

The MID Instrument at the European XFEL

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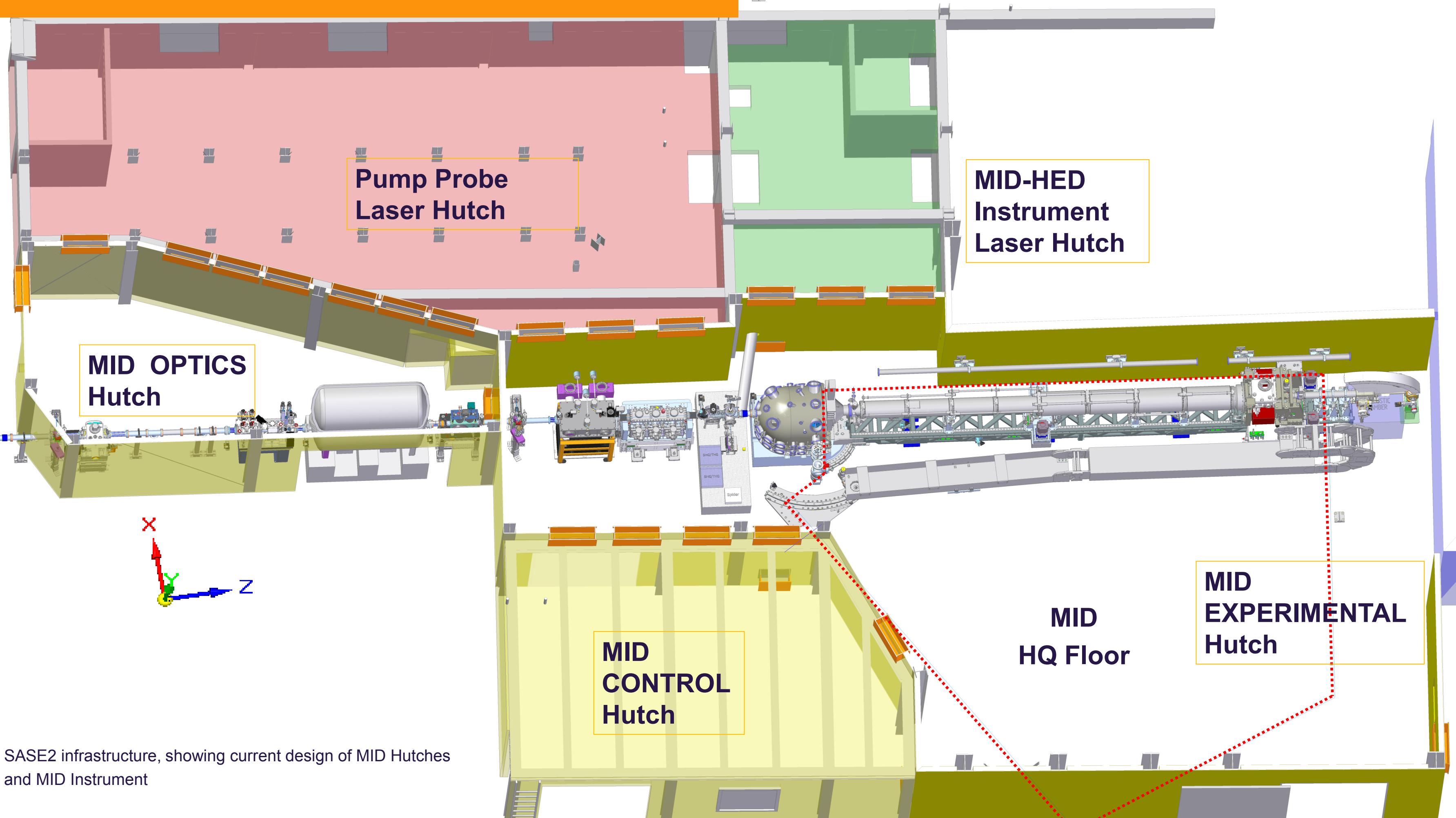
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Abstract: The Materials Imaging and Dynamics (MID) instrument of the European XFEL facility will provide unique capabilities in materials imaging and dynamics experiments, with particular focus on the application of coherent X-ray scattering and diffraction techniques. Coherent diffractive imaging (CDI) and X-ray photon correlation spectroscopy (XPCS) experiments are at the heart of the activities planned at the MID station, but also time-resolved scattering and imaging studies can be foreseen, taking advantage of the time structure and high flux of the X-ray free-electron laser (XFEL) beam. Here we present the technical realizations of the devices inside the Optics and Experimental Hutes. SAXS, WAXS and large field of view configurations are shown.

