



BioSurface Technologies, Corp.

FC 81 Flow Cell Operations

The model FC 81 flow cell consists of a polycarbonate or anodized aluminum flow channel. Glass viewing ports allow transmission microscopy of biofilm growth in the flow channel.



Viewing Windows:

The viewing windows consist, on the bottom of the reactor, of a glass microscope slide, and on the top of the reactor a no.2, 24x60 mm cover slip. The top and bottom designation is arbitrary. The flow cell may be operated in any orientation. Milled recesses on the flow channel accept the glass slide or glass cover slip. The recess for the glass slide is deeper than the recess for the cover slip.

The glass viewing windows are held in place by a pair of aluminum cover plates. The cover plates also compress the silicone rubber gasket material to provide a leak-proof flow cell.

FLOW CELL ASSEMBLY AND OPERATION

It is very important the flow cells be assembly properly to provide a leak-proof seal.

Disassembly:

1. Remove the screws holding the cover plates in place.
2. Remove the cover plates. (Most likely the gaskets and glass viewing ports will remain with the cover plates).
3. Carefully remove the glass slide and glass cover slip from the gasket

- material. If the slide or cover slip is broken, remove and discard these items.
4. Carefully clean the gasket surface, removing all glass and other debris. **It is very important no residual material be left on the gasket surface (wash in clean water to remove all debris).**
 5. Clean the flow channel surfaces using water and laboratory detergent. **Do not scrub or mar the glass/flow channel mating surfaces.**

Assembly:

1. Carefully position the glass slide in the recessed slot on the flow channel (the deeper and longer of the recessed slots).
2. Carefully position the silicone gasket on the inside surface of the cover plate with threaded screw holes (no recessed beveling of the screw holes). Align the holes in the gasket to the threaded holes on the cover plate (the silicone gasket will stick to the aluminum plate if it is wet).
3. Carefully position the cover plate/gasket onto the flow channel. Make sure the glass slide stays in the recessed slot and the screw holes in the gasket still line up with the holes in the cover plate.
4. While holding the cover plate on the flow channel in proper position, carefully invert the flow channel and set it down on a clean, flat, stable surface.
5. Insert the short corner screws through the flow channel into the base plate. Do not overtighten these screws!
6. Carefully position a clean, unbroken cover slip in the shallow recessed slot on the flow channel. It is very important the cover slip be properly positioned in the recessed slot. **Improper placement will result in cover slip breakage upon tightening the cover plates.**
7. Carefully position the other clean gasket on the other cover plate (plate with recessed beveled screw holes). Align the screw holes in the gasket and the cover plate.
8. Put several screws through the beveled holes on the cover plate and through the holes on the gasket. These screws will help hold the gasket in place as it is placed onto the flow channel (the gasket will stick to the cover plate if it is wet).
9. Carefully place the cover plate with gasket onto the flow channel lower the cover plate straight down onto the flow channel/coverslip to prevent the coverslip from moving out of the recess). **It is very important the cover slip remain properly positioned in the**

recessed slot (improper placement will result in cover slip breakage and or leaking).

10. Place the screws into the beveled screw holes and tighten evenly around the perimeter, alternating sides as the screws are tightened (only lightly tighten until all screws are in place, then tighten snugly using an alternating pattern). **It is important the screw holes in the cover plate align with the holes in the gasket material.** Improper alignment may result in leakage.
11. Install tubing on the hose barbs and pump liquid through the flow cell.

AUTOCLAVING INSTRUCTION:

The FC 81Flow Cells are completely autoclavable. Polycarbonate plastic will degrade with a numerous autoclave cycles and may eventually require replacement.

BioSurface Technologies recommends always using the slow (liquid) exhaust option. The screws holding the cover plates on the flow cell should be loosened to allow for material expansion when autoclaving the polycarbonate flow cell). Tubing connected to the flow cell should allow free exchange of steam with the surrounding environment. BST recommends using a gas permeable material to cover the tubing ends such as autoclave paper instead of a gas-impermeable material, such as tin foil. (for the polycarbonate flow cell: slowly tighten the screws as the flow cell cools or wait until the flow cell is completely cooled before tightening the screws). Align all tubing connected to the flow cell to minimize stress on the flow cell fittings.

SPARE PARTS

Screws

Gasket

Cover slips

Glass Slide

With proper care, the gaskets should be re-useable for numerous experimental evaluations. The spare gasket provided requires removal of the clear protective polymer sheeting from both sides of the gasket prior to installation.

The Model FC 81 uses standard microscope slides and no. 2 24x60 mm cover slips as viewing ports.

The gasketing material is 0.020 inches thick silicone rubber. Other materials may be used.

The flow channel is manufactured from polycarbonate or anodized aluminum. The flow cell is completely autoclavable.

TROUBLE SHOOTING

Problem: Glass viewing ports keep breaking:

Solution:

- Check to ensure the glass is properly positioned in the recessed slot.
- Ensure the gasket surfaces and flow channel mating surfaces are total free of debris.

Problem: Flow cell leaks.

Solution:

- Tighten screws further to compress gasket.
- Make sure flow channel and hose barbs are free and clear of obstructions.
- Make sure glass viewing ports are not cracked or broken.
- Check gasket for rips or tears. Clear of all debris. Replace as necessary.
- High flow rates may create too much back pressure to contain leakage. Reduce flow rate. **The flow cell is designed for a maximum flow rate of 3.5 ml/minute.**
- Glass slide well depth is machined to a precise depth to accommodate 1.00 mm thickness glass slides. A tolerance of +/- 0.02 mm glass slide thickness variation is acceptable. If the flow cell is leaking from the glass slide side of the flow cell, try a thicker glass slide to generate a seal.

If you have any questions concerning the Model FC 81 Flow Cell, please contact BioSurface Technologies Corporation at: (406) 585-2812
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