InSight® X3+™ A and InSight X3™ A

Widely Tunable Ultrafast Lasers With Integrated Attenuation

mks | Spectra-Physics

The Spectra-Physics InSight X3+ A and InSight X3 A models are equipped with integrated attenuation for real-time optimization of the experimental pulse energy. Built on the proven InSight platform with >1,000 peer-reviewed publications, InSight X3+ A and InSight X3 A lasers are designed to produce results. Each model delivers high average power, short pulses and dispersion compensation to support the most demanding experiments in neuroscience, immunology and biology.

Based on patented technology[1], InSight is a hands-free, fully computer-controlled light source. It features a gap-free, 680 nm to 1300 nm tuning range which nearly doubles the accessible wavelengths when compared to traditional Ti:sapphire lasers. The InSight performance is optimized in the 900–1100 nm range to support the common green and red fluorescent proteins including GFP, RFP, GCaMP, jRGECO, and mCherry. With the InSight X3+ A increased output power, experiments using red flurophores in the 1200–1300 nm range can be performed.

InSight X3+ A and InSight X3 A are equipped with the standard, DeepSee integrated dispersion compensation to ensure pulse broadening effects are minimized. As a result, fluorescence signal and penetration depth are maximized. The integrated attenuators provide real-time adjustment of the output energy delivered to the sample. Their fast response time acts as a software-controlled switch that can be used to minimize exposure for delicate samples and to minimize backlash effects.

Both lasers can be equipped with a fixed 1045 nm dual beam option to support the diverse needs of multimodal imaging. The tunable and fixed outputs are synchronized which enables several applications including advanced imaging techniques such as CARS and SRS. The InSight also supports simultaneous, multi-wavelength excitation of fluorophores and/or genetically encoded calcium indicators, and second and third harmonic generation microscopies.

The InSight Advantage

- Field proven with the largest installed base in the market
- Real-time Integrated attenuation
- High reliability with >1,000 peer-reviewed publications
- Broad tuning range (680–1300 nm) for maximum flexibility
- Highest peak power for maximum fluorescence
- Short pulses using integrated DeepSee™ precompensation

Applications

- Multiphoton Imaging
- Stimulated Raman spectroscopy (SRS)
- Optogenetics
- Nonlinear spectroscopy
- Coherent anti-stokes Raman Spectroscopy (CARS)

1. Patents: https://www.newport.com/patent-information

InSight X3+ A and InSight X3 A Specifications[1, 9]

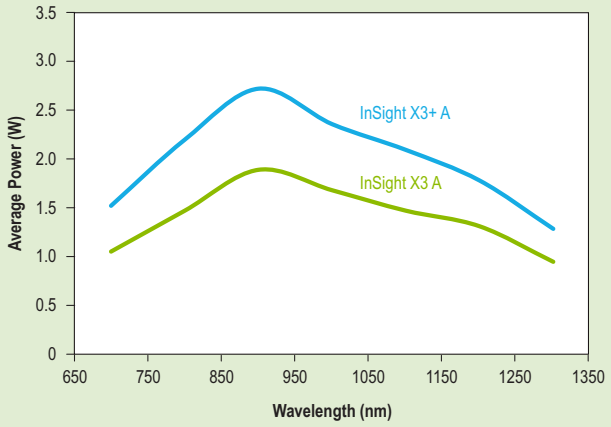
	InSight X3+ A		InSight X3 A	
Output Characteristic	Main Output	Dual Output	Main Output	Dual Output
Tunable Range	680–1300 nm	1045 nm (fixed)	680–1300 nm	1045 nm (fixed)
Average Power	>1.4 W at 700 nm >2.1 W at 800 nm >2.6 W at 900 nm >2.2 W at 1000 nm >2.0 W at 1100 nm >1.7 W at 1200 nm >1.2 W at 1300 nm	>3.0 W	>0.9 W at 700 nm >1.4 W at 800 nm >1.8 W at 900 nm >1.6 W at 1000 nm >1.4 W at 1100 nm >1.2 W at 1200 nm >0.9 W at 1300 nm	>3.0 W
Pulse Width[2, 3]	<120 fs	<170 fs	<120 fs	<200 fs
Noise[2, 4]	<0.5 %	<0.25 %	<0.5 %	<0.5 %
Precompensation Dispersion Range	680 nm: 0 fs^2 to -25,000 fs^2 800 nm: 0 fs^2 to -17,000 fs^2 900 nm: 0 fs^2 to -12,000 fs^2 1050 nm: 0 fs^2 to -5,500 fs^2 1300 nm: 0 fs^2 to -4,500 fs^2	N/A	680 nm: 0 fs^2 to -25,000 fs^2 800 nm: 0 fs^2 to -17,000 fs^2 900 nm: 0 fs^2 to -12,000 fs^2 1050 nm: 0 fs^2 to -5,500 fs^2 1300 nm: 0 fs^2 to -4,500 fs^2	N/A
Repetition Rate	80 MHz			
Spatial Mode[2]	TEM_{00} M^2 <1.2			
Beam Diameter($1/e^2$)[2]	1.1 ±0.3 mm			
Beam Divergence, full angle[2]	<1.5 mrad			
Beam Roundness[2]	0.8–1.2			
Beam Astigmatism[2]	<25 %			
Beam Pointing Stability[5]	<350 µrad			
Tuning Speed[6]	>50 nm/sec			
Stability[7]	<±1 %			
Polarization[2]	>500:1 horizontal			
Attenuator Control				
Rise Time [5% - 95%]	<500 ns			
Contrast Ratio	1000:1			
Minimum Control Step	0.1 %			
Analog Control	0–10 V			
Input Impedance[8]	10 kΩ			
Cooled Water Temperature in Closed-loop Chiller	21°C, Typical			
Electrical Requirements				
Power Supply	100-120 V~/200-240 V~, 50/60 Hz			
Chiller	100-200 V~, 50/60 HzC			
Total System Power Consumption	<1500 W			
Communication Interface	RS-232, USB, PC required			
Sync Signal	SMA			

InSight X3+ A and InSight X3 A Specifications[1, 9]

	InSight X3+ A	InSight X3 A
Environmental Requirements		
Altitude	Up to 2000 m	
Temperature, Operating	20–25 °C	
Relative Humidity, Operating	Maximum 75% non-condensing up to 25°C	
Temperature, Storage	15–35°C	
Relative Humidity, Storage	Maximum 65% for 15–35°C	
Cooled Water Temperature in Closed-loop Chiller	21°C, Typical	

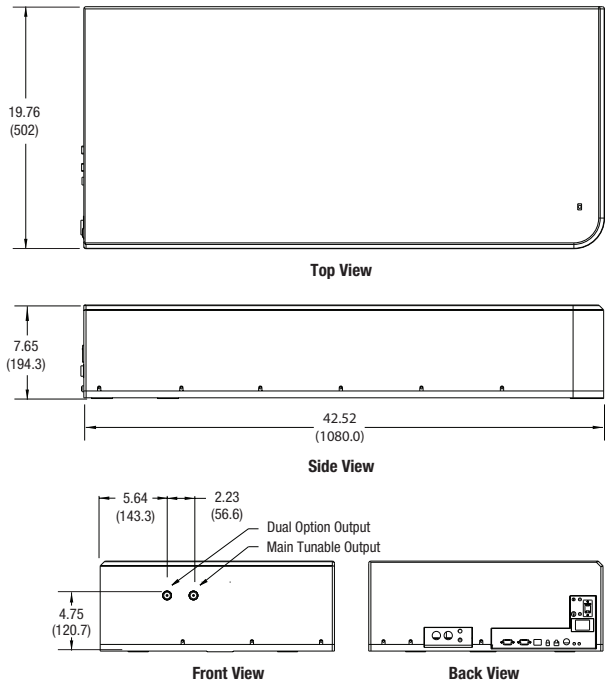
1. Due to our continuous improvement program, specifications may change without notice.
2. Specification applies to 900 nm (tunable) output.
3. A $sech^2$ pulse shape is used to determine the pulse width as measured with a Newport PulseScout® autocorrelator.
4. Specification represents rms noise measured in a 10 Hz to 10 MHz bandwidth.
5. Maximum deviation across the entire tuning range and precompensation dispersion range.
6. Averaged over entire tuning range.
7. Percent power drift in any 2-hour period with less than ±1°C temperature change after a 1-hour warm up.
8. For alternate impedence, contact factory.
9. **InSight X3+ A and InSight X3 A are Class IV – High-Power Lasers, whose beams are, by definition, safety and fire hazards. Take precautions to prevent exposure to direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.**

Typical InSight Tuning Curves*



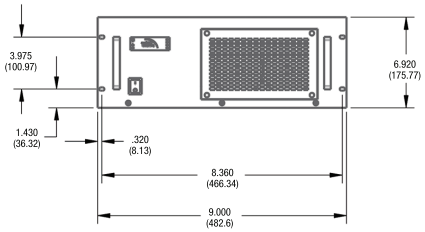
1. Typically measured performance; not a guaranteed or warranted specification.

InSight X3+ A and InSight X3 A Dimensional Drawing

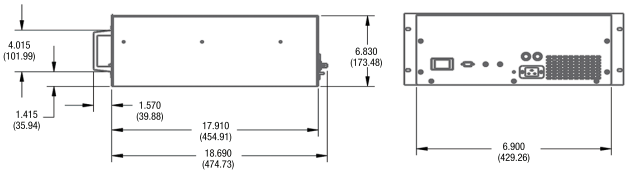


Dimensions in inch (mm)

InSight X3+ A and InSight X3 A Laser Head Dimensions



Outline drawing, power supply, front view



Outline drawing, power supply, side (left) and rear (right) views

Dimensions in inch (mm)

InSight X3+ A and InSight X3 A Power Supply Dimensions

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