LABORATORY AND PILOT MIXER-SETTLERS
TYPE MD

MD UX 1-4: laboratory mixer settler, battery of 4 stages

Types of applications:

→ PHARMACEUTICALS: Purification of active principles (e.g. antibiotics)
→ CHEMICALS: Washing (e.g. polymers) or extraction (e.g. acetic acid)
→ FOOD INDUSTRY: Purification of food components (e.g. lactic and citric acids)
→ HYDROMETALLURGY: Separation or purification (e.g. precious metals)
→ VARIOUS INDUSTRIES: Perfumes, aromas, essentail oils, etc.

28-stage battery SX 2-0, PVDF construction
6 stages: primary extraction
10 stages: stripping
12 stages: secondary extraction
**PRINCIPES ET DEFINITIONS:**

Liquid liquid extraction consists in transferring one (or more) solute(s) contained in a **feed solution** to another immiscible liquid (solvent). The solvent that is enriched in solute(s) is called **extract**. The feed solution that is depleted in solute(s) is called **raffinate**.

![Diagram](image)

The feed solution and the solvent are brought in intimate contact so as to carry out the transfer of the solute(s). The two outgoing liquid phases extract and raffinate are separated by static decantation (mixer-settler) or by centrifugal decantation (Rousselet Robatel centrifugal extractors LX or BXP).

**TECHNOLOGY:**

One stage of a mixer-settler is comprised of two zones:

**Mixer**: a mixing chamber where a mechanical agitator brings in intimate contact the feed solution and the solvent to carry out the transfer of solute(s). The mechanical agitator is equipped with a motor which drives a mixing and pumping turbine. This turbine draws the two phases from the settlers of the adjacent stages, mixes them, and transfers this emulsion to the associated settler.

**Settler**: a settling chamber where the two phases separate by static decantation. Coalescence plates facilitate the separation of the emulsion into two phases (heavy and light). The two phases then pass to continuous stages by overflowing the light phase and heavy phase weirs. The height of the heavy phase weir can be adjusted in order to position the heavy/light interphase in the settling chamber based on the density of each one of the phases.

![Image](image)
**CONSTRUCTION:**

**Materials of construction:** polyethylene, polypropylene, polyvinylidene fluoride, PTFE for sizes 1 and 2 only.

**Engine equipment:** the pumping turbine is driven in rotation by a three-phase, totally enclosed electric motor (IP55 protection) that can be explosion-proof. The motor is controlled by an AC variable frequency drive to adjust the speed of the agitation.

**Sight glasses:** a sight glass at the end of the settling chamber enables to visualize the separation between the two phases.

**Covers:** made from plexiglas or glass (depending on the sizes), can be positioned on the settling chamber to reduce solvent evaporation for instance.

**Size:** Rousselet Robatel provides 6 sizes of mixer-settlers ranging from 1 to 6 with many options for mixers and settlers of different volumes.

**Recycling:** the mixing efficiency or the phase separation may often be improved by increasing the flow rate of one of the phases — recycling of the phase from the settler to the mixer of the same stage.

Mixer-settlers of sizes 1 and 2 are equipped with internal recycling channels, a recycle phase selector, and a recycle flow regulator who carry out this functionality. Mixer-settlers of sizes 3 to 6 are equipped with connections for external recycling and the recycle flow can be adjusted by external piping systems.

**Intermediate inlets and outlets:** universal mixer-settlers UX are equipped with intermediate inlets and outlets at each stage. Various selectors permit operation of the required number of stages in a given battery and allow the division of the battery into several sections (for extraction, washing, back extraction for instance).

**VERSIONS**
Rousselet Robatel offers 3 versions of mixer-settlers:
- SX standard version Basic module
- RX version with internal recycling
- UX universal version with recycling of intermediate inlets and outlets
**Mixer-settlers**: special design for hydrometallurgy

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>MIXER-SETTLELS</th>
<th>TYPE</th>
<th>NUMBER OF STAGES</th>
<th>LENGTH OF ONE STAGE</th>
<th>WIDTH OF 4 STAGES BASIC MODULE, NIPPLES EXCLUDED (mm)</th>
<th>HEIGHT WITH STANDARD MOTOR (mm)</th>
<th>MIXER VOLUME (L)</th>
<th>SETTLER VOLUME (L)</th>
<th>DECANTATION AREA (cm²)</th>
<th>OVERALL FLOW RATE (L/h)</th>
<th>WEIGHT OF BASIC MODULE MADE OF POLYETHYLENE (Kg)</th>
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**ROUSSELET CENTRIFUGATION SA**

Head office: ROUSSELET CENTRIFUGATION SA
PAE de Marenton
07104 ANNONAY - FRANCE

UK ROUSSELET / ROBATEL U.K Ltd
Parkside House, 17 East Parade
HARROGATE
NORTH YORKSHIRE HG 1 5LF

Germany ROUSSELET CENTRIFUGATION S.A.
Bierbacher Str. 30
D-66424 HOMBURG-WÖRCSHEILER

USA ROBATEL Inc.
703 West Housatonic Street
PITTSFIELD
MA 01201

E-mail: rousselet.sa@ousselet.com
sales@rousselet-robate.com
rousselet@conline.de
sales@robate.com

Web: www.rousselet.com - www.rousselet-robate.com