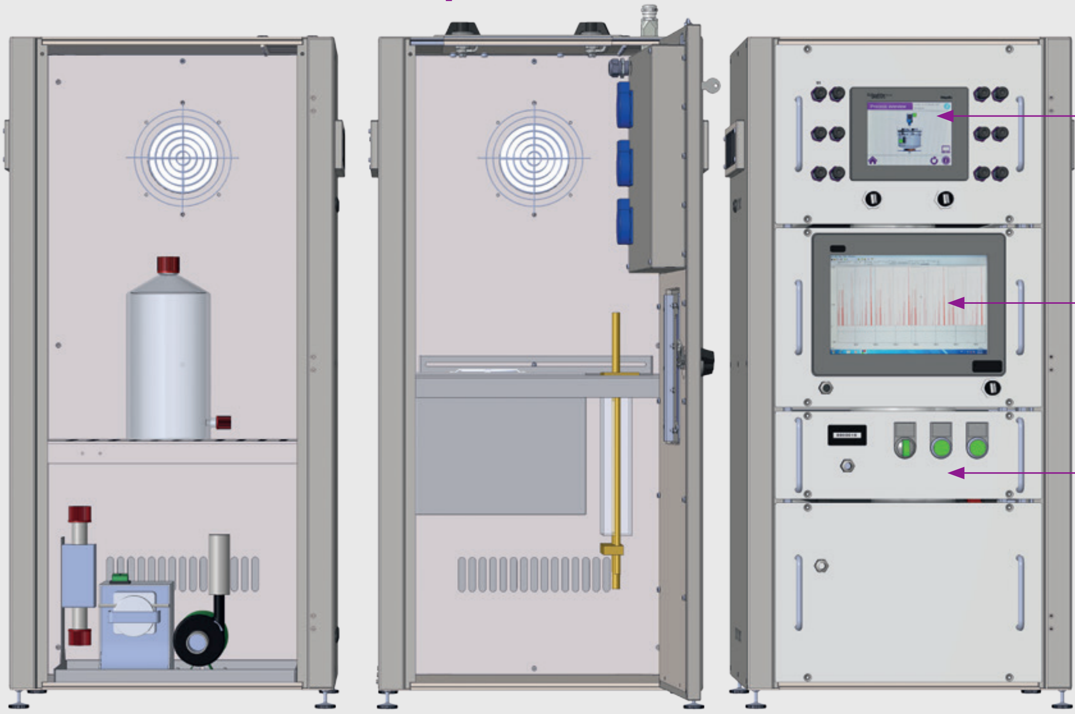


Example configuration

MPDSEVO Mikrophotoreactor novaLIGHT FMP250

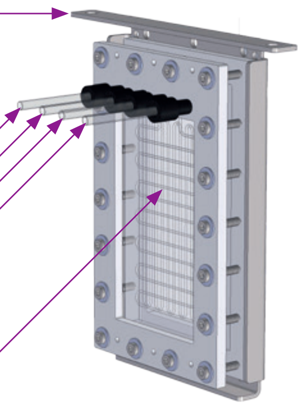
Batch reactors are limited in their lack of accurate reaction control and their inaccurate temperature management. Furthermore, the penetration depth of photons can often be limited due to absorption, thus an optimal photochemical reaction cannot take place.

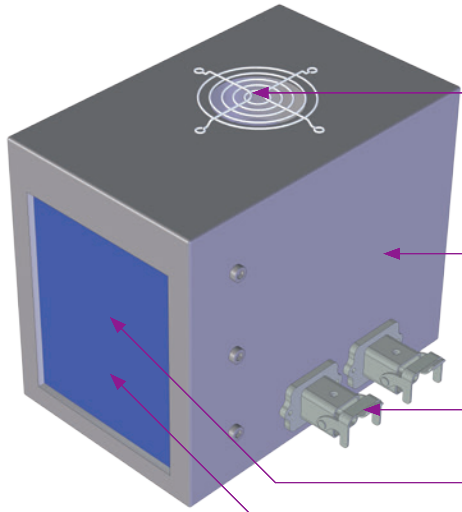
Conti Flow microphotoreactors from Peschl Ultraviolet GmbH resolve these limitations and enable controlled implementation of photochemically initiated reactions.

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 for basic experiments.

The optimised mixed structures enable the formation of an extremely low coefficient of dispersion and ensure a highly efficient mixing of the reaction.

When combined with the irradiation module **nova**LIGHT FMP250, the planar microphotoreactor enables a precise wavelength screening using filters and constitutes an important tool in the process development of photochemical reactions. By using interchangeable filters, the mercury spectrum can be viewed and evaluated in the absorption range of the reaction medium. The development of secondary reactions or of adverse photochemically initiated polymerisation effects can thus be precisely identified and analysed. This provides important parameters for selecting the optimal radiation source or data on edge filters or filter liquids that may be required.





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 is highly innovative and allows the implementation 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 hold 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. The band-pass filters used in the radiation module are sensitive to temperature. Therefore, the medium pressure radiation source used in the **nova**LIGHT FMP250 is air-cooled and the filter is thus thermally insulated.

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.
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
- Transmission into the UVC range
- Chemically inert and stable
- Possible wavelength screening
- Customised reaction-optimised structure development is possible