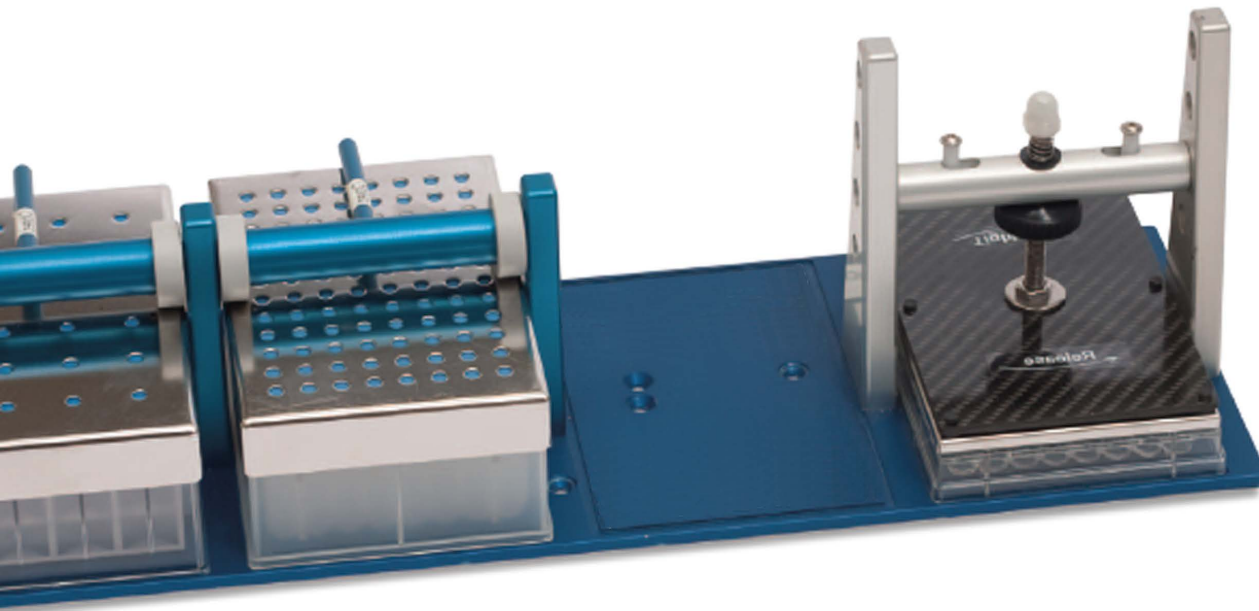


With You  
Every Step  
of the Way



**MICRO-FLASK** BY DUETZ

**SUPERIOR LIQUID CULTURE IN  
MICROTITER PLATES**



## SCALE DOWN TO MICRO-LITER VOLUMES WITHOUT SACRIFICING CULTURE QUALITY

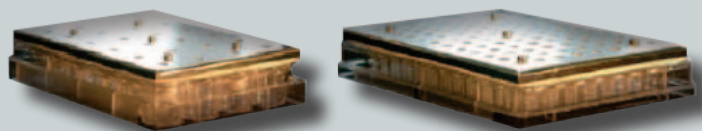
Micro-Flasks<sub>by Duetz</sub> provide you with the most process information from your orbital shakers – at minimal cost. You can scale-down shake flask experiments to 6-, 24-, or 96- well microtiter plates without sacrificing aeration or mixing dynamics, and the Micro-Flask<sub>by Duetz</sub> enables a single person to grow and test thousands of strains with minimum handling.

### BENEFITS OF SMALL-VOLUME CULTURES

Microtiter plates are a low-cost way to increase the number of experiments performed in finite incubator space. Their small volumes reduce costs associated with media components, and the plates themselves are inexpensive pre-sterilized culture vessels. The format of the plates enables compatibility with time-saving devices from multichannel pipettes to liquid handling robots.

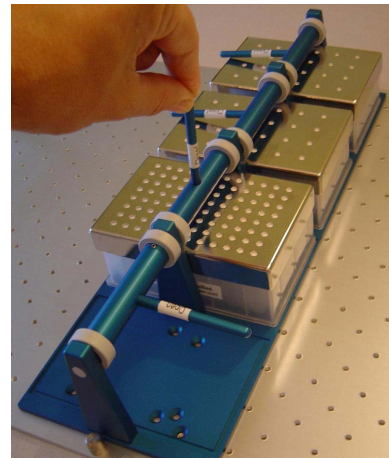
### FEATURES

- Up to 96 bioreactors per microtiter plate
- Suitable for microbial or cell-culture processes
- Oxygen transfer rates similar to shake flasks
- Eliminates well-to-well positional effects
- Universal clamp system for all shakers
- Up to 16 plates in one clamp (1,536 cultures!)
- Automation friendly



### APPLICATIONS OF MICRO-FLASKS<sub>BY DUETZ</sub>

- Strain screening
- Cell-line development and storage
- Medium optimization
- High-throughput studies of bacterial, yeast, or cell culture libraries
- Metabolic flux studies
- Comparative study of clinical isolates
- Cultivation using expensive reagents



Covers are available for 96-, 24-, and 6-well deep and low-well plates.

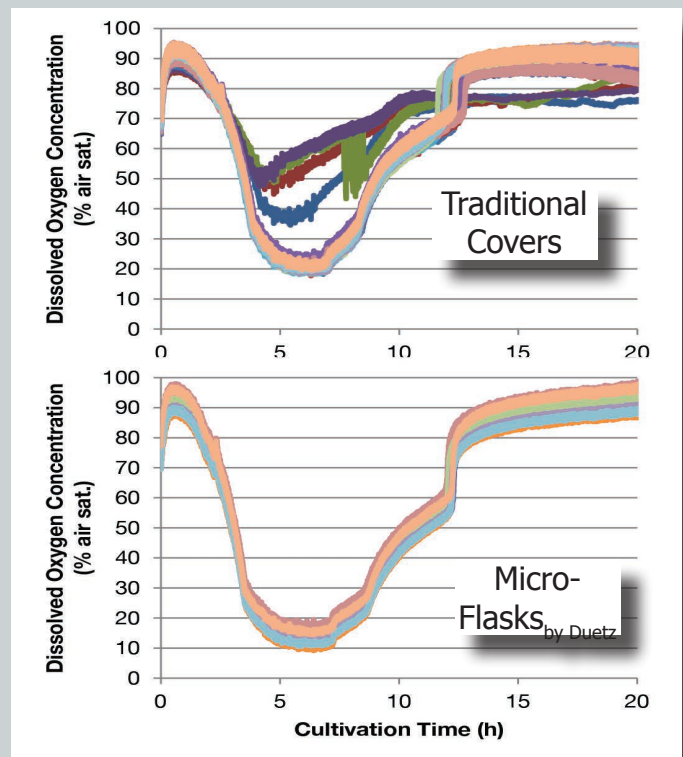
### SANDWICH COVERS PROVIDE OPTIMAL GROWTH CONDITIONS AND REPRODUCIBILITY

The Micro-Flask<sub>by Duetz</sub> sandwich covers are autoclavable, re-usable layers designed to improve microtiter plate performance. The sandwich covers are designed to provide headspace refreshment rates of 1-2 vvm in shakers. Micro-Flasks<sub>by Duetz</sub> minimize evaporation, permitting culture times of several weeks.

Micro-Flasks<sub>by Duetz</sub> ensure every well of a microtiter plate is exposed to identical culture conditions. In addition to preventing cross-contamination during vigorous shaking, The sandwich covers also provide uniform diffusion paths for each well, virtually eliminating well-to-well variability.











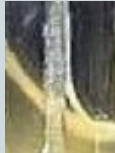

### HIGH-THROUGHPUT APPLICATIONS

Micro-Flasks<sub>by Duetz</sub> are robotics-friendly, and the CryoReplicator accessory allows for sampling and replicating frozen microtiter plates without thawing. A small volume can be transferred without thawing allows the master plate, enabling hundreds of sample events without loss of viability.



In traditional cultures in microtiter plates, oxygen concentrations can vary significantly well-to-well and create positional artifacts in your data (top). Micro-Flasks<sub>by Duetz</sub> eliminate this variability (bottom).

With judicious selection of plate geometry, fill volume, and shaking parameters, you can achieve a very wide range of culture conditions with your Micro-Flasks, by Duetz and significantly improve the quality of your screening experiments!

Type of Microtiter Plate	Well Volume	Culture Volume	Orbital Shaking Frequency	Shaking Amplitude	O <sub>2</sub> transfer rate (30°C, air, 1 bar)	Headspace Refreshment Rate	Evaporation rate per well (at 30°C)	Mixing Pattern at 300 rpm	
								25 mm amplitude	50 mm amplitude
24-square deep-well polypropylene, 17x17 mm, depth 40mm		2500 µL	300 rpm	50 mm	51 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	2.5 mL min <sup>-1</sup> (1 vvm)	50% humidity: 50 µL H <sub>2</sub> O day <sup>-1</sup>		
		2500 µL 2500 µL	300 rpm 220 rpm	25 mm 50 mm	39 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 35 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	2.5 mL min <sup>-1</sup> (0.6 vvm)			
24-round low-well polystyrene, diameter 16mm, depth 18 mm		750 µL	300 rpm	50 mm	40 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	1.1 mL min <sup>-1</sup> (1.4 vvm)	50% humidity: 30 µL H <sub>2</sub> O day <sup>-1</sup>		
		750 µL 1000 µL 1000 µL	300 rpm 300 rpm 300 rpm	25 mm 50 mm 25 mm	25 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 30 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 19 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	1.1 mL min <sup>-1</sup> (1.1 vvm)			
96-square deep-well polypropylene, 8x8 mm, depth 40 mm		500 µL	300 rpm	50 mm	38 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	1 mL min <sup>-1</sup> (2 vvm)	50% humidity: 22 µL H <sub>2</sub> O day <sup>-1</sup>		
		500 µL 750 µL 750 µL 1000 µL 1000 µL	300 rpm 300 rpm 300 rpm 300 rpm 300 rpm	25 mm 50 mm 25 mm 50 mm 25 mm	12 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 24 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 7 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 18 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 3 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	1 mL min <sup>-1</sup> (1.3 vvm) 1 mL min <sup>-1</sup> (1 vvm)			
96-round low-well polystyrene, diameter 6.5 mm, depth 11 mm		100 µL	300 rpm	50 mm	39 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	250 µL min <sup>-1</sup> (2.5 vvm)	50% humidity: 6 µL H <sub>2</sub> O day <sup>-1</sup>		
		100 µL 150 µL 150 µL 200 µL 200 µL	300 rpm 300 rpm 300 rpm 220 rpm 300 rpm	25 mm 50 mm 25 mm 50 mm 25 mm	20 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 32 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 16 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 12 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup> 12 mmol O <sub>2</sub> L <sup>-1</sup> h <sup>-1</sup>	250 µL min <sup>-1</sup> (1.7 vvm) 250 µL min <sup>-1</sup> (1.3 vvm)			

Your Applikon process consultant can work with you to get the most out of your microtiter plates:

- Determine the best well geometry for your cells
- Provide a custom gas mix in the atmosphere around your plates
- Obtain real-time pH and dO<sub>2</sub> kinetics from each well of your plate
- Help you establish the best shaker settings for your process



To learn more about the Micro-Flasks and related systems, scan this QR code or visit:

[www.applikonbio.com/microflask](http://www.applikonbio.com/microflask)

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Every Step  
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