AMOLF physics of functional complex matter

Annex

Technical specifications confocal fluorescence module for optical tweezers

Organization	[name]
Function	[function]
Ms./Mr.	[naam]
Contact details	[email]

1. Introduction

This schedule of requirements specifies the instrument and conditions concerning the purchase AMOLF intends to do. Requirements are to be considered as mandatory to comply with.

2. Conformity

We kindly ask you to fill in the table in chapter 3.

3. Requirements

Please state if you comply (“y” or “n”) with each of the requirements.

System features

Nr	Requirement	y/n
1.	The system is a single-molecule confocal fluorescence module for a C-trap optical tweezers instrument by Lumicks.	
2.	This capability to integrate these capabilities with a C-trap optical tweezers by Lumicks. The latter allows: the manipulation of individual polymers like DNA and polypeptides with step sizes of less than 0.2 nm, using traps with very high force (>1000 pN) and stiffness (1.5 pN/nm), measurement of forces and length changes of the polymer with very high resolution (<0.1 pN and <0.3 nm at 100 Hz, while showing very high force stability (<0.3 pN change over 2 minutes), an ultra-stable multi-channel micro-fluidics system with automated pressure-driven laminar flow, that enables constant flow-rate necessary for high-resolution measurements and enhanced throughput	
3.	The single-molecule confocal imaging of multiple differently labeled proteins on the polymer with single photon sensitivity, confocal spot positioning accuracy of less than 5 nm, leading to a proprietary localization precision of 15 nm with high background rejection, enabling measurements in high concentrations.	
4.	Combining the above measurements simultaneously and in real time, so that detected events can be correlated, while visualizing key data in an intuitive and interactive manner.	
5.	Directing all key instrument actions using a scripting language. Ability, for instance, to automatically start/stop imaging, change flow, capture beads, perform bead movements, while measuring forces.	
6.	All above measurements must be combined with an ultra-stable multi-channel micro-fluidics system with automated pressure-driven laminar flow and intuitive software, that enables an extremely constant flow-rate necessary for performing high-resolution single-molecule force-fluorescence measurements and greatly enhanced throughput.	

Confocal microscopy

Nr	Requirement	y/n
7.		
8.	Confocal resolution Diffraction limited	
9.	Spot position accuracy < 5 nm	
10.	Localization precision < 15 nm	
11.	Scanning speed Up to 100 Hz	
12.	Sensitivity Optimized for single fluorophore detection	
13.	Dark counts < 0.025 photons per pixel dwell time (0.1 ms)	
14.	Background rejection limit 100 nM at 1 ms integration time	
15.	Photon time tagging accuracy 10 ns	
16.	Field of view (x,y) 50 µm x 35 µm	

17.	Number of confocal colors (488 nm, 561 nm, 638 nm) 2 or more colors	
18.	The capability to integrate these capabilities with a C-trap optical tweezers by Lumicks, which allows: the manipulation of individual polymers like DNA and polypeptides with step sizes of less than 0.2 nm, using traps with very high force (>1000 pN) and stiffness (1.5 pN/nm), measurement of forces and length changes of the polymer with very high resolution (<0.1 pN and <0.3 nm at 100 Hz, while showing very high force stability (<0.3 pN change over 2 minutes), an ultra-stable multi-channel micro-fluidics system with automated pressure-driven laminar flow, that enables constant flow-rate necessary for high-resolution measurements and enhanced throughput	

Warranty and Services

Nr	Requirement	y/n
19.	All equipment should be guaranteed for trouble-free operation and against manufacturing defects for a minimum period of 12 months after the acceptance test at AMOLF. Sufficient numbers of rapidly wearing and consumable parts are to be included with the system to cover the warranty period. The Contracting Authority may demand from the supplier that they replace the products at their expense within the set term, if the products show defects which do not permit normal use in accordance with the terms of the contract, for a period of one year counting from the date of provisional acceptance at the place of delivery.	
20.	The vendor should guarantee the availability of spare parts and service support for at least 10 years.	
21.	Technical help desk support should be available during normal local office working hours.	
22.	The company must have a local (Benelux) service department.	
23.	The language of all support (visits and technical help desk) should be English or Dutch.	
24.	The Vendor should offer software updates for at least 10 years.	

Shipping and delivery

Nr	Requirement	y/n
25.	The system must be packaged for shipment in a way to ensure safe delivery.	
26.	The vendor ensures, under their full responsibility, the transport and installation of all equipment on the site.	
27.	Customs, shipping, transport, transport insurance and taxes are the responsibility of the vendor.	
28.	Delivery of the microscope uses the as-is path to the relevant room within the AMOLF building.	

Documentation

Nr	Requirement	y/n
29.	The following documentation will be provided as electronic pdf files in English: installation Manual, operation Manual and maintenance Manual	
30.	The following details will be provided in the documentation: system footprint, system dimensions and weight, and infrastructure requirements	

Other requirements

Nr	Requirement	y/n
31.	The system can operate in a lab environment compatible with biological samples (ML-I and ML-II).	
32.	The system should be new and not used.	
33.	The vendor should provide all pre-installation requirements.	
34.	The system should comply with all relevant safety regulations.	
35.	Offline software licenses are provided for processing of the acquired images	
36.	On request of AMOLF, the vendor shall demonstrate the capability of the system to comply with the requirements.	