

Culturing in microwell plates

Kuhner EquipNote

by Kuhner shaker



An ever-decreasing sample volume required for analysis is allowing more and more cell and microbial cultures to be downscaled from Erlenmeyer flasks to microwell plates. Due to the standardised SBS-format of microwell plates automation solutions can be implemented, greatly expanding the possibilities of fast screening and optimisation studies.

Initially culturing in microwell plates was limited by a lack of understanding of the hydrodynamics and the lack of good clamp and cover systems. However, now it can be said that there is a large amount of information and hardware available that allows reproducible and scalable culturing in microwell plates that is in-line with shake flasks results.

In this article the focus will be on some of the technologies Kuhner Shaker can offer to improve culturing results.

System Duetz:

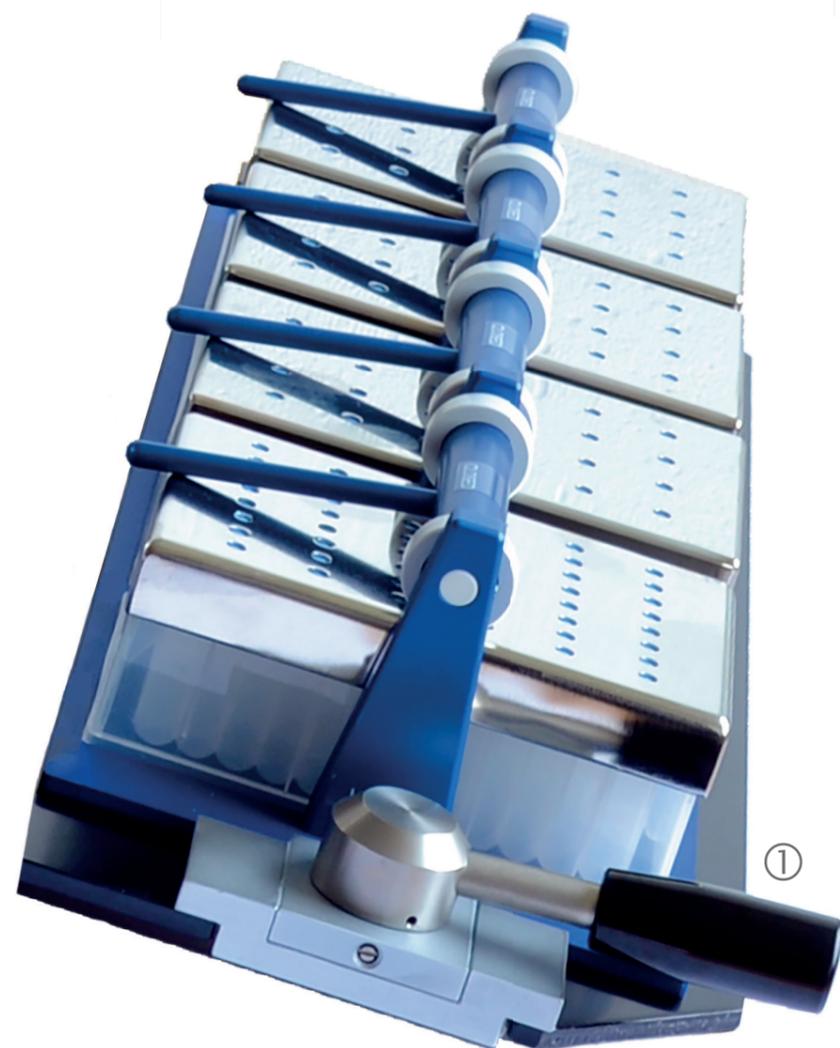
Besides the installation/clamping of a microwell plate in a shaker or shaker-incubator, the microwell plate cover is also an important consideration. Some users culture with the standard hard-plastic cover while others use foils to provide a sterile barrier for their culture. One downside of the standard hard plastic cover is that well-to-well reproducibility issues are often reported. Regarding the foils/film which are glued onto the microwell plate, drops forming on the membrane (with glue) and falling back into the culture may influence the cells.

The Duetz System ① is a very elegant and effective combination of clamp and cover that allows for better well-to-well reproducibility, prevention of cross-contamination and standardisation of aeration and evaporation rates. The basis is a reusable metal cover with a filter sandwich. This cover seals all the wells and provides a defined gas exchange port with sterile barrier for every individual well. Different hole sizes mean the gas exchange can be adapted depending on the cultivation type (oxygen demand): e.g. *E. coli* or mammalian cells

Use of the System Duetz Covers requires a special clamp since the cover must be pressed-down to achieve a tight seal. A number of different System Duetz clamps are available and these are compatible with most tray types typically used for culturing in microwell plates. Universal System Duetz clamps use a screw-down mechanism suitable for both deep well and low well plates. Lever operated SystDuetz clamps allow deep well plates to be quickly and conveniently positioned on a shaker tray.

Trays for microwell plates:

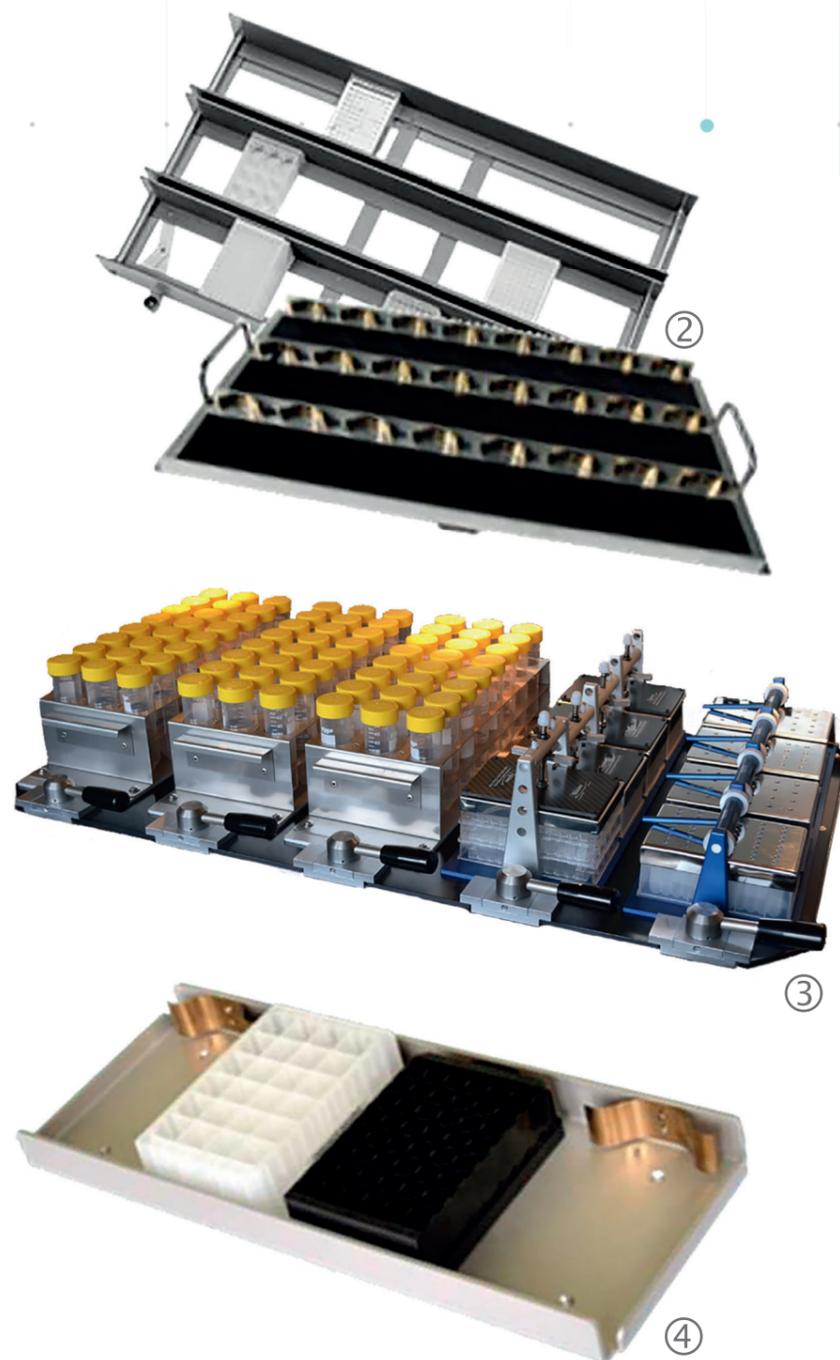
Kuhner has designed a variety of trays to facilitate a broad spectrum of users. These trays offer a variety of capacity and flexibility, and all provide secure and stable fixing of microwell plates at high shaking velocities.



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The Lever-Operated Tray ②

This design has two external levers that clamp down all plates simultaneously from two sides. With 24 positions this tray is suitable for users that culture in larger numbers of microwell plates, either low well or deep well. The trays are available in a variety of wall heights for stacking low well plates

The Spring-Loaded Microwell Plate Tray

In this tray every position has a spring that allows plates to be clamped down or removed individually. The design is compatible with every deep well SBS-format microwell plate and every lid that is commonly used. The System Duetz mono lever-type clamp for deep well microwell plates is particularly suited to this tray (see picture).

EPFL Tray ③

The EPFL tray features five lever-operated docking stations for tube racks and System Duetz Quad Clamps. This tray accepts up to five four-A2position System Duetz clamps. The EPFL tray combines flexibility of use with easy exchange of clamp types.

This system is frequently applied to semi-automatic processes. A single four position clamp can be removed and installed in a liquid handler, while all the other plates carry on shaking.

Universal Tray

The Universal Tray has a pre-drilled hole pattern that allows users to screw-down a variety of clamps. It is therefore ideal for labs working with many different applications and working volumes. We have a variety of microwell plate clamps that can be attached to these plates:

- The spring-loaded quad clamps ④
- System Duetz mono lever-type clamp
- System Duetz duo clamps (2 positions)
- System Duetz quad clamps (4 positions)

Conclusion

There are a variety of trays, covers and clamps available to fulfil the different needs of a range of users. However, it is important to realise that there are more parameters that determine successful culturing in small volumes than just a well-designed clamp. Parameters such as the orbital throw setting, shaking speed, fill volume, well geometry and the type of cover are a few examples that can determine if scalable and reproducible results are achievable. Choosing a good quality shaker-incubator is also important to ensure reproducibility is not affected by poor temperature gradients, a lack of shaking speed precision or poor uniformity of mixing.

Contact us for more information, or consult the [Doctor Shaker](#) platform if you would like to know more.