

LIOPSTAR-HQ

high repetition rate dye laser



- low ASE < 0,05%
- repetition rates up to 100 kHz
- highly efficient laser resonator
- eroded stainless steel case for oscillator and amplifier cells
- new state-of-the-art integrated electronics and user friendly LabView Software
- intelligent PI control for FCU autotracking unit
- temperature stabilized crystals
- USB port
- remote control via TCP / IP protocol
- smallest footprint

frequency conversion units

- internal open loop frequency doubling with look-up-table
- autotracking FCU available
- high scan speed, up to 10 nm/min
- usable for repetition rates from < 1 Hz up to 100 kHz
- temperature control for doubling crystal

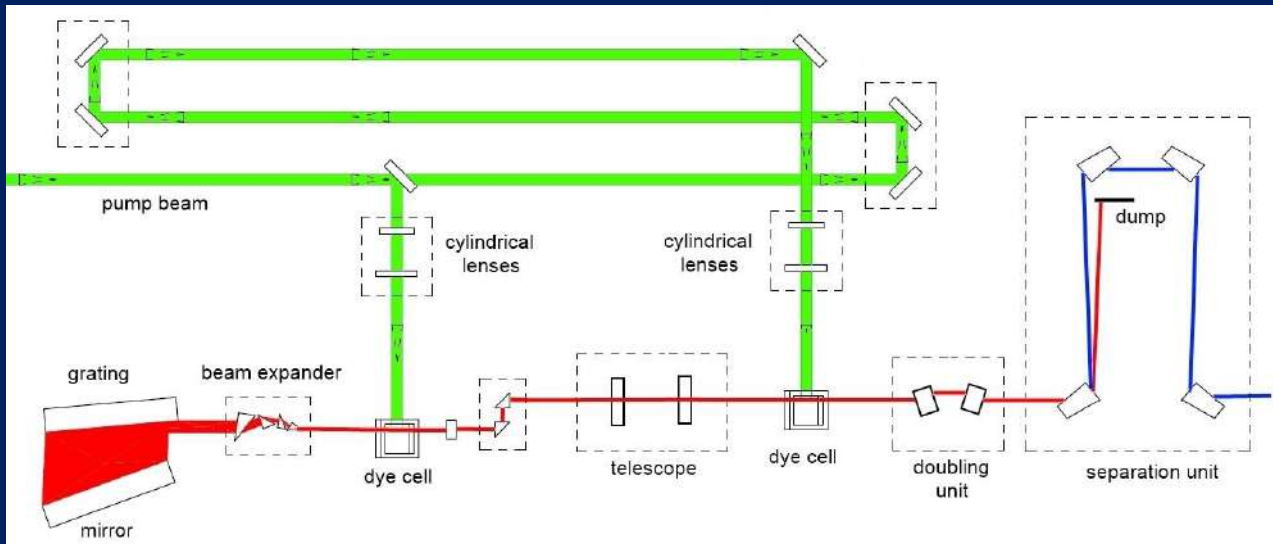
Options

- 3rd amplifier cell for high power operation
- temperature and flow monitoring

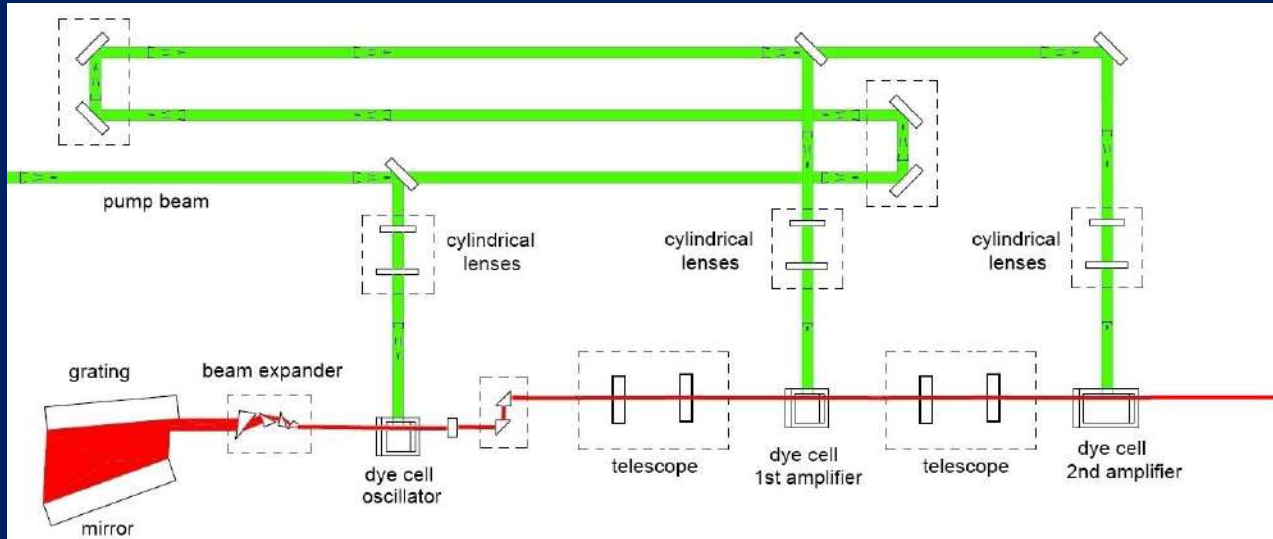
linewidth specifications		LIOPSTAR-HQ	
	grating	tuning range	linewidth
LIOPSTAR-HQ	1800 l/mm, 90 mm	430 nm – 900 nm	< 0.08 cm ⁻¹ @ 565 nm
LIOPSTAR-HQ	2400 l/mm, 90 mm	430 nm – 740 nm	< 0.06 cm ⁻¹ @ 565 nm
specifications		LIOPSTAR-HQ	
conversion efficiency: Nd:YAG pumped 532 nm, 10 kHz, 10ns, 40W Nd:YAG pumped 532 nm, 10 kHz, 10ns, 15W	10 W, 25% @ 564 nm 6.8 W, 17% @ 640 nm 2 W, 13% @ 440 nm	Rhodamine 6G DCM Coumarin 120	
conversion efficiency: Nd:YAG pumped 532 nm, 10 kHz, 10ns, 90W Nd:YAG pumped 355 nm, 10 kHz, 10ns, 30W	20 W, 22% @ 564 nm 13.5 W, 15% @ 640 nm 3.3 W, 11% @ 440 nm	Rhodamine 6G DCM Coumarin 120	
conversion efficiency SHG	>10%		
conversion efficiency: Nd:YAG pumped 532 nm, 1 kHz, 150ns, 90W	20 W, 22% @ 564 nm 500 mW, 2.5% @ 282 nm	Rhodamine 6G SHG	
wavelength reproducibility	< 0.002 nm		
absolute accuracy	< 0.01 nm		
scan linearity	< 0.002 nm		
wavelength stability	< 0.001 nm/°C		
divergence	0.5 mrad		
polarisation	> 98 %	vertical	
ASE-background	< 0.5 %		
dimensions		LIOPSTAR-HQ	
LIOPSTAR-HQ	1040 mm x 400 mm x 300 mm ± 10 mm, 80 kg		
beam input height	180 mm ± 10 mm		
beam output height	200 mm ± 10 mm		
requirements		LIOPSTAR-HQ	
cooling for dye solvent	800 Watt, resonator & amplifier system		
laboratory	dust-free air (flow box)		
voltage	110...230V, single phase, 50 Hz/ 60 Hz		
computer	single USB port		
operating system	Windows XP/ Windows Vista/ Windows 7		
pump laser pulse power, kHz operation	up to 150 Watt		

specification are subject to change without notice

LiopStar-HQ



LiopStar-HQ with 3rd amplifier (rectangular cell or Bethune cell)



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TRLi SERIES

Compact High Energy and High Repetition Rate Q-switched Nd:YAG Lasers

2 0 2 0



TRLi Series

Designed for flexibility and enhanced user experience

APPLICATIONS

- OPO Pumping
- Ti:Sa Pumping
- Dye Laser Pumping
- Deflashing
- Cleaning
- Spectroscopy
- Photoacoustic Imaging
- LIBS
- LIDAR & Remote Sensing
- Flash Photolysis
- Ablation
