

Langmuir–Blodgett trough

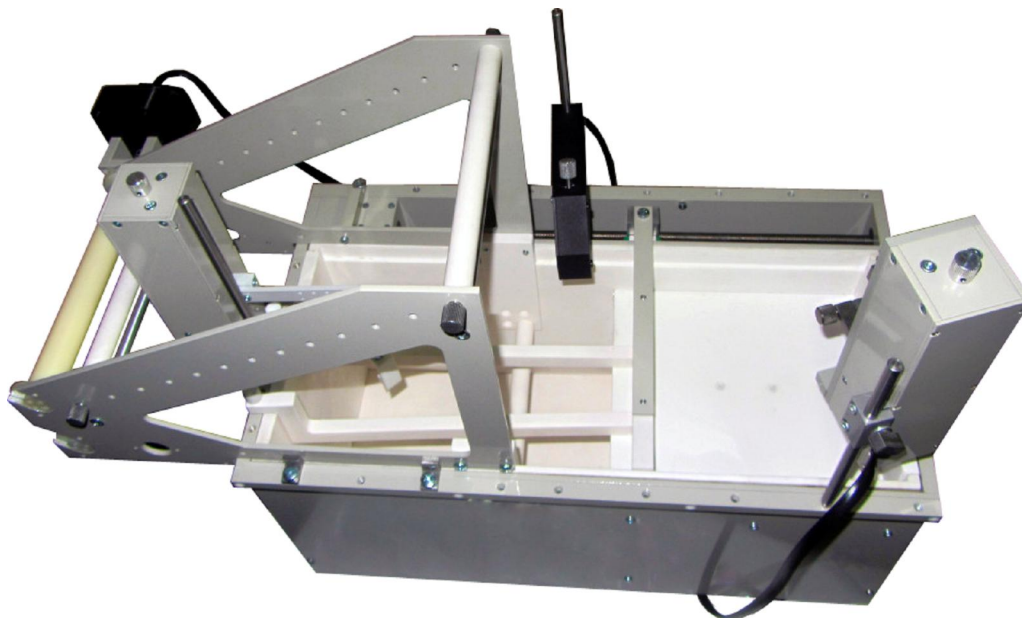
LT-310

A device for application of mono- and multimolecular films according to the Langmuir–Blodgett and similar techniques

Langmuir–Blodgett trough LT-310 is experimental scientific apparatus intended for application of mono- and multimolecular films according to the Langmuir–Blodgett (LB) and Langmuir–Schaefer (horizontal precipitation, HP) techniques. It also can be applied for deposition of thin layers of various nature on rigid substrates.

Langmuir–Blodgett trough represents an open PTFE vessel on metal frame. The vessel is used to fill it with a liquid (usually water) and to form on the liquid surface a thin monomolecular layer of studied substance(s). Moving barrier installed on the frame is used to compress the layer and to support its integrity while surface tension sensor traces the layer integrity. Immersing experimental substrates into the liquid in the vessel or lifting it up through the monomolecular layer allows transferring the monomolecular layer onto the substrate. Dipping mechanism serves for the vertical translation of the substrate. A dosing unit allows to automate application of the studied substance(s) on to the liquid surface.

Additional units and accessories allow to implement the monomolecular layer deposition for versatile substrate types: winding unit allows to deposit LB layer onto flexible substrate (tape), rig for horizontal precipitation also allows to deposit the monomolecular layer onto submerged substrate according to Langmuir–Schaefer technique by simple lowering of the liquid level (draining).



LT-310 apparatus with all the installed units and additional accessories

All sensors and mechanisms of LT-310 are driven by its control electronic unit. The control electronic unit also is connected to host personal computer via USB. All procedures of the apparatus are controlled from a specialized software run on the host PC.



