



*BioSurface Technologies Corporation*

# Bio-inLine® Biofilm Reactor (IBR 500) Operator's Manual

The Bio-inLine® Biofilm Reactor is designed to facilitate biofilm growth for drinking and process water studies. The Bio-inLine® Biofilm Reactor (IBR-500) is an in-line biofilm reactor based on a modified Robbins Device (mRD) and holds 12 coupon plugs, each of which holds one ½" diameter disc coupon (same disc coupons as used in the CDC Biofilm Reactor® and Rotating Disc Biofilm Reactor). The primary Bio-inLine® manufacturing materials (PET and nylon) are compatible with drinking water and process water systems. The sample disc coupons are half-inch diameter, which when held by the Coupon Holder Plugs, sit flush with the interior wall of the channel. Removal of sample disc coupons is readily completed by shutting the isolation valves, removing the Coupon Holder Plugs with the provided removal tool, and loosening the setscrews holding the coupons in the Coupon Holder Plugs.



Model IBR-500 Bio-inLine® Biofilm Reactor

## 1. Flow Chamber

The IBR-500 flow chamber is a ½” square channel. When properly assembled, the disc coupons will be surface flush with the top of the flow channel. The reactor is designed with an entry segment to facilitate flow stabilization past the entry fittings. Flow characterization is readily determined using standard flow models for square cross-section pipes. Valves and entry/exit fittings are 3/8” NPT.

## 2. Coupons

The Bio-inLine® Biofilm Reactor has been designed to accommodate standard half-inch diameter disc coupons (0.5in diameter and 0.15in thickness). These sample disc coupons are available in more than 40 materials, and additional material options can be manufactured upon request. These sample discs are compatible with the CDC Biofilm Reactor® and Rotating Disk Biofilm Reactor. Sample disc coupons are held in the Coupon Holder Plugs with a stainless steel set-screw. A 0.050” hex tool is provided with the reactor to allow easy removal of the sample discs for microbial culturing and further testing. Methodologies for culturing and antimicrobial testing on these discs are available as part of the CDC Biofilm Reactor Standard Methods.

## 3. Reactor Assembly

The Bio-inLine® Biofilm Reactor consist of a PET flow chamber with lid, nylon Coupon Holder Plugs, silicone rubber gaskets, and 316 stainless steel isolation valves. The isolation valves are attached to the flow chamber with nylon fittings. The reactor lid holds 12 Coupon Holder Plugs that compress an O-ring to generate a pressure seal. The entry and exit ball valves are 316 stainless steel with PTFE seats.

Each of the sample disc coupons is mounted in a recessed well on the underside of the Coupon Holder Plugs and held in place by a 4-40 set screw (316 stainless steel). Installation of the plugs into the reactor lid is facilitated by use of the provided 2-prong tool that fits into the top of each of the plugs. The Coupon Holder Plugs must be turned into their respective holes until the plugs bottom out on the interior channel lip. This installation will position the sample disc coupons surface flush with the top of the flow channel.

## 4. Autoclaving Instructions

The Bio-inLine® Biofilm Reactor is made from black PET (polyethylene terephthalate) with nylon coupon holder plugs, and silicone O-rings. The reactor is fully autoclavable up to 121°C, at 20 minutes. Using temperatures or times past what is suggested may cause unnecessary stress to some materials and will not be covered under warranty.

**NOTE:** While the reactor is autoclavable, be aware that the black PET material will warp and degrade with use. This warping can be kept to a minimum if chemical sterilization is used in place of autoclaving. Check material compatibility sheets prior to using any harsh chemicals to ensure longevity of the reactor.

When autoclaving the reactor, it is recommended to use the slow (liquid) exhaust option. All lid screws should be loosened ½ turn to allow for material expansion, and the Sample Plugs should be loosened ¼ turn prior to autoclaving. Any connected tubing should be open to the air to allow free exchange of steam to the surrounding environment. It is recommended that a gas-permeable material be used to cover the ends of the tubing, such as autoclave paper. The reactor should be autoclaved only while inverted (upside down) and allowed to fully cool after

autoclaving to avoid coupons falling free from the coupon holder plugs. After autoclaving, wait until the reactor has fully cooled before retightening lid screws and Coupon Holder Plugs. It is recommended the reactor not be placed directly on a cold countertop after removal from a hot autoclave to minimize thermal shock to the PET material and lengthen the service life of the reactor. Once the reactor has cooled, and all fittings and screws retightened, the reactor is ready for installation into the flow system, and ready for use.

## 6. Pressurized Use

The Bio-inLine<sup>®</sup> Biofilm Reactor was designed to be used with water only. It has been tested up to 100psi, and should not be used with higher pressures or with pressurized gasses (including air). When pressurizing the reactor for the first time, the system should be monitored to ensure no leaks or cracks have been introduced.