- PLD



Bolt and play harmonic modules

All harmonic wavelengths of Nd:YAG (532nm, 355nm, 266nm and 213nm) are available via dedicated separate easy change modules. Each harmonic module automatically adapts to a pre-set configuration.

Intellihead™ laser function control

The Intelligent laser head uses a dedicated microprocessor to provide precision control over a host of functions including harmonic temperature stabilisation, automatic harmonic tuning, energy monitoring and attenuator controls. The system continuously monitors the Intellihead card and the PSU microcontroller, providing feedback to the user via the LUCi controller.

Automatic harmonic tuning and auto-stabilisation

As standard, all the harmonic modules are angle tuned with high precision linear actuators for auto-tuning at start up or on demand. Continuous auto-tuning is then possible due to the fast response of the mechanical angle tuning as opposed to conventional thermal tuning. This feature maintains the set energy over long periods of continuous operation and includes a PSU control function to compensate for the lamp aging process.

Integrated motorised beam attenuator

A high resolution motorised variable attenuator is standard for harmonic modules. This provides continuous energy adjustment of the laser output whilst keeping all other beam parameters constant. An optional motorised variable attenuator for 1064nm is available.

Twin-rod architecture for high beam homogeneity

A twin-rod birefringence compensating oscillator design is standard on all TRLi series. This feature ensures the highest beam homogeneity possible. The benefits are seen in low M^2 (higher focusability), better beam profiles and more efficient harmonic conversion.

LUCi touchscreen system control interface

Full access to the control parameters and sensor feedback from the laser head and power supply are all via the intuitive LUCi touchscreen user interface or the TRLi PC software.



LUCi Touchscreen

Fast set up and total control

The laser head and LUCi controller connect directly to the PSU and the whole laser can be assembled and running in less than 15 minutes.

TRLi



Flexible and upgradable

The standardised mechanical mounting system for the harmonic modules ensures add-on modules will always be available for your TRLi laser. The laser system firmware and LUCi software can also be easily upgraded via USB.

Large model range

The TRLi series encompasses both high energy (850mJ) and high repetition rate (200Hz) models. With the addition of super-Gaussian, Telescopic and Stable resonator choices, choosing a TRLi for your precise application could not be easier.

The ultimate modular laser system

Not only does TRLi Series provide access to all harmonic modules, it offers additional BET and OPO modules for an even wider range of applications.



