Andor Revolution WD Detailed Description

The Andor Revolution WD spinning disk confocal is based around a fully motorized Nikon TiE inverted microscope equipped with differential interference contrast, LED transmitted and epi-fluorescent light sources, and Perfect Focus. An Okolab Bold Line stage-top incubator and controller provides temperature, CO₂ and humidity control. The objectives include a CFI Plan Fluor 10x/0.3NA objective with a 16mm working distance, a CFI Plan Apo 20x/0.75NA objective with a 1mm working distance, a CFI Lambda S Apo LWD 40X/1.15NA water immersion objective with a 0.59-0.61 mm working distance and 0.15-0.17 mm coverslip thickness correction collar, a CFI Plan Apo VC 60x/1.2NA water immersion objective with a 0.27 mm working distance, and a CFI Plan Apo VC 100X/1.4NA oil immersion objective with a 0.13 mm working distance. An ASI motorized piezo XYZ stage is equipped with rotary encoders for positional feedback and features a 22nm XY step size with a 120 x 100 mm range of travel and a 50 nm Z-axis step size with a 300 µm range of travel. The Yokogawa CSU-W1 confocal unit is fully motorized and equipped with two camera ports, two 10-position emission filter wheels, a motorized wide-field bypass mode, and a motorized adjustable aperture for a field of view of up to 17x16 mm. The spinning disk has 50 µm pinholes and operates at 1500-4000 rpm allowing for imaging at up to 200 frames per second. Motorized switching between three multi-band pass dichroics for multi-wavelength imaging across the visible spectrum: 405/488/561 nm (e.g. BFP/GFP/RFP); 405/488/561/640 (e.g. BFP/GFP/RFP/TOTO-3); and 445nm/514nm/640nm (e.g CFP/YFP/TOTO-3). The Revolution 500 series AOTF Laser Modulator and Multiport Combiner allows for fast switching between six solid state lasers providing the following laser lines: 100 mW 405nm diode laser, 50 mW 488nm DPSS, 40 mW 445nm diode laser, 515nm 50mW DPSS laser, 50 mW 561nm DPSS laser, and a 100 mW 640nm diode laser. A Precision Controller Unit allows synchronized triggering of the cameras and spinning disk unit. On one CSU-W1 camera port there is an Andor Neo16-bit sCMOS camera with 2560x2160 pixel chip and 6.5 um pixels deep-cooled to -40°C for fast confocal imaging with high spatial resolution and a wide field of view. This camera has a 57% quantum efficiency and is capable of up to 30 frames per second. On the other CSU-W1 camera port there is an Andor TuCam dual camera imaging adapter with two Andor iXon ULTRA 897BV black illuminated EMCCD cameras with 512x512 pixel chips and 16 µm pixels cooled deep-cooled to -70°C for fast confocal imaging with maximum sensitivity. These cameras have a quantum efficiency of >90% and are capable of up to 56 frames-per-second. The TuCam contains two selectable dual band-pass dichroic mirrors for simultaneous dual-wavelength imaging of CFP/YFP or GFP/mCherry. A laser-galvo operated FRAPPA unit introduced through a back port of the microscope allows for photobleaching or photoactivation of user-defined regions of interest within the field of view with fast switching using any of the six available laser lines. The entire system is controlled by a PC workstation with 32GB Ram, 27"LCD monitor with 2560x1440 resolution, nVidia high performance graphics processors, and MetaMorph 7X Premier software optimized for multi-dimensional acquisition and analysis capability.