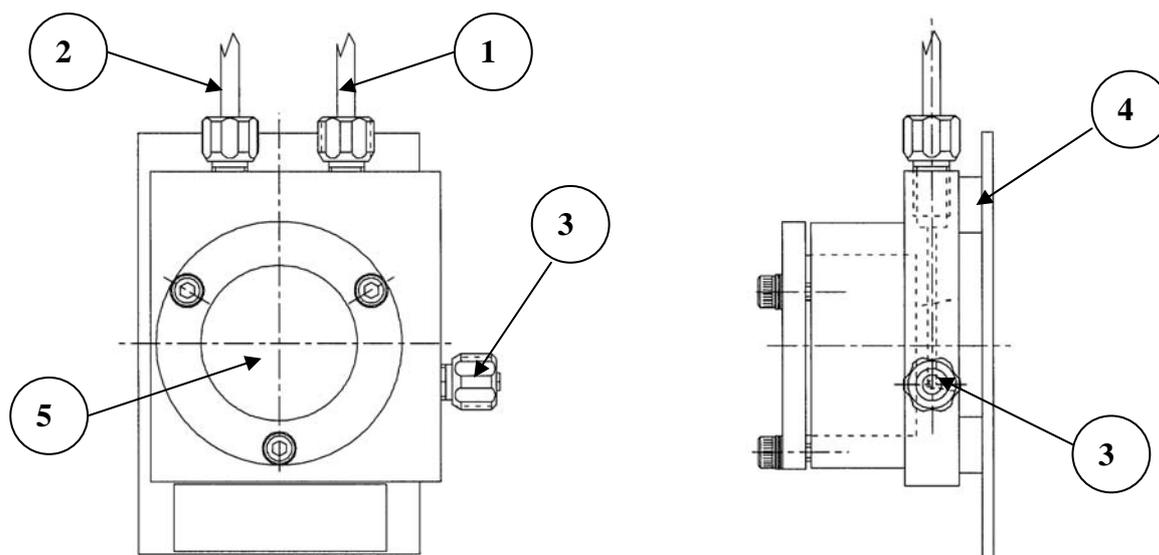


## 3 Port Liquid Flow Cell

### Introduction

The 3 Port Liquid Flow Cell is a liquid flow cell with ZnSe windows incorporating a wedged PTFE spacer at a nominal 100microns pathlength. The cell can be operated as a 2 or 3 port setup for connectivity and flow of a sample liquid.

### Diagram Of Cell



- 1 Connection Port 1 on flow cell.
- 2 Connection Port 2 on flow cell.
- 3 Connection Port 3 on flow cell.
- 4 3" x 2" slide mount plate on flow cell.
- 5 ZnSe windows in flow cell.

### For 2 Port Operation

To operate the cell via 2 ports for flow, connection port 1 (1) is the inlet port, connection port 2 (2) is the outlet port and connection port 3 (3) is blocked or closed if connected to a switchable valve. In this way a flow of sample or solvent solution passes through the cell system only.

### For 3 Port Operation

The cell can be operated using all three connection ports to flush the cell with alternate sample and solvent solutions. In this mode of operation connection port 3 (3) becomes the main inlet port and may need to be connected to a switchable valve for the sample and solvent flushing solutions. Connection port 1 (1) becomes the sample "prefill" path and needs to be shut off (maybe with another valve) when the cell itself is to be filled for analysis. Connection port 2 (2) becomes the sample or solvent "dump" path after flow through the cell.

### Cleaning of the Cell

If at all possible the cell should not be deconstructed when being cleaned. Usually a flow of an appropriate solvent is all that is necessary to clean and prepare the cell in readiness for a new sample.

## Changing the Wedged Spacer of the Cell

Due to the nature of construction of the cell with a wedged spacer, Specac Ltd recommends return of the cell for cleaning and inspection if blockages occur or the cell will not allow flow of a liquid.

However, if you wish to change the wedged spacer for yourself, the procedure to do so is as follows:-

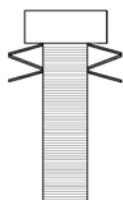
Tools/parts required:-

- 1) Adjustable torque wrench P/N GS10504 – set to 20cNm torque setting.
- 2) 2.5mm A/F hex drive adapter head for M3 cap head bolts P/N GS10588.
- 3) Nominal 0.1mm (100micron) wedge PTFE spacer P/N 387-407.
- 4) Vacuum (suction pad) pen for picking up and safely handling the windows.