Control electronic unit of LT-310 apparatus

CHARACTERISTICS OF LANGMUIR–BLODGETT TROUGH ‘LT-310’

Number of movable horizontal barriers:	One
Full free surface area:	855 cm ²
Maximum free surface area confined with the barrier:	815 cm ²
Compressed (effective) area:	620 cm ²
Liquid medium volume:	9600–10900 cm ³
Dipping well:	not smaller than 250x180x200 mm (w-d-h)
Maximum dimensions of the immersed substrate:	170x170x170 mm (w-d-h)
Travel range of the movable horizontal barrier:	350 mm
Velocity range of the barrier motion:	single side compression – 0.01 to 50 mm/min
Dipper mechanism stroke:	86 mm (vertical position of the unit can be adjusted manually)
Dipper mechanism velocity range:	0.01–40 mm/min,
Step of the dipper mechanism velocity change:	0.1 mm/min
Possibility of altering different monomolecular layers deposition:	Available
Delay between the layers deposition:	0–100000 s
Surface tension sensor:	Based on Wilhelmy plate 15x15 mm (vertical position of the sensor can be adjusted manually)
Working range of the surface tension sensor:	0–80 mN/m (stepped and fine adjustment of the range are available)
Sensitivity of the surface tension sensor:	0.05 mN/m
Number of surface tension sensors:	One / Two (two sockets for connecting sensors are available by default)
Dozer for substance feed to aqueous surface:	- syringe pump: with substance reserve 1 ml (syringes of up to 10 ml applicable), motion range of leading rod – 65 mm - peristaltic pump with flow rate about 0.157 ml per one revolution of motor
Overall dimensions:	Trough without mounted rig not bigger than – 490x280x260 mm (w-d-h); Maximum size with installed accessories – 660x340x500 mm (w-d-h); Control unit – 200x293x80 mm (w-d-h); Total weight (with all accessories and control unit) – 21 kg.
Supply voltage:	240 V 2.3 A 50 Hz
Control voltage supplied from control unit to elements of the trough:	+5 V; –5 V; +15 V
Power consumption:	Average 100 W, peak not more than 500 W (without host PC)
Additional accessories included:	<ul style="list-style-type: none"> • Substrate clamping holder for fixing flat objects on the dipper lever. • Rig for film application by the horizontal precipitation method (by liquid medium draining). • A unit for tape substrate winding with a set of guides. • The trough is equipped with one draining nozzle at bottom of the dipping well and 3 additional nozzles in shallow area, all nozzles for connecting tube of 5 mm inner diameter.

