

# Timing and Recombination Unit (TRU)



## For Ultrafast Applications

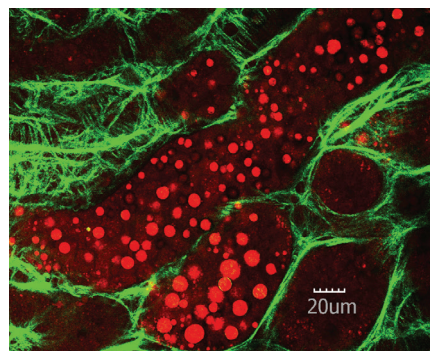
Newport's Timing and Recombination Unit (TRU) is a specially designed addition to dual wavelength, dual output laser sources, such as the Spectra-Physics InSight® X3™ Dual, allowing users to switch between single or dual beam output modes. Developed by research scientists in the MKS Technology and Applications Center, the TRU is engineered to facilitate a large variety of single and dual beam, ultrafast spectroscopy and imaging applications, such as single and multi-color two-photon fluorescence, pump-probe, SHG, SRS, CARS, and others.

Each beam is conveniently equipped with a manual or motorized variable attenuator for precise power control of the transmitted output. A specially designed, high accuracy, dual position manual slider assembly allows switching from a single to a dual beam collinear setup without affecting alignment. In the single beam regime, both the fixed (1045 nm) and/or tunable (680 – 1300 nm) beams of InSight X3 Dual are separately available. In the dual beam, collinear regime, it is possible to select the tunable laser wavelength from 760 nm to 940 nm, which when overlapped with the fixed 1045 nm output, corresponds to a Raman shift range of 1000 – 3500  $\text{cm}^{-1}$  for CARS and SRS. The beam paths and variable delay line are optimized to temporally and spatially overlap the fixed and tunable beams. The TRU compensates for the optical delay introduced by the DeepSee™ pre-compressor inside the laser, ensuring that transform limited pulses arrive at the focal plane of the objective.

The system includes silver mirrors on the fixed beam path, with the tunable beam path upgraded to broadband, ultrafast dielectric mirrors. Both versions provide temporally and spectrally distortion-free outputs.



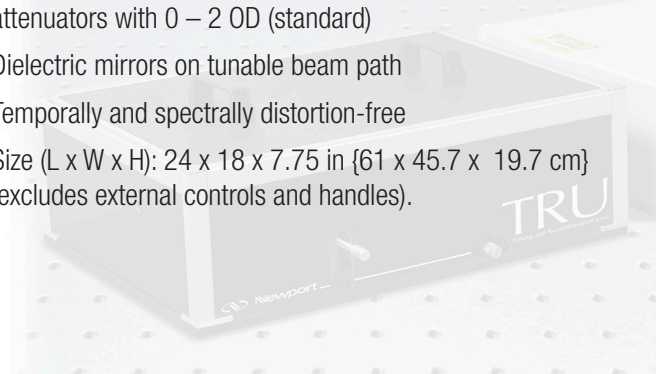
Above: TRU with the Spectra-Physics InSight® X3™ Dual laser (cover removed)



Left: CARS (red) and SHG (green) images of murine liver tissue

## Product Features

- Flexibly designed to work with dual wavelength, dual output laser sources, such as the Spectra-Physics InSight® X3™ Dual
- Easily switch between single or dual beam output, while maintaining beam alignment
- Collinear, dual beam operation, supports tunable wavelength range of 760 – 940 nm
- Includes two, manual or motorized Newport ultrafast variable attenuators with 0 – 2 OD (standard)
- Dielectric mirrors on tunable beam path
- Temporally and spectrally distortion-free
- Size (L x W x H): 24 x 18 x 7.75 in {61 x 45.7 x 19.7 cm} (excludes external controls and handles).



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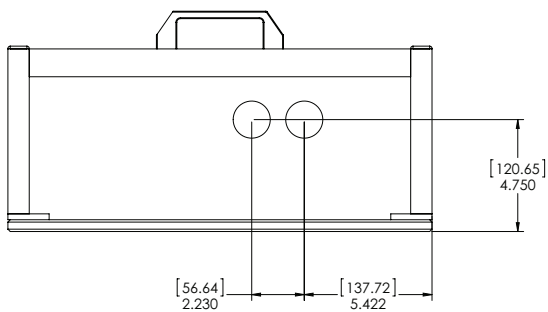
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### Specifications

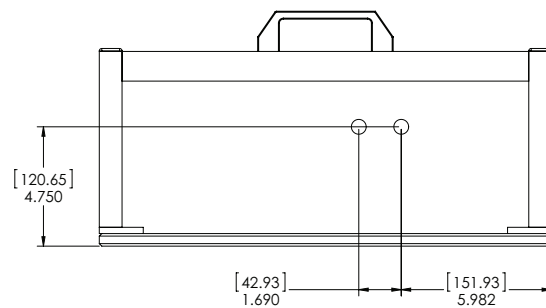
Fixed beam wavelength (typical)	1045 nm
Tunable beam spectral range (single beam)	680 – 1300 nm
Tunable beam spectral range (dual beam)	760 – 940 nm
Raman shift for CARS, SRS	1000 – 3500 $\text{cm}^{-1}$
Maximum throughput (dielectric mirrors)	>85%
Maximum throughput (silver mirrors)	>70%
Attenuation of tunable and fixed beams	0 – 2 OD
Output polarization of tunable and fixed beams	S- (vertical) standard*
Beam entrance/exit height	4.75 in (120.65 mm)

\* TRU can be custom configured for horizontal P- or mixed S-/P- outputs.

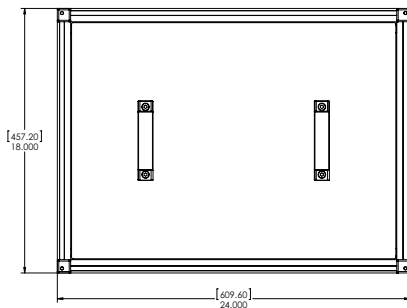
Front View



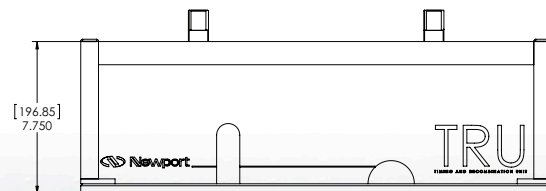
Back View



Top View



Side View



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