

# Modular mixer

The Modulomix is a continuous modular mixer based on proven Cyclomix batch mixing technology. It has been designed specifically for the pharmaceutical industry and can be used for low, medium or high shear applications. The Modulomix can be integrated in a PAT (Process Analytical Technology) environment.

For decades, pharmaceutical powder ingredients have been mixed using batch processes. However, continuous mixing is a very promising cost-saving device that can be recommended to pharmaceutical companies looking to reduce the costs of processing.

Converting to continuous processing also introduces a lot of new considerations which Hosokawa Micron B.V. can help you deal with. These considerations include:

- Feasibility trials
- Trials on a complete dry granulation production line
- PAT
- Defining batches in continuous processing
- Combining new processing equipment in existing production lines
- Up-scaling
- Reducing impact of start-up, change over and emergency downtime
- Minimising and dealing with off-spec product

## Working principle

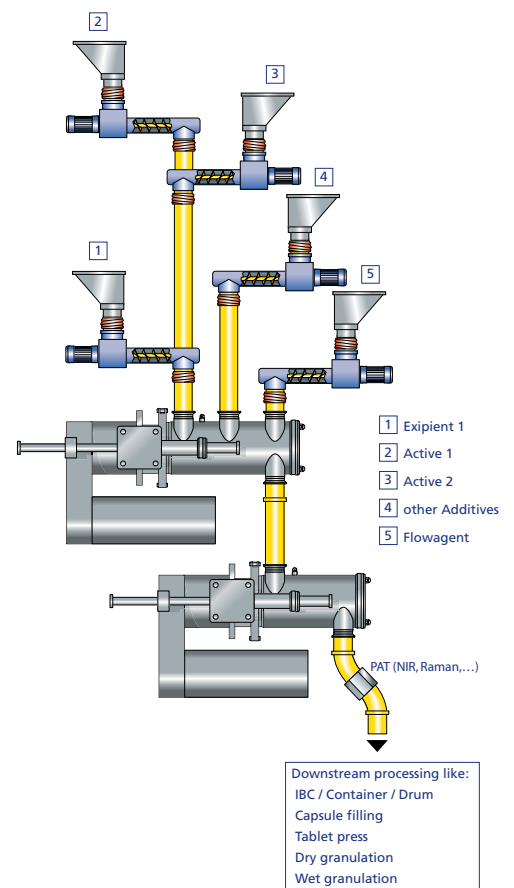
The Modulomix has been designed to be compact with fast reactivity, minimum residue and rapid start-up and shutdown protocols. It produces homogeneous blending in the blending chamber with little change to PSD (Particle Size Distribution) or temperature. Its intensive agitation regime produces a perfect mixture with extremely short residence times. It is fast and can be adapted to suit varying mixing conditions due to its variable speed as well as the design of its agitator blades. Mixing Mg-stearate for example, demands a different mixing regime to mixing drugs, which e.g. can be solved by cascading more than one Modulomix mixers in series.

As you can see in the flow diagram, up to 3 different products can be fed into inlet 1 at a time, thanks to the special inlet device on Modulomix 1. If required, you can also dose additional product(s) via inlet 2 on Modulomix 1, and all of these ingredients will be mixed efficiently by the Modulomix 1, normally under high shear conditions.

The lubricant can then be added through inlet 3 on Modulomix 1, which is directly connected to inlet 1 on Modulomix 2. The Modulomix 2 normally has lower shear conditions (needed for the lubricant) for creating the perfect final mix.

The final mix leaves the mixing system via a specially-designed PAT chute. Different PAT devices can be inserted to enable continuous control of the quality of the mix.

# Continuous mixing





## Key features

### Short residence times

Thanks to the high shear agitation regime in the mixer, the average residence times are very short. Nevertheless, repeated trials have demonstrated almost no PSD shifts due to this agitation regime and very good RSD (Relative Standard Deviation) values. Even at low throughputs (< 1 kg/h), choosing the right feeder will give RSD (5 sec.) values well below 5%. These values can be reduced even further by the mixer(s).

### Complete mixing system

The Modulomix has been designed to offer flexibility and adaptability as part of any continuous blending system. With help from our expert engineers, you will have no trouble specifying the best possible solution for all your powder processing requirements.

The Modulomix is a very compact blender that can be incorporated into Hosokawa Micron B.V.'s total continuous blending systems. This means that you can combine the Modulomix with Powder Transfer Systems (PTS), Loss-in-Weight (LIW) feeders, continuous blenders, PAT technologies and even downstream processing, like (wet) granulation and / or compacting.

A continuous Modulomix system could be complemented with:

- Refill system for pharma-feeders
- Reliable and accurate pharma-feeders (set point deviation  $\leq 3\%$ )
- Specially-designed filling system for dosing multiple feeder inputs into the mixing system
- Specially-designed PAT chute and PAT monitoring device(s)
- Specially-designed on-spec/off-spec downstream switches
- Specially-designed downstream off-spec bins
- Complete and PAT integrated controls (GAMP5)
- Easy connection to any downstream processing (granulation, tablet press, compactor etc.)



# Continuous pharma mixer

Low to high shear

Adaptable Compact Flexible

Short residence times

Minimum residue

Fast reactivity