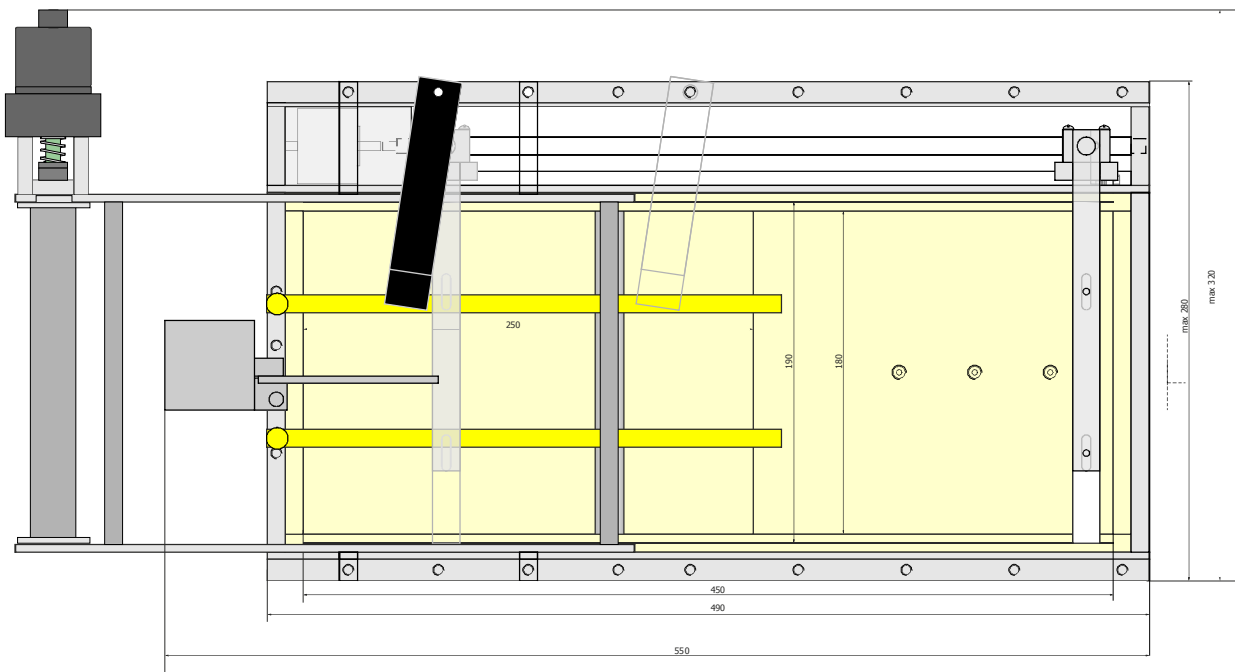
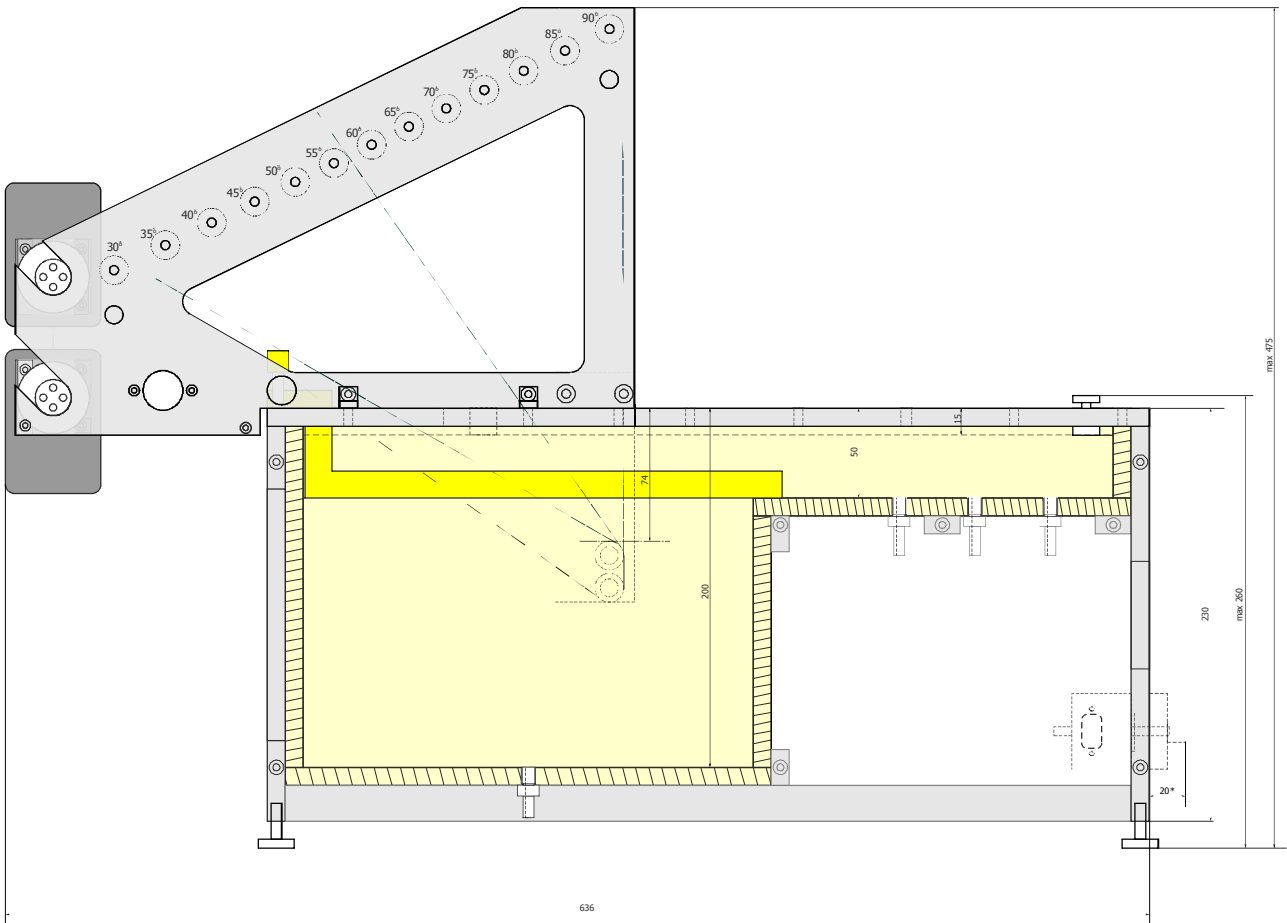
Housing: Aluminum with powder polymer coating, PVA, ABS.
Internals: PTFE.
Inner and minor elements: Aluminum, stainless steel, ABS.
Installation: 4 feet on bottom of the trough frame.
Connection: Mains cable with plug (German type).