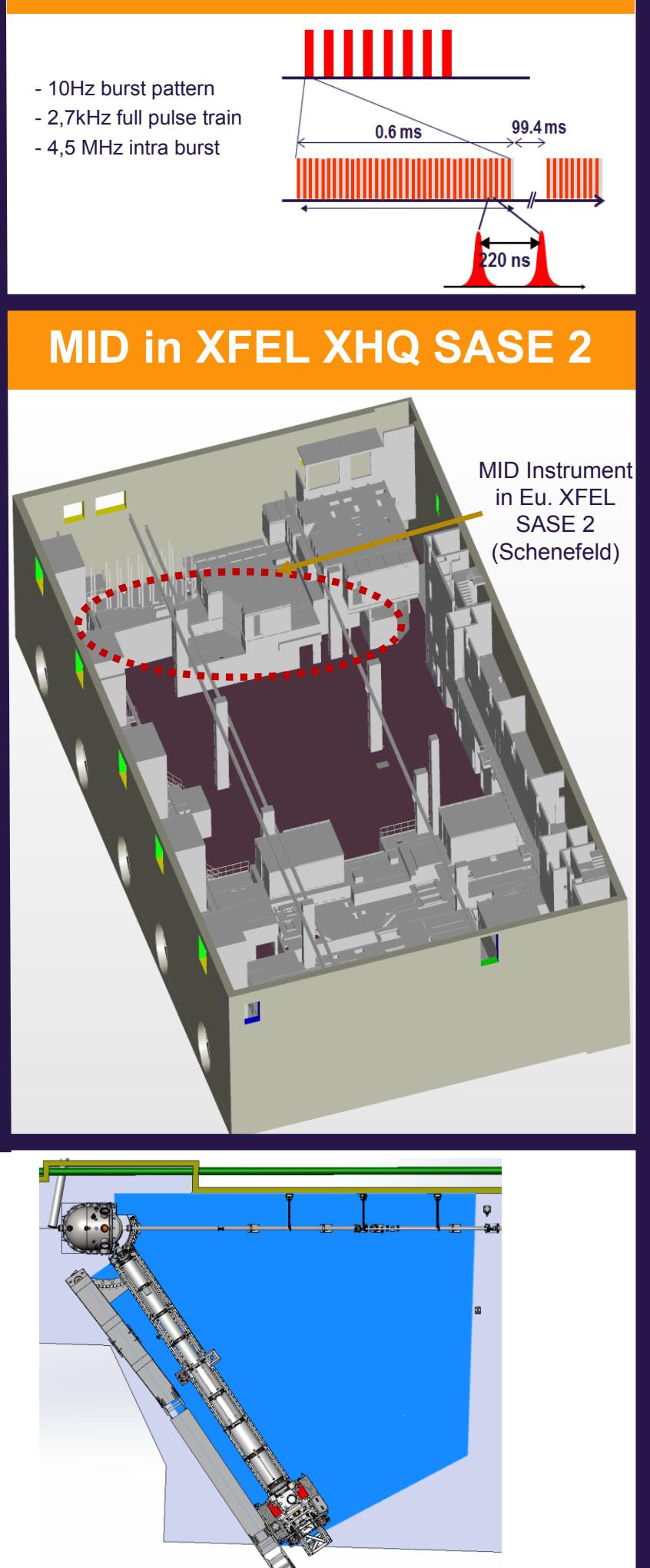
SASE 2 - MID Instrument



MID Instrument characteristics

Photon energy range	5–25 keV (coherent) and > 25 keV (high-energy option)
Bunch charge	1–1000 pC
Polarization	Linear (horizontal)
Pulse duration	1–100 fs
Beam size on the sample	1–200 μm, 1 mm, and nanofocus option
Beamline optics	2 monochromators (Si(111) and Si(220)) 2 compound refractive lens (CRL) translocator units Split and delay line High-energy Laue monochromator (optional)
Equipment	Multipurpose chamber, SAXS/WAXS geometries with long horizontal detector arm, small vertical WAXS setup, single-pulse X-ray diagnostics, different detector systems (AGIPD, FastCCD), optical pump laser source

XFEL Pulse Train

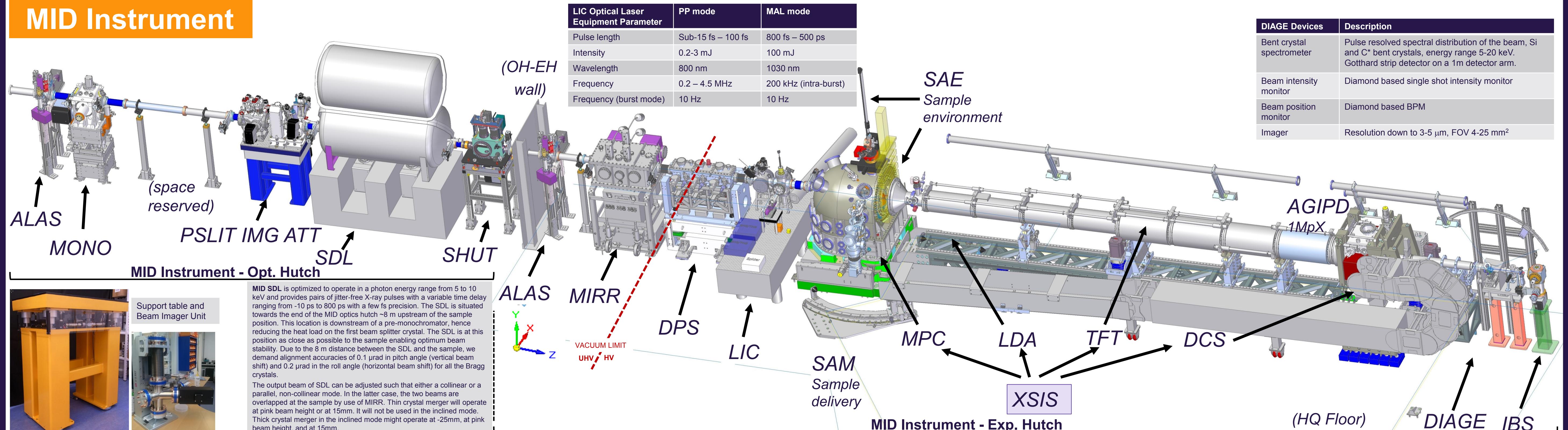


MID HQ Floor – main characteristics

Roughness	$R_z \leq 10 \mu\text{m}$
Planarity	$\leq 70 \mu\text{m} / \text{m}^2$ $\leq 600 \mu\text{m} / \text{total HQ floor (ca } 66 \text{ m}^2)$
Hardness	Mastic: Shore 80 Stone slabs: Shore 80 equiv.
Test run	with airpads



MID Instrument



Multi Purpose Chamber (MPC)

