

## Technical Specifications

<b>General Specifications</b>	
type of instrument	confocal Raman microscope for low temperatures and high magnetic fields
compatibility	for a toplayer cryostat or integrated into an optical table
objectives/lenses	high NA cryogenic objectives: LT-APO/532-Raman, LT-APO/633-Raman, LT-APO/NIR, others upon request
key features	detection of Raman peaks down to <10 rel. cm <sup>-1</sup> ; many upgrades including polarization control
<b>Modes of Operation</b>	
imaging modes	single point measurements or imaging (mapping) of Raman, photoluminescence or fluorescence
optional upgrades	polarization control and analysis
<b>Resolution</b>	
lateral resolution	<400nm (for 532nm excitation)
vertical resolution	<2µm (for 532nm excitation)
<b>Detection</b>	
spectrometer	mirror-free high throughput spectrometer with f=300; others upon request
filters	<90cm <sup>-1</sup> (RayLine Coupler), <10cm <sup>-1</sup> (RayShield Coupler) Raman cut-off (optional)
gratings	for 532nm excitation: 600/mm and 1800/mm (BLZ 500nm) on automated triple grating turret; others upon request
spectral resolution	<1cm <sup>-1</sup> /pixel (1800/mm grating)
CCD camera	high-sensitivity back-illuminated CCD detector, peltier-cooled to -60 °C at 20 °C room temperature, 1024x127 pixels, 90% quantum efficiency at 532 nm, 100 kHz readout; FI, DD, EMCCD upon request
<b>Sample Positioning</b>	
total travel range	5 x 5 x 4.8 mm <sup>3</sup> (open loop)
step size	0.05..3 µm @ 300 K, 10..500 nm @ 4 K
fine scan range	50 x 50 µm <sup>2</sup> @ 300 K, 30 x 30 µm <sup>2</sup> @ 4 K (open loop)
sample holder	ASH/QE/8/CFM or ASH/QE/4CX
<b>Suitable Operating Conditions</b>	
temperature range	1.8K..300K (attoDRY2100)
magnetic field range	up to 12T (depending on magnet)
<b>Excitation</b>	
excitation wavelength	532nm, 633nm, 785nm, others upon request
<b>Scan Controller and Software</b>	
scan controller	WITec USB 3.0 FPGA based scan controller providing open loop control of the cryogenic piezo-scanners, spectrometer control and full automation control (if chosen)
software	powerful WITec software package for video & data acquisition and analysis
<b>Inspection optics</b>	
field of view	>40µm diagonal
type of camera	color video image, good contrast for i.e. 2D materials
<b>Options and Upgrades</b>	
automation	TruePower (calibrated laser power), automated shutters, automated switching between white light and Raman, automated calibration
additional feedthroughs	DC and high-frequency lines & optical fiber feedthroughs
add ons	additional optical breadboards for home-built optics experiments (attoDRY2100)
software upgrade	TrueMatch: software for spectra analysis and for building up a spectral library
programming upgrade	LabVIEW package: building blocks for writing your own integrated control of temperature, magnet and Raman software