TRLi with OPO module



TRLi Beam Expanding Telescope (BET) module

User experience

All TRLi lasers are field rugged and sealed to IP54 against the ingress of moisture and dirt. The laser resonator is housed in a body machined from solid aluminium to ensure high mechanical and optical integrity.

A comprehensive 2 year warranty, long flashlamp lifetimes and the Litron guarantee of quality build make the TRLi series one of the easiest lasers to own and maintain.

Super-Gaussian Compact High Energy Q-switched Nd:YAG Lasers

TRLi G RANGE SPECIFICATIONS

Model	TRLi G 850 -10	TRLi G 650 -10	TRLi G 450 -10	TRLi G 400 -20	TRLi G 600 -20	TRLi G 550 -30	TRLi G 350 -30	TRLi G 320-50
Repetition Rate (Hz)	10	10	10	20	20	30	30	50
Output Energy (mj)								
1064nm	850	650	450	400	600	550	350	320
532nm	435	325	220	200	300	275	175	160
355nm ⁽¹⁾	230	150	130	120	100	90	70	60
266nm	100	70	60	50	60	60	40	30
213nm ⁽²⁾								
Pulse Stability (±%) [RMS] ⁽³⁾								
1064nm	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]
532nm	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]
355nm	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]
266nm	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]
Power Drift (±%) ⁽⁴⁾								
1064nm	3	3	3	3	3	3	3	3
532nm	5	5	5	5	5	5	5	5
355nm	5	5	5	5	5	5	5	5
266nm	10	10	10	10	10	10	10	10
Pulse Duration (ns) ⁽⁵⁾								
1064nm	6-7	6-7	6-7	6-7	6-9	6-9	6-9	6-9
532nm	5-6	5-6	5-6	5-6	5-8	5-8	5-8	5-8
355nm	5-6	5-6	5-6	5-6	5-8	5-8	5-8	5-8
266nm	5-6	5-6	5-6	5-6	5-8	5-8	5-8	5-8
Beam Parameter								
Beam Diameter (mm) ⁽⁶⁾	9.5	8.0	6.4	6.4	8.0	8.0	6.4	6.4
Beam Divergence (mrad) ⁽⁷⁾	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
M ² @ 1064nm ⁽⁸⁾	<2	<2	<2	<2	<2	<2	<2	<2
Pointing Stability (µrad) ⁽⁹⁾	<35	<35	<35	<35	<35	<35	<35	<35
Timing Jitter ⁽¹⁰⁾	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Linewidth @1064nm (cm ⁻¹)	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Spatial Profile Near Field ⁽¹¹⁾	>0.75	>0.75	>0.75	>0.75	>0.75	>0.75	>0.75	>0.75
Spatial Profile Far Field ⁽¹²⁾	>0.95	>0.95	>0.95	>0.95	>0.95	>0.95	>0.95	>0.95
Lamp Life (pulses)	10 ⁸	10 ⁸	10 ⁸	10 ⁸	10 ⁸	10 ⁸	10 ⁸	10 ⁸
Services								
Voltage	100-250VAC	100-250VAC	100-250VAC	100-250VAC	100-250VAC	100-250VAC	100-250VAC	100-250VAC
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Power Phase	Single	Single	Single	Single	Single	Single	Single	Single
Cooling	Air Cooled	Air Cooled	Air Cooled	Air Cooled	Water Cooled	Water Cooled	Water Cooled	Water Cooled
Ambient Temp ⁽¹³⁾	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C
Water Temp ⁽¹⁴⁾					20°C	20°C	20°C	20°C
PSU Type	LPU1000	LPU1000	LPU1000	LPU1000	19" Rack	19" Rack	19" Rack	19" Rack

1. High energy 355nm as standard with standard 2HG module.

2. Contact Litron for more information.

3. Peak-to-Peak Energy - 100% of pulses.

4. 8 Hours continuous running without adjustment.

5. FWHM - Fast photodiode and >1GHz oscilloscope.

6. Beam diameter is rod diameter - FWHM diameter will be smaller.

7. Full angle for 90% of the output energy.

8. Measured using ISO 11146-1:2005.

9. Half angle.

10. Jitter is measured with respect to the Q-switch trigger input.

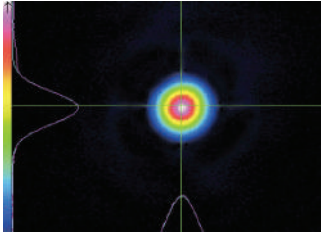
11. Least squared fit to Gaussian at ~ 0.4m from the laser output.

12. Least squared fit to Gaussian at the focus of a 1m lens.

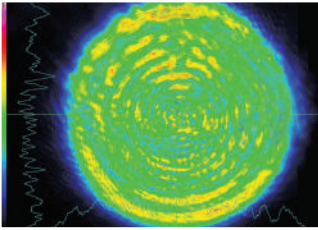
13. 5 to 80% relative humidity (non condensing).

14. >8 lpm at <5 bar.

* LPU1000 - 110VAC option requires autotransformer to be specified on order.



Far Field at 1064nm >95% Gaussian fit.



Near Field at 1064nm

Stable Telescopic Compact High Energy Q-switched Nd:YAG Lasers

TRLi ST RANGE SPECIFICATIONS

Model	TRLi ST 850-10	TRLi ST 650-10	TRLi ST 450-10	TRLi ST 400-20	TRLi ST 550-30
Repetition Rate (Hz)	10	10	10	20	30
Output Energy (mJ)					
1064nm	850	650	450	400	550
532nm	425	325	225	200	225
355nm	130	100	80	65	80
266nm	95	70	55	50	60
213nm ⁽¹⁾					
Pulse Stability (±%) [RMS] ⁽²⁾					
1064nm	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]
532nm	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]
355nm	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]
266nm	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]
Pulse Duration ⁽³⁾					
1064nm	9-12	9-12	9-12	9-12	9-12
532nm	8-11	8-11	8-11	8-11	8-11
355nm	7-10	7-10	7-10	7-10	7-10
266nm	7-10	7-10	7-10	7-10	7-10
Beam Parameter					
Beam Diameter (mm) ⁽⁴⁾	9.5	8.0	6.4	6.4	8
Beam Divergence (mrad) ⁽⁵⁾	<0.8	<0.8	<0.8	<0.8	<0.8
Pointing Stability (μrad) ⁽⁶⁾	<100	<100	<100	<100	<70
Timing Jitter ⁽⁷⁾	<0.5	<0.5	<0.5	<0.5	<0.5
Linewidth @ 1064nm (cm ⁻¹)	<0.7	<0.7	<0.7	<0.7	<0.7
Lamp Life (pulses)	10 ⁸	10 ⁸	10 ⁸	10 ⁸	5x10 ⁷
Services					
Voltage	100-250VAC	100-250VAC	100-250VAC	100-250VAC	220-250VAC
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Power Phase	Single	Single	Single	Single	Single
Cooling	Air Cooled	Air Cooled	Air Cooled	Air Cooled	Air Cooled
Ambient Temp ⁽⁸⁾	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C
PSU Type	LPU1000	LPU1000	LPU1000	LPU1000	16U Rackmount

1. Contact Litron for more information.

2. Pulse-to-pulse energy.

3. FWHM - Fast photodiode and >1GHz oscilloscope.

4. Beam diameter is rod diameter - FWHM diameter will be smaller.

5. Full angle for 90% of the output energy.

6. Half angle.

7. RMS jitter. Measured with respect to the Q-switch trigger input.

8. 5% to 80% relative humidity (non condensing).

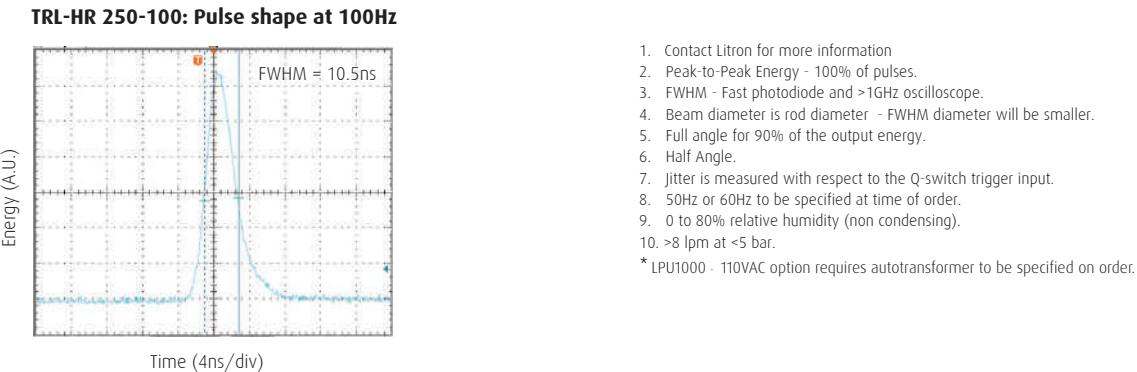
* LPU1000 - 110VAC option requires autotransformer to be specified on order.



TRLi HR RANGE SPECIFICATIONS

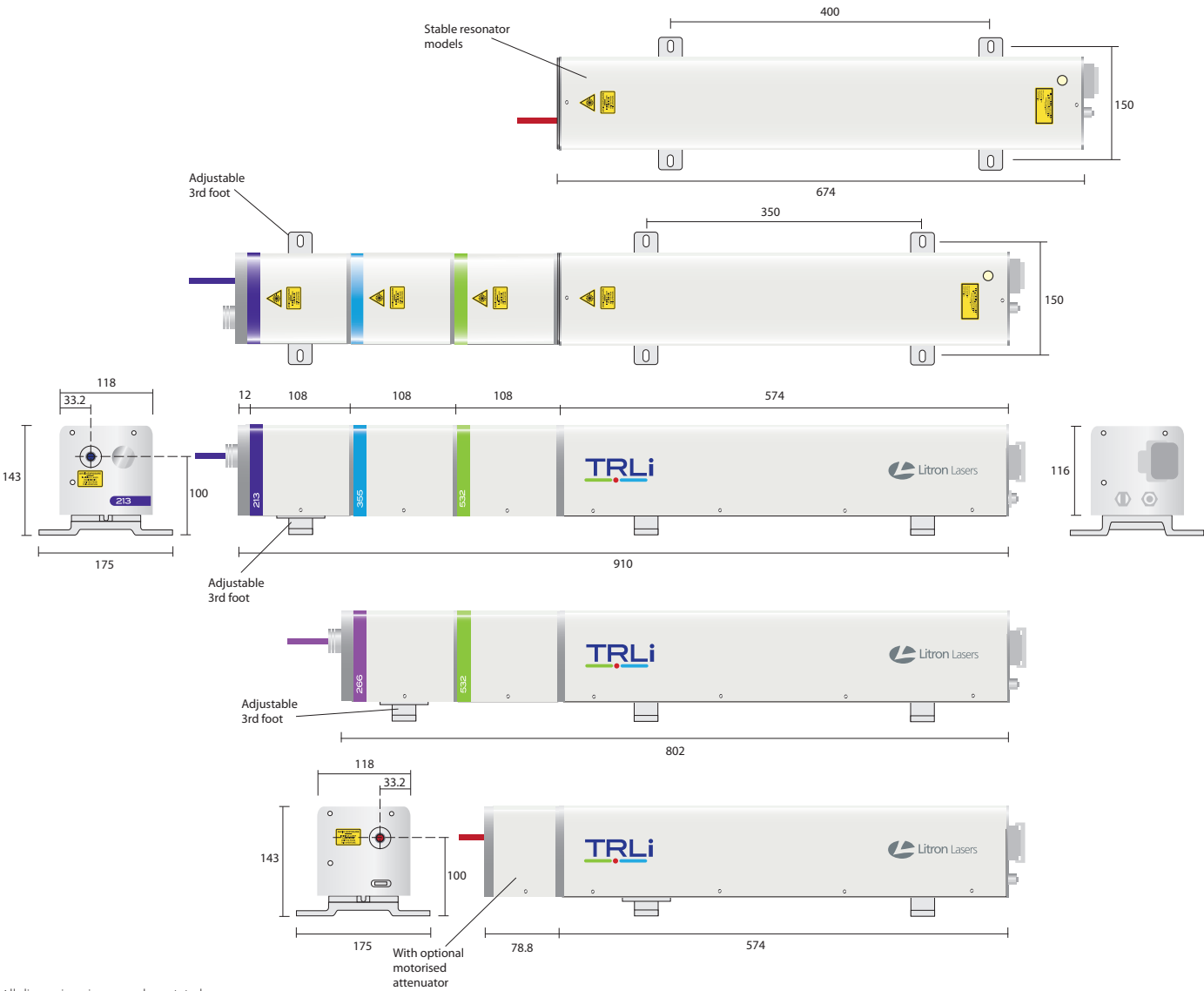
High Repetition Rate Compact High Energy Q-switched Nd:YAG Lasers

Model	TRLi HR 320-50	TRLi HR 100-100	TRLi HR 250-100	TRLi HR 80-200	TRLi HR 120-200
Repetition Rate (Hz)	50	100	100	200	200
Output Energy (mJ)					
1064nm	320	100	250	80	120
532nm	160	60	130	45	65
355nm	60	20	45	15	20
266nm	30	10	20	7	9
213nm ⁽¹⁾					
Pulse Stability (±%) [RMS] ⁽²⁾					
1064nm	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]	2 [0.6]
532nm	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]	3 [1.0]
355nm	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]	4 [1.3]
266nm	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]	6 [2.0]
Pulse Duration ⁽³⁾					
1064nm	8-11	8-11	8-11	8-11	8-11
532nm	8-10	8-10	8-10	8-10	8-10
355nm	7-9	7-9	7-9	7-9	7-9
266nm	7-8	7-8	7-8	7-8	7-8
Beam Parameter					
Beam Diameter (mm) ⁽⁴⁾	6.4	6.4	6.4	6.4	6.4
Beam Divergence (mrad) ⁽⁵⁾	<8	<8	<8	<8	<8
Pointing Stability (µrad) ⁽⁶⁾	<50	<50	<50	<50	<50
Timing Jitter ⁽⁷⁾	<0.5	<0.5	<0.5	<0.5	<0.5
Linewidth @ 1064nm (cm ⁻¹)	<0.7	<0.7	<0.7	<0.7	<0.7
Lamp Life (pulses)	10 ⁸	10 ⁸	10 ⁸	10 ⁸	10 ⁸
Services					
Voltage	100-250VAC	100-250VAC	100-250VAC	100-250VAC	100-250VAC
Frequency ⁽⁸⁾	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Power Phase	Single	Single	Single	Single	Single
Cooling	Water Cooled	Air Cooled	Water Cooled	Water Cooled	Water Cooled
Ambient Temp ⁽⁹⁾	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C
Water Temp ⁽¹⁰⁾	20°C		20°C	20°C	20°C
PSU Type	19" Rack	LPU1000	19" Rack	19" Rack	19" Rack



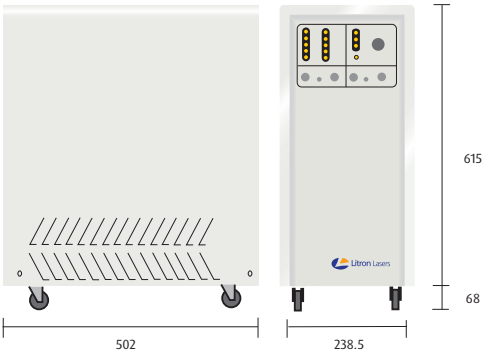
MECHANICAL DATA

Laser Head with Doubler, Tripler, Quadrupler & Quintupler Units

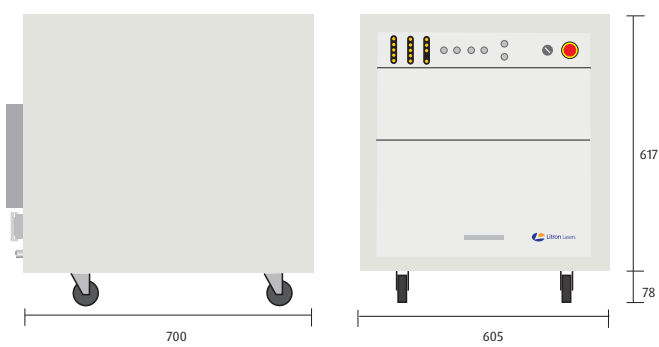


All dimensions in mm unless stated.

LPU1000 PSU



12U Rackmount PSU



TRLi Series

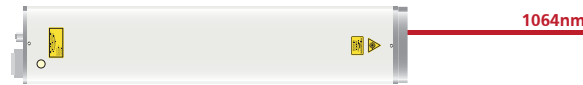
Flexible model options to suit most applications

All model options are available with harmonic auto-tuning, auto-stabilisation and variable motorised attenuator.

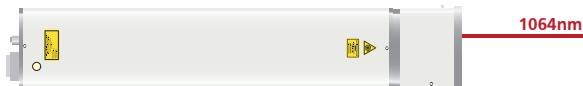
Other model options include:

Built-in harmonic diode pointer.

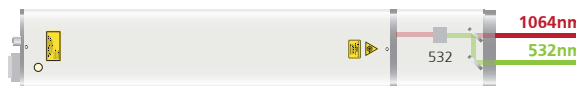
Options for 1064nm output



Options for 1064nm output with optional motorised attenuator



Options for 532nm output



Options for 355nm output



Options for 266nm output



Option for 213nm output



*For details on 213nm, please contact Litron directly



Our policy is to improve the design and specification of our products. The details given in this document are not to be regarded as binding.



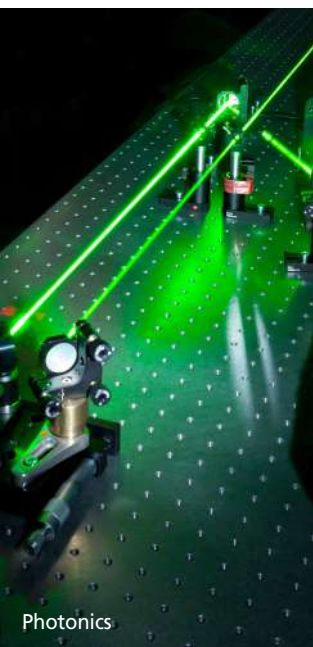
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VIBRATION ISOLATION SYSTEMS



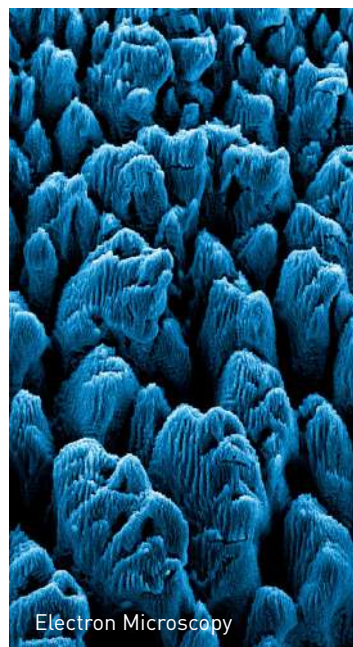
Photonics



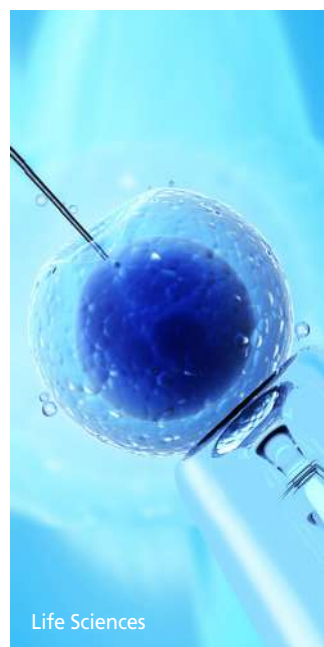
Semiconductor



Metrology



Electron Microscopy



Life Sciences

DVIA-T Series

Tabletop Active Vibration Isolation Platform



Features

· Isolating Sub-Hertz Vibration

DVIA-T series provides excellent vibration isolation performance in 1–10 Hz, where the low frequency vibration critically disturb nanoscale measuring tools. The vibration control range of DVIA-T series starts from 0.5 Hz, achieving 90% vibration isolation at 2 Hz.

· Automatic Leveling to Payload Weight

If there are changes in an environment and location or placing other instruments, users can adjust a level of DVIA-T by simply pressing a button.

· Portable Design

The smallest model is 420 mm x 500 mm 93mm which weighs only 25 kg, allowing user to hand carry and install on any place at all.

· Optimal Vibration Solution

Our own software provides the optimized vibration solution by employing the software to tune the feedback and feedforward control systems depending on users' instruments weight and environments, if required by users.

· It's Simple. Plug and Play!

DVIA-T incorporating a Plug & Play operation system, allowing users to use all functions by simply plugging a power cable in to AC power and pressing buttons.

· Real-Time Monitoring

With the GUI software and integrated active sensors allow users to monitor real time vibration levels and isolation performance. Furthermore, an LCD display on the front side of DVIA-T, enables users to monitor the automatic leveling and real time vibration levels.

· No Air

Metal springs are integrated in DVIA-T series as to reduce high frequency vibrations and compressed air is not required.



Electron Microscopy



3D Optical Surface Metrology

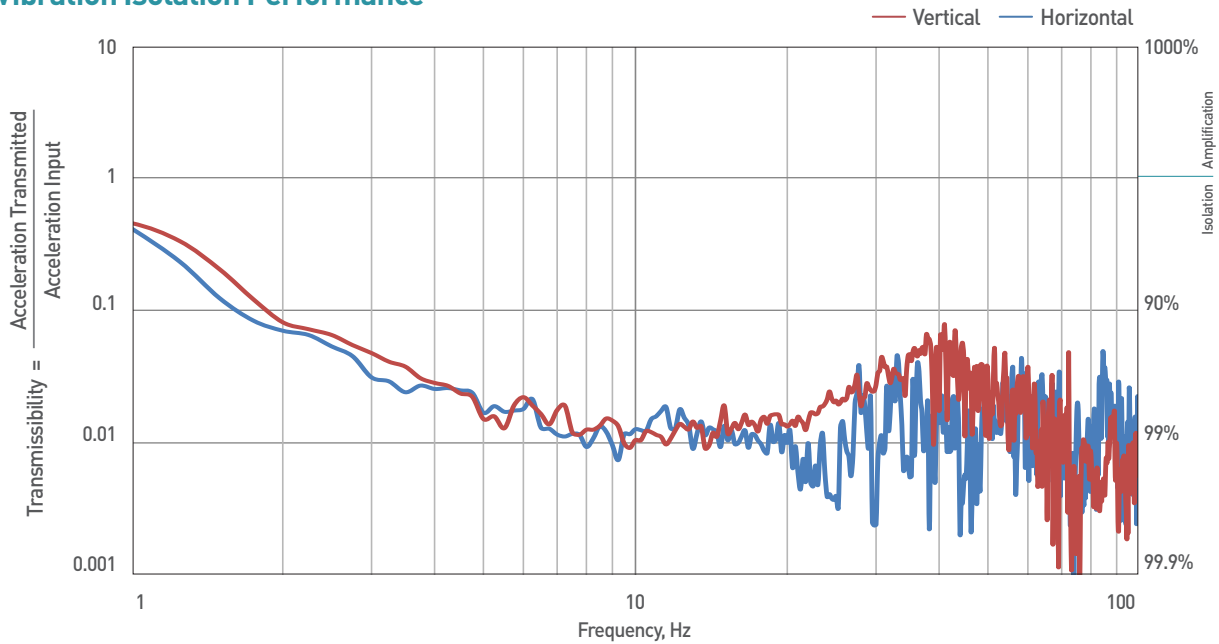


AFM

Application

- Tabletop SEM
- Atomic Force Microscopy
- Scanning Probe Microscopy
- Optical Microscopy
- Confocal Microscopy
- Interferometry
- Micromanipulation
- Nanoindentation
- Ultra-Precision Metrology Tools

Vibration Isolation Performance



Specifications

Model No.	DVIA-T45	DVIA-T56	DVIA-T67	DVIA-T78
Dimensions (W x D x H)	420 x 500 x 93 mm	500 x 600 x 93 mm	600 x 700 x 95 mm	700 x 800 x 95 mm
Maximum Load Capacity	90 kg / 150 kg	90 kg / 150 kg	90 kg / 150 kg	90 kg / 150 kg
Weight	25 kg	32 kg	47 kg	56 kg
Actuator	Electromagnetic Actuator			
Maximum Actuator Force	Vertical : 6 N, Horizontal : 3 N			
Active Isolation Range	0.5 – 100 Hz			
Degrees of Freedom	6 degrees			
Vibration Isolation Performance	40 – 80% at 1 Hz / ≥90% at ≥2Hz			
Settling Time	≤0.3 sec*			
Automatic Leveling / Load Adjustment	Yes			
Real-Time Monitoring	Active isolation status and automatic leveling on LCD display			
Top Plate	No Mounting Holes / M6 Mounting Holes / Custom			
Transportation	Internal Lock System			
Input Voltage (V)	AC 80 – 260 V / 50 – 60 Hz			
Power Consumption (W)	Less than 36 W			
Operating Range	Temperature (°C)	5 – 50 °C		
	Humidity (%)	20 – 90%		

*0.3 sec settling time is measured after 90% reduction of input. (The settling time varies with several conditions, such as payload, force, natural frequency, etc.)

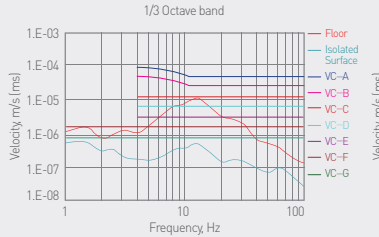
DVIA-T Case Studies



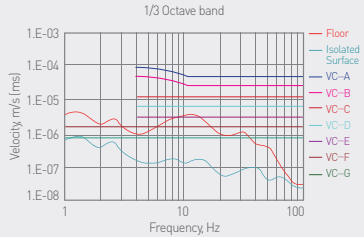
AFM Cantilever

The comparison of silicon substrate images measured on DVIA-T and a normal work table, clearly indicates that the DVIA-T remarkably reduces the vibration seen in the images.

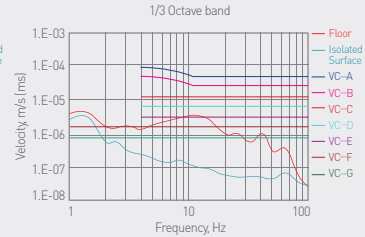
Z-axis



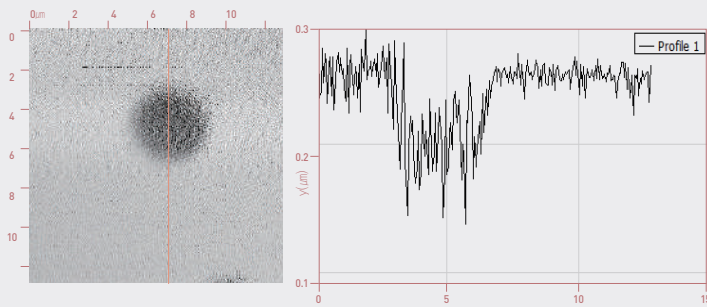
X-axis



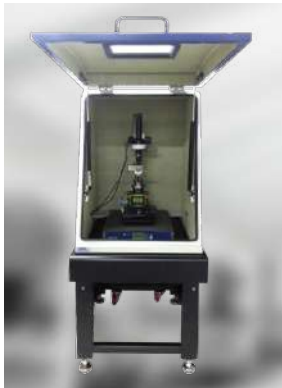
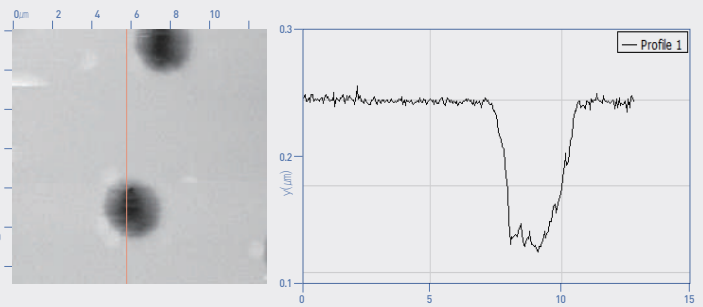
Y-axis



Silicon substrate images measured on the normal table (without vibration isolation)



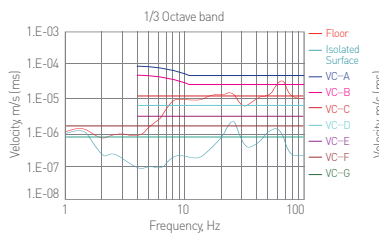
Silicon substrate images measured on the DVIA-T (active vibration isolation)



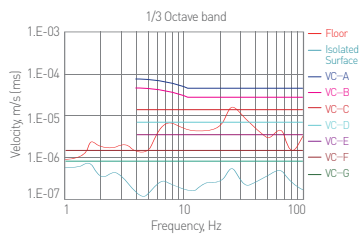
Bruker MULTIMODE8-U AFM

We compared line profile images that were measured on the DVIA-T placed inside the acoustic enclosure and on the pneumatic vibration isolation table.

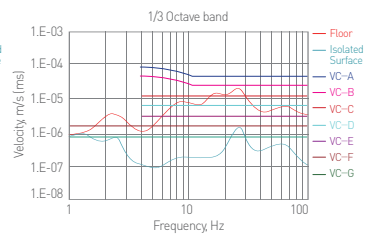
Z-axis



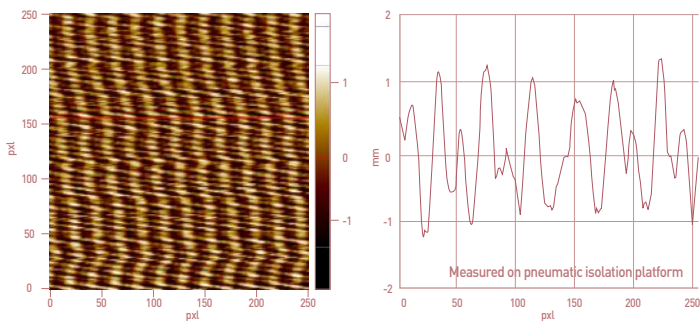
X-axis



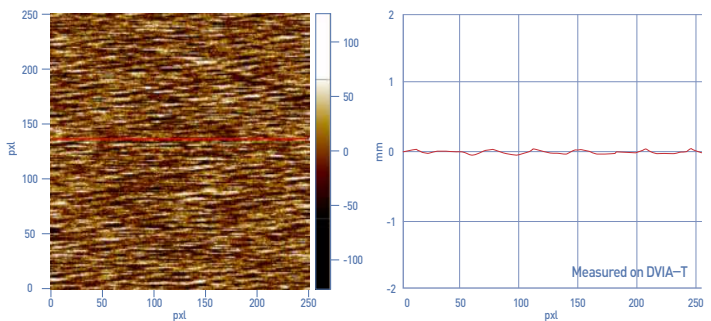
Y-axis



Pneumatic Vibration Isolation Platform



Set point of DVIA-T : 563.25 (nN)



The comparison of the line profile images demonstrated that the noise originating from the pneumatic vibration isolation table were 10 times bigger than the noise coming from the DVIA-T.



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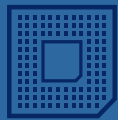
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