

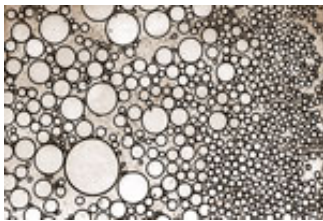


## Ultrasonic Mixing for Biodiesel Production

**Hielscher offers ultrasonic mixing reactors for the production of biodiesel at any scale. The ultrasonic mixing improves mass transfer and reaction kinetics leading to faster transesterification and higher yield. It saves excess methanol and catalyst.**

Ultrasonic reactors are recommended for production capacities of 0.25ton (80 gal) per hour or more. Hielscher offers ultrasonic reactors of an individual capacity of up to 16ton/hr (5100 gal/hr). In general you should consider using three to five units in parallel to accommodate variations in production rates.

## Lower Material Costs and Boost Biodiesel Yield



Excess methanol and catalyst are significant cost factors in biodiesel production. Hielscher ultrasonic reactors add cavitation shear to the mixing process. This gives you much smaller methanol droplets resulting in improved methanol and catalyst utilization. Therefore, less methanol and catalyst are required. In addition to that, the cavitation influences the reaction kinetics, leading to faster and more complete [transesterification](#).

[Click here to read more about ultrasonics and biodiesel processing efficiency!](#)

## Small and Medium Scale Biodiesel Reactors



For small and medium size biodiesel production of up to 9ton/hr (2900 gal/hr), Hielscher offers you the [UIP500hd](#), [UIP1000hd](#) and [UIP1500hd](#). These three ultrasonic reactors are very compact, easy to integrate or retro-fit. They are built for heavy duty operation in harsh environments. Below you will find recommended reactor setups for a range of production rates.

|                              | ton/hr      | gal/hr     |
|------------------------------|-------------|------------|
| 1x <a href="#">UIP500hd</a>  | 0.25 to 0.5 | 80 to 160  |
| 1x <a href="#">UIP1000hd</a> | 0.5 to 1.0  | 160 to 320 |
| 1x <a href="#">UIP1500hd</a> | 0.75 to 1.5 | 240 to 480 |
| 2x <a href="#">UIP1000hd</a> | 1.0 to 2.0  | 320 to 640 |
| 2x <a href="#">UIP1500hd</a> | 1.5 to 3.0  | 480 to 960 |

4x UIP1500hd

3.0 to 6.0

960 to 1920

6x UIP1500hd

4.5 to 9.0

1440 to 2880

## Full Scale Industrial Biodiesel Reactors



For industrial processing biodiesel production plants Hielscher offers the [UIP4000](#), [UIP10000](#) and [UIP16000](#). These ultrasonic processors are designed for the continuous processing of high flow rates. The [UIP4000](#) and [UIP10000](#) can be integrated into standard sea freight containers. Alternatively, all three processors are available in stainless steel cabinets. The upright installation requires minimal space. Below you find recommended setups for typical industrial processing rates.

|                             | ton/hr       | gal/hr         |
|-----------------------------|--------------|----------------|
| 3x <a href="#">UIP4000</a>  | 6.0 to 12.0  | 1920 to 3840   |
| 5x <a href="#">UIP4000</a>  | 10.0 to 20.0 | 3200 to 6400   |
| 3x <a href="#">UIP10000</a> | 15.0 to 30.0 | 4800 to 9600   |
| 3x <a href="#">UIP16000</a> | 24.0 to 48.0 | 7680 to 15360  |
| 5x <a href="#">UIP16000</a> | 40.0 to 80.0 | 12800 to 25600 |

## Inline Ultrasonic Mixing of Oil and Methanol

Ultrasonic mixing reactors replace tank agitators and other dynamic shear mixers. The ultrasonic reactors are generally installed to mix two feed streams. Oil and methanol (with catalyst). For this, a crude pre-mix is pumped into the ultrasonic reactor, where the [ultrasonic cavitation](#) mixes and [emulsifies](#) both reagents within 5 to 15 seconds. This is an inline mixing process. When the mix exits the flow cell reactor, the glycerin will separate by gravity within less than 60 minutes. Alternatively, you can feed the mix into a centrifuge after several minutes of residence / reaction time. The inline mixing reduces the number and volume of tanks used for conventional batch processing. This improves capital utilization.

