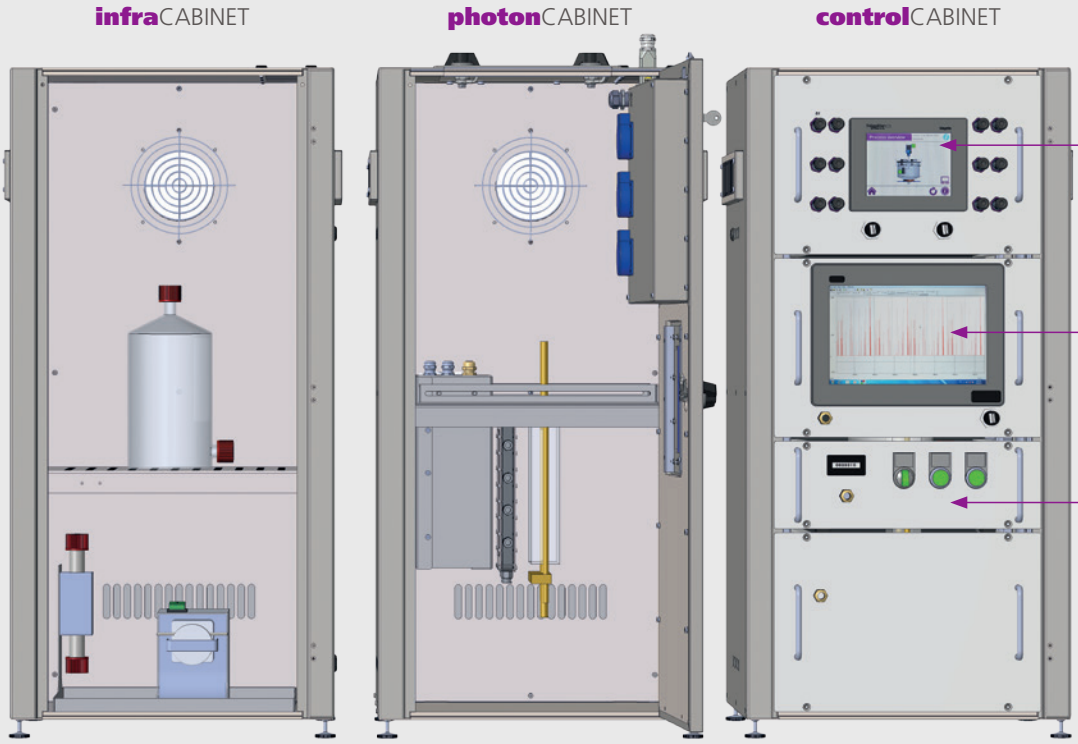
MPDS



Example configuration

MPDSEVO Mikrophotoreactor novaLIGHT FLED400

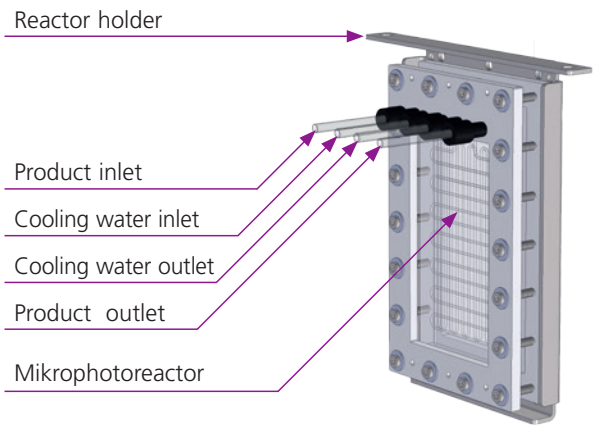
Batch reactors are limited in their lack of accurate reaction control and their inaccurate temperature management. Furthermore, the penetration depth of photons can often be limited due to absorption, thus an optimal photochemical reaction cannot take place.

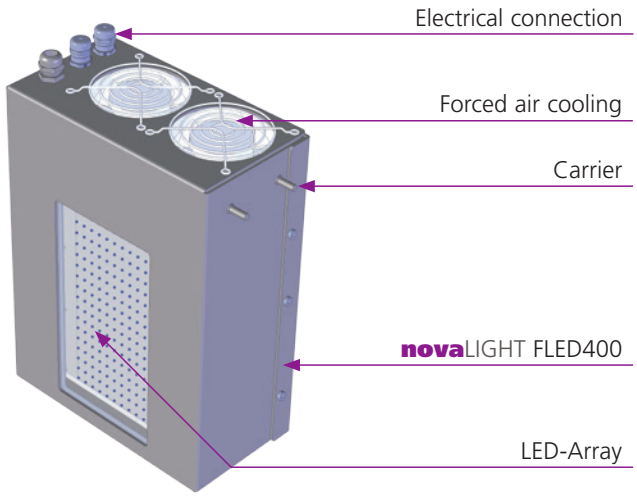
Conti Flow microphotoreactors from Peschl Ultraviolet GmbH resolve these limitations and enable controlled implementation of photochemically initiated reactions.

Due to the continuous operating mode, the reaction kinetics can be optimally configured and precisely analysed in conjunction with an online analysis. The Conti Flow operation facilitates the development of the reaction or the optimisation of existing processes because the reaction can be traced accurately from start to finish. This allows the simple, yet highly accurate, control of photochemical reactions. The potential formation of by-products due to excess exposure, for example, can be traced exactly.
Although planar microphotoreactors exhibit reflection losses when coupling the radiation, which leads to a decrease in efficiency of the system, they have some key advantages and are often the method of choice.
The optimised mixed structures enable the formation of an extremely low coefficient of dispersion and ensure a highly efficient mixing of the reaction.

In combination with the innovative **nova**LIGHT FLED400 LED radiation sources, photochemical reactions can be performed in a wavelength-selective and energy-efficient manner. The continuous power control of the LEDs allows the accurate adjustment of the radiant flux to the requirements of the reaction. Thus the power consumption of the LED light source can be compared directly with a mercury vapour medium pressure radiation source (**nova**LIGHT FMP250).

Due to the high pressure resistance, higher flow rates can be driven in the planar microphotoreactor than would be possible with a tube reactor.





The microphotoreactors from Peschl Ultraviolet GmbH were designed specifically to meet the requirements of the photochemistry equipment.

They are available in borosilicate 3.3 and, for the first time, in quartz glass. The use of quartz glass as a reactor material in combination with LED light sources is not yet state-of-the-art since commercially available LED chips <350nm, were currently defined as non-usable due, among other things, to their limited service life. The microphotoreactor made of quartz glass is nevertheless useful in conjunction with a medium pressure radiation source (**nova**LIGHT FMP250), since quartz glass allows the performance of photochemical reactions <310nm. This fact makes the microphotoreactor from the **MPDS** modular system suitable for universal use and resolves existing restrictions in the market.

A bracket made of PTFE and stainless steel is used to record the microphotoreactor cell and its connection to the pump and the cooling circuit via HPLC connections and perfluorinated tubes. When designing, importance is attached to a robust design which takes into account the requirements of glass equipment in terms of good stress distribution on the glass cell.

The small reaction volume in the microphotoreactor can heat up due to the energy of the photons that are introduced. Thus the microphotoreactors from Peschl Ultraviolet GmbH were provided with an efficient cross-flow cooling on the back of the photoreactor cell to enable the reaction liquid to be thermally stabilised.

For conventional photoreactors, up-scaling is not performed primarily by scaling, but by multiplying the reaction systems until the output per unit of time (numbering-up) is achieved. For economic reasons, however, a certain „up-scaling" of photoreactors is often also required in the „numbering-up" in order to limit the number of photoreactors and the related costs of the infrastructure. Here, the planar microphotoreactor has advantages over the tube reactor because the resulting pressure loss during an enlargement of the format does not pose a significant problem due to the high pressure resistance.

The LED light sources can also be adjusted in size in a modular manner to the format of the reactor cells, thus enabling the construction of industrially suited microphotoreactor systems.

This type of process development makes it possible to scale laboratory results relatively risk-free in systems in order to achieve the target output.

The following aspects of this photoreactor are advantageous:

- Controlled thermal conditions
- Controlled flow rate
- Controlled conversion rate and analysis of reaction kinetics
- Long retention time
- High mass transfer in the photoreactor
- Chemically inert and stable
- Use of monochromatic LED light sources
- Customised reaction-optimised structure development is possible

Peschl Ultraviolet GmbH
Weberstraße 19, 55130 Mainz / Germany
peschl-ultraviolet.com

Phone +49 (0) 6131 143 845-0
Fax +49 (0) 6131 143 845-90
Email info@peschl-ultraviolet.com

Peschl Ultraviolet
advanced uv-products