



## TRLi SERIES

Modular High Energy Q-switched  
Nd:YAG Lasers



# TRLi Series

Designed for flexibility and enhanced user experience



## APPLICATIONS

- **OPO Pumping**
- **Ti:Sa Pumping**
- **Dye Laser Pumping**
- **Deflashing**
- **Cleaning**
- **Spectroscopy**
- **Photoacoustic Imaging**
- **LIBS**
- **LIDT**
- **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 touch screen user interface or the TRLi PC software.



LUCi Controller

### 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.





Motorised variable attenuator

IP54 Sealed output window



Intelligent bolt-on harmonic unit

### Fibre Delivered Seeder

With the addition of an injection seeder, output linewidths of  $0.003\text{cm}^{-1}$  are possible. The use of a high stability, high power single longitudinal mode (SLM) seed laser gives unsurpassed lock for continuous SLM output.

### 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 resonators, matching the specification of a TRLi to your precise application could not be easier.

### The ultimate modular laser system

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



Disconnectable laser head



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 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

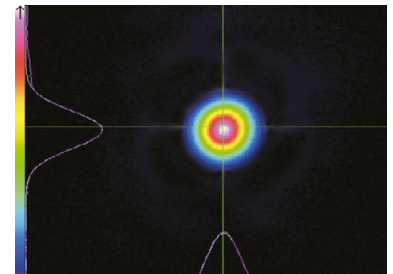
## TRLi G RANGE SPECIFICATIONS

Model	TRLi G 850-10	TRLi G 650-10	TRLi G 450-10	TRLi G 600-20	TRLi G 400-20	TRLi G 550-30	TRLi G 350-30	TRLi G 320-50
<b>Repetition Rate (Hz)</b>	10	10	10	20	20	30	30	50
<b>Output Energy (mJ)</b>								
1064nm	850	650	450	600	400	550	350	320
532nm	435	325	220	300	200	275	175	160
355nm <sup>(1)</sup>	230	150	130	130	120	90	70	60
266nm	100	70	60	60	50	60	40	30
213nm <sup>(2)</sup>								
<b>Output Energy SLM Option* (mJ)</b>								
1064nm	765	585	405	540	360	495	315	285
532nm	390	290	200	270	180	245	155	145
355nm <sup>(1)</sup>	230	150	130	130	120	90	70	60
266nm <sup>(2)</sup>								
<b>Pulse Stability (±%) [RMS] <sup>(3)</sup></b>								
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]
<b>Power Drift (±%) <sup>(4)</sup></b>								
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
<b>Pulse Width (ns) <sup>(5)</sup></b>								
1064nm	6-7	6-7	6-7	6-9	6-7	6-9	6-9	6-9
532nm	5-6	5-6	5-6	5-8	5-6	5-8	5-8	5-8
355nm	5-6	5-6	5-6	5-8	5-6	5-8	5-8	5-8
266nm	5-6	5-6	5-6	5-8	5-6	5-8	5-8	5-8
<b>Beam Parameter</b>								
Beam Diameter (mm) <sup>(6)</sup>	9.5	8.0	6.4	8.0	6.4	8.0	6.4	6.4
Beam Divergence (mrad) <sup>(7)</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
M <sup>2</sup> @ 1064nm <sup>(8)</sup>	<2	<2	<2	<2	<2	<2	<2	<2
Pointing Stability (μrad) <sup>(9)</sup>	<35	<35	<35	<35	<35	<35	<35	<35
Timing Jitter (ns) <sup>(10)</sup>	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Linewidth @ 1064nm (cm <sup>-1</sup> )	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Spatial Profile Near Field <sup>(11)</sup>	>0.75	>0.75	>0.75	>0.75	>0.75	>0.75	>0.75	>0.75
Spatial Profile Far Field <sup>(12)</sup>	>0.95	>0.95	>0.95	>0.95	>0.95	>0.95	>0.95	>0.95
Lamp Life (pulses) <sup>(13)</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>
<b>Services</b>								
Voltage	220-250VAC	220-250VAC	220-250VAC	220-250VAC	220-250VAC	220-250VAC	220-250VAC	220-250VAC
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	Water Cooled	Air Cooled	Water Cooled	Water Cooled	Water Cooled
Ambient Temp <sup>(14)</sup>	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 <sup>(15)</sup>				20°C		20°C	20°C	20°C
PSU Type	LPU1000	LPU1000	LPU1000	19" Rack	LPU1000	19" Rack	19" Rack	19" Rack

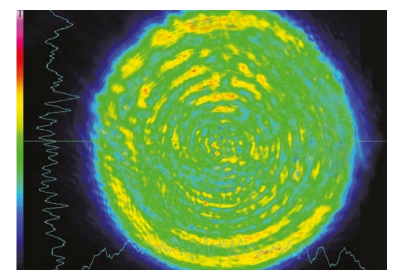
- (1) High energy 355nm as standard with standard 2HG module.
- (2) Contact Litron for more information.
- (3) Pulse-to-pulse energy.
- (4) 8 hours continuous running without adjustment.
- (5) FWHM.
- (6) Beam diameter is rod diameter - FWHM diameter will be smaller.
- (7) Full angle for 90% of the output energy.
- (8) Measured using ISO 11146-1:2005.
- (9) Full 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) 80% of energy, or 1 year, whichever comes first.
- (14) 5 to 80% relative humidity (non-condensing).
- (15) >8 lpm at <5 bar.

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

*SLM Option	
<b>Beam Parameter</b>	
Timing Jitter (ns) <sup>(7)</sup>	± 1
Linewidth @ 1064nm (cm <sup>-1</sup> )	0.003
<b>Services</b>	
Voltage	220-250VAC
Frequency	50/60Hz
Power Phase	Single
Cooling	Water Cooled
Ambient Temp <sup>(9)</sup>	5-35°C
Water Temp <sup>(15)</sup>	20°C
PSU Type	LPU1000 / 19" Rack



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
<b>Repetition Rate (Hz)</b>	10	10	10	20	30
<b>Output Energy (mJ)</b>					
1064nm	850	650	450	400	550
532nm	425	325	225	200	225
355nm	130	100	80	65	80
266nm	100	70	55	50	60
213nm <sup>(1)</sup>					
<b>Pulse Stability (±%) [RMS] <sup>(2)</sup></b>					
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]
<b>Pulse Width (ns) <sup>(3)</sup></b>					
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
<b>Beam Parameter</b>					
Beam Diameter (mm) <sup>(4)</sup>	9.5	8.0	6.4	6.4	8.0
Beam Divergence (mrad) <sup>(5)</sup>	<0.8	<0.8	<0.8	<0.8	<0.8
Pointing Stability (μrad) <sup>(6)</sup>	<50	<50	<50	<50	<50
Timing Jitter (ns) <sup>(7)</sup>	<0.5	<0.5	<0.5	<0.5	<0.5
Linewidth @ 1064nm (cm <sup>-1</sup> )	<0.7	<0.7	<0.7	<0.7	<0.7
Lamp Life (pulses) <sup>(8)</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	5x10 <sup>7</sup>
<b>Services</b>					
Voltage	220-250VAC	220-250VAC	220-250VAC	220-250VAC	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 <sup>(9)</sup>	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C
PSU Type	LPU1000	LPU1000	LPU1000	LPU1000	19" Rack

(1) Contact Litron for more information.

(2) Pulse-to-pulse energy.

(3) FWHM.

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

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

(6) Full angle.

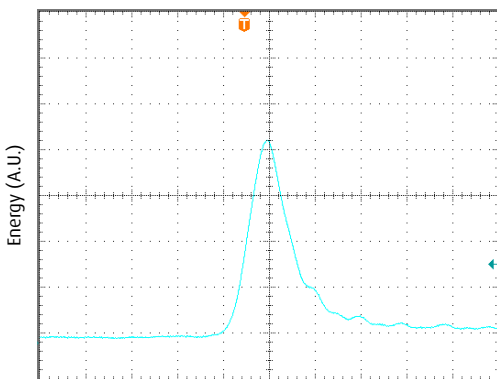
(7) RMS jitter. Measured with respect to the Q-switch trigger input.

(8) 80% of energy, or 1 year, whichever comes first.

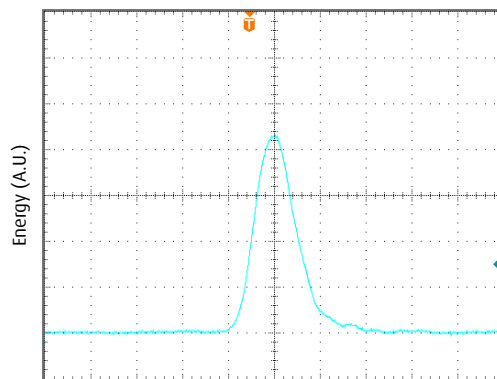
(9) 5 to 80% relative humidity (non-condensing).

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

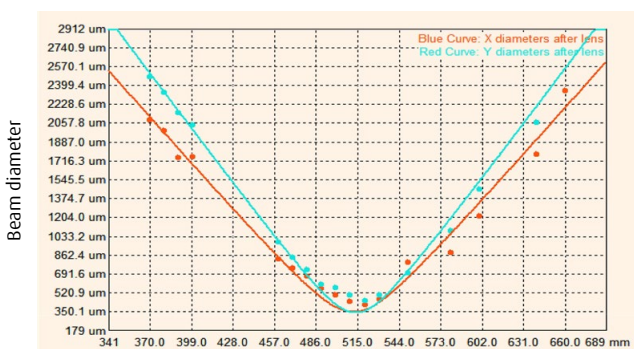
TRLi ST 850-10: Pulse width 10.0ns at 1064nm



TRLi ST 850-10: Pulse width 9.7ns at 532nm



TRLi ST 850-10: M<sup>2</sup> = 4



Distance from lens

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

## TRLi HR RANGE SPECIFICATIONS

Model	TRLi HR 320-50	TRLi HR 250-100	TRLi HR 100-100	TRLi HR 120-200	TRLi HR 80-200
<b>Repetition Rate (Hz)</b>	50	100	100	200	200
<b>Output Energy (mJ)</b>					
1064nm	320	250	100	120	80
532nm	160	130	60	65	45
355nm	60	45	20	20	15
266nm	30	20	10	9	7
213nm <sup>(1)</sup>					
<b>Pulse Stability (±%) [RMS] <sup>(2)</sup></b>					
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]
<b>Pulse Width (ns) <sup>(3)</sup></b>					
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
<b>Beam Parameter</b>					
Beam Diameter (mm) <sup>(4)</sup>	6.4	6.4	6.4	6.4	6.4
Beam Divergence (mrad) <sup>(5)</sup>	<8	<8	<8	<8	<8
Pointing Stability (μrad) <sup>(6)</sup>	<50	<50	<50	<50	<50
Timing Jitter (ns) <sup>(7)</sup>	<0.5	<0.5	<0.5	<0.5	<0.5
Linewidth @ 1064nm (cm <sup>-1</sup> )	<0.7	<0.7	<0.7	<0.7	<0.7
Lamp Life (pulses) <sup>(8)</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>	10 <sup>8</sup>
<b>Services</b>					
Voltage	220-250VAC	220-250VAC	220-250VAC	220-250VAC	220-250VAC
Frequency <sup>(9)</sup>	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Power Phase	Single	Single	Single	Single	Single
Cooling	Water Cooled	Water Cooled	Air Cooled	Water Cooled	Water Cooled
Ambient Temp <sup>(10)</sup>	5-35°C	5-35°C	5-35°C	5-35°C	5-35°C
Water Temp <sup>(11)</sup>	20°C	20°C		20°C	20°C
PSU Type	19" Rack	19" Rack	LPU1000	19" Rack	19" Rack

(1) Contact Litron for more information.

(2) Peak-to-Peak Energy - 100% of pulses.

(3) FWHM.

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

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

(6) Half angle.

(7) Jitter is measured with respect to the Q-switch trigger input.

(8) 80% of energy, or 12 months, whichever comes first.

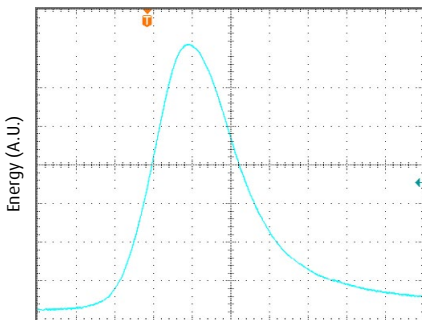
(9) 50Hz or 60Hz to be specified at time of order.

(10) 0 to 80% relative humidity (non-condensing).

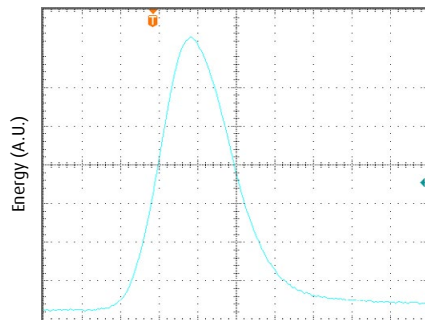
(11) >8 lpm at <5 bar.

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

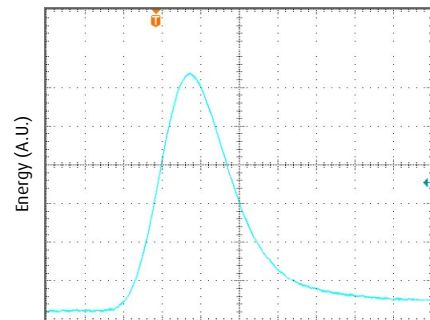
TRLi 250-100: Pulse width 9.8ns at 1064nm



TRLi 250-100: Pulse width 8.4ns at 532nm



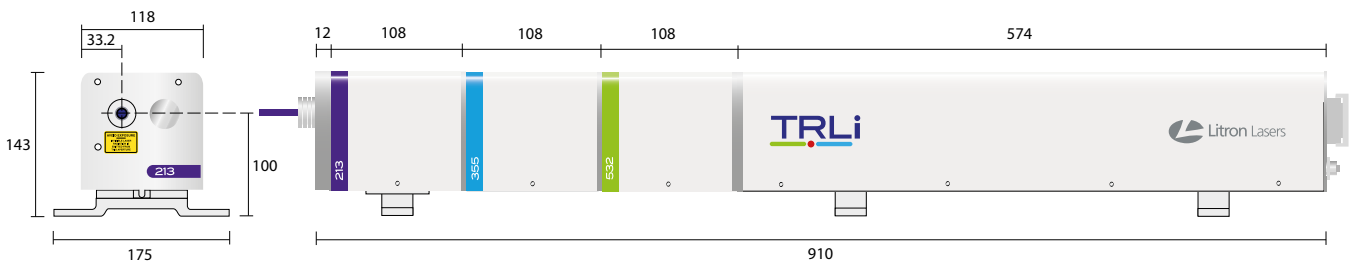