## Dismantling of the Cell and Removal of Windows

Using the torque wrench and 2.5mm A/F adapter head, release each of the M3 bolts in rotation by 90 degree turns until they are all free of clamping the metalwork.

Remove each bolt with its set of 3 spring washers. It is important to keep the spring washers stacked on the bolt as shown by the diagram below.



The 3 washers are stacked on each bolt alternating up and down as shown. To seal the cell components, the bolts are tightened to a 20cNm torque until the washers compress.

Carefully lift the metal window clamp from the cell body. Remove the large O-ring using a suitable tool (e.g. wooden cocktail stick) to avoid damage to the front ZnSe window or the O-ring itself.

If a Vacuum Pen is available, use this to lift out the front ZnSe window from the cell and transfer to a desiccator (or safe place). Alternatively, place a card (or Selvyt polishing cloth material) over the window aperture and turn the cell and card over gently until the front ZnSe window falls onto the card.

The wedged PTFE spacer will probably release with the window. Be careful that the rear ZnSe window does not fall out unexpectedly which may result in damage.

Removal of the rear ZnSe window will most likely require a little light pressure from the rear of the cell aperture. It is best to lay the cell face down on a soft but firm surface, and then start to press the window out using a steady force, until the Viton gasket gently releases. The rear ZnSe window, and Viton gasket can then be recovered.

## Assembly of the Cell and Tightening of the Windows

Dismantle and clean the parts of the cell. (Use methylated spirits or petroleum ether.) The Viton gasket needs to be cleaned in Isopropyl Alcohol to pre-condition it.

Place the Viton gasket into the cell body, positioning it correctly using a suitable tool and ensuring good flow in and out of the two ports (small holes).

Ideally, using a vacuum suction pad pen, place the rear drilled/tracked ZnSe window into the cell, ensuring that the drilled tracks are uppermost. This window is to be positioned with care to align with the port and drill holes. If a vacuum pen is not available then the window needs to be positioned carefully using gloved hands/fingers.

Take the wedged PTFE spacer and place into position over the rear ZnSe window. There is a notch in the edge of the circular spacer and the spacer must be placed in the cell such that the notch will be at the top (12 O'clock position) of the cell when constructed. (The notch determines the thicker end of the wedged spacer.) When placing the wedged spacer make sure it aligns with the flow ports and drill holes similar to the rear ZnSe window fitting procedure.

Fit the plain (non-drilled/tracked) front ZnSe window allowing it to gently drop onto the spacer. Be careful not to disturb the alignment of parts below.

Insert the large O-ring and lightly press around its edge to fit in place.

Fit the metal window clamp plate into position orientating it correctly with its bolt holes having checked that there are no marks or imperfections on the PTFE gasket that makes contact with the front ZnSe window. Lower it into place, keeping it level with respect to cell body. Place the nine dished spring washers on the three M3 bolts as shown from the diagram. Note each set of three spring washers must be fitted so that they work in series; i.e. 1<sup>st</sup> spring washer = cone to bolt head, 2<sup>nd</sup> spring washer reversed, 3<sup>rd</sup> spring washer = cone to bolt head).

Fit the M3 bolts with their spring washer sets, but only tighten to just touch the metal window clamp. Apply light pressure keeping the metal window clamp plate absolutely level and adjust the three bolts to a just "nip tight" point. Check that the metal window clamp plate has an even gap from the cell body all the way around its circumference.

Now tighten each M3 bolt by 90 degree turns in sequence using the torque wrench, and repeat this operation until each bolt has reached a torque of 20cNm. Try to feel that the bolts are being increased in torque evenly. (A torque of 20cNm should be enough for the cell to hold 30psi.)

If possible apply air pressure of 30 psi for say 5 minutes to allow the seals to settle-in. The cell is now ready for use. Some settling will occur so re-torque after 24 hours. Alternatively, heat the cell to 80°C, allow it to cool to room temperature and then re-torque.