

# Quick Change Sparger System for Bioreactors and Fermentors

## Sparging and Mass Transfer from Gases to Liquids

In bioreactor and fermentor systems, optimal mass transfer of gases like oxygen or carbon dioxide is perhaps the most difficult task to accomplish. Oxygen, in particular, is poorly soluble in water - and even less in cell culture and fermentation broths. Oxygen transfer is aided by agitation used to mix nutrients and to keep the cell culture or fermentation homogeneous. There are limits to agitation speed due to high power consumption as well as damage to organisms resulting from excessive tip speed. Agitation alone does not provide adequate mass transfer.

Using a Mott porous metal sparger greatly increases mass transfer rates in bioreactors and fermentors. The introduction of gases into stirred or unstirred reactor vessels via millions of tiny bubbles increases the gas-to-liquid contact areas allowing for optimal mass transfer rates. In-tank applications, with sparging elements located inside the tank, can be batch or continuous flow, with or without agitation.



figure 1

*Mott porous metal sparging elements with sparger wand and quick change trident adapter*

## Quick Change Spargers\* Provide Fast and Easy Installation and Validation

In the past Mott porous metal sparger elements, or "frits" as they are sometimes called, were welded to the end of sparger assemblies. This fixed method of attachment required either a cut and re-weld method of replacement or a clean out-of-place method for the entire sparger assembly to meet GMP validation methods.

Today, Mott offers a Quick Change Sparger that reduces the time and effort to replace the porous metal sparger element.

With the Quick Change Sparger system (see figure 2), the porous metal element can be removed and replaced after each use. Eliminating the need to re-weld the tip or clean the entire assembly. After each batch, a new tip can be installed on the end of the assembly and is ready for steam in place operation. Or the sparger tip can be cleaned out of place utilizing a number of methods including ultrasonic cleaning or detergent and water flush.

Either way, the Quick Change Sparger can help make sparger change out simple and easy. Changing to new clean sparger tips after each batch provides an excellent method of maintaining GMP process validation methods.

*\* Patent Pending*

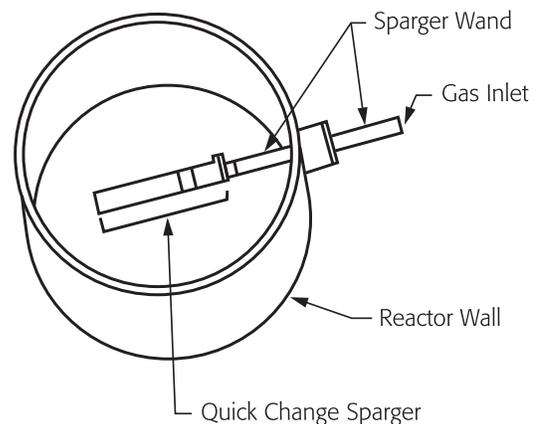


figure 2

### Available for Retrofit

The Quick Change Sparger consists of a trident adapter for the end of the sparging wand or assembly and a mating porous metal sparging tip (See figure 3). The adapter can be used to modify existing sparger assemblies to accept the Quick Change Sparger tip. The trident adapter design provides optimal support for the porous element without the need for threads, clamps or other excessive areas that cannot be sterilized during SIP cycles.

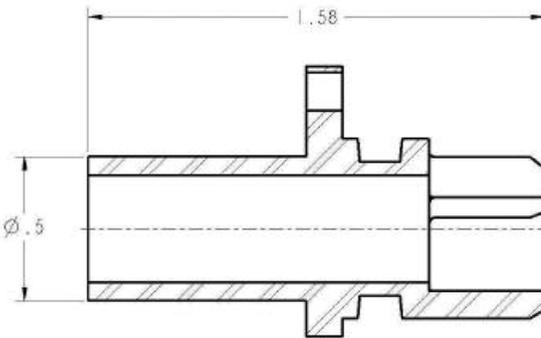
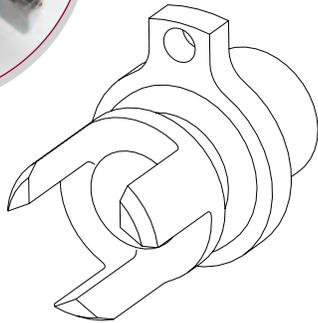


figure 3

Quick Change Sparger Trident Adapter #207680

### Quick Change Sparger – Product Offering

The Quick Change Spargers are available in the following standard sizes:

Inlet Tube sizes are all 1/2 inch OD with the following porous element sizes:

- 3/4 inch OD sparger tubes with 1 inch, 2 inch, 3 inch and 4 inch porous element lengths. Porous metal media grades are 0.5 $\mu$ m, 2 $\mu$ m, 5 $\mu$ m and 10 $\mu$ m.
- 1 inch OD sparger tubes with 1 inch, 2 inch, 3 inch and 4 inch porous element lengths. Porous metal media grades are 0.5 $\mu$ m, 2 $\mu$ m, 5 $\mu$ m and 10 $\mu$ m.

### Mott Porous Metal Spargers – a Biotech Industry Standard

The ultimate goal of the bioprocess engineer is to provide an optimum environment for biological processes. One major concern is the shear sensitivity of certain cell cultures. The use of shear protective additives such as Pluronic F-68 or methyl-cellulose are proven to reduce the shear impact of bubble rupture from sparged gas in cell cultures. Industry studies have continually proven that the simplest and most effective method of oxygen transfer is direct sparging of gas into the system.

For decades bioreactor and fermentor designers and operators have relied on Mott porous metal spargers to provide this uniform bubble size and dispersion rate. The 316LSS porous metal spargers are robust and capable of withstanding temperatures in excess of 400°C (752°F) and differential pressure in excess of 500 psid. This rugged material allows for repeated sterilizations via autoclave or through steam in place methods. The 316LSS material also ensures zero out-gassing and no extraction of harmful contaminants.

### Materials of Construction

Standard porous media for spargers is 316L stainless steel, which provides excellent corrosion resistance and high temperature capability, up to 400°C (750°F). Standard sparger hardware is 316L stainless steel. Other materials are available on special order, including 304L SS, 347 SS, 430 SS, Inconel® 600, Monel® 400, Nickel 200; Hastelloy® C276, C22 and X; and Alloy 20.

## Quick Change Sparger

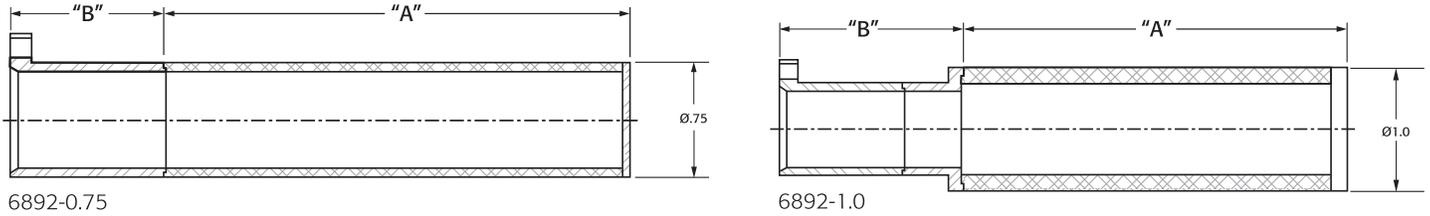


figure 3

### BIO-PHARM SPARGER PART DESCRIPTION

Code	Product Family										
6892	Removable Sparger Elements										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 15%;">Code</th> <th style="width: 85%;">OD/ID</th> </tr> </thead> <tbody> <tr> <td>0.75</td> <td>0.75 OD / .625 ID</td> </tr> <tr> <td>1</td> <td>1.0 OD / .750 ID</td> </tr> </tbody> </table>	Code	OD/ID	0.75	0.75 OD / .625 ID	1	1.0 OD / .750 ID				
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