Standard units are safety-approved and bear the test mark:

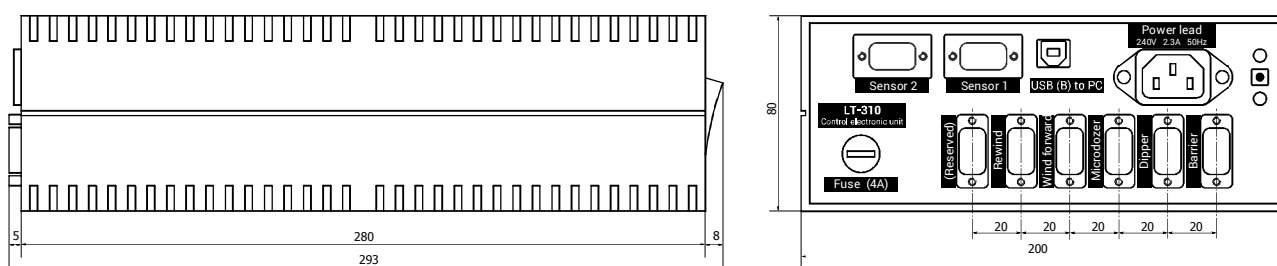


Interface:  USB.

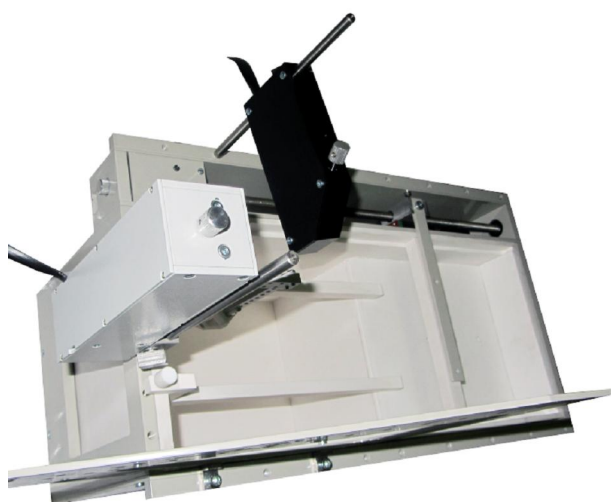
LT-310 trough schematics and dimensions



LT-310 control electronic unit dimensions



LT-310 configuration variants



Conventional LB trough configuration includes horizontal barrier, surface tension sensor and dipper unit



Configuration of the trough for horizontal precipitation includes horizontal barrier, surface tension sensor and specialized rig – two Z-shaped PTFE bars with adjusting screw on one end. Draining hose(s) are employed in the technique.



Configuration of the trough for deposition on tape substrate includes horizontal barrier, surface tension sensor and specialized rig for tape winding. Additionally, a microdozing unit may be also involved to automate replenishment of active substance in the liquid interface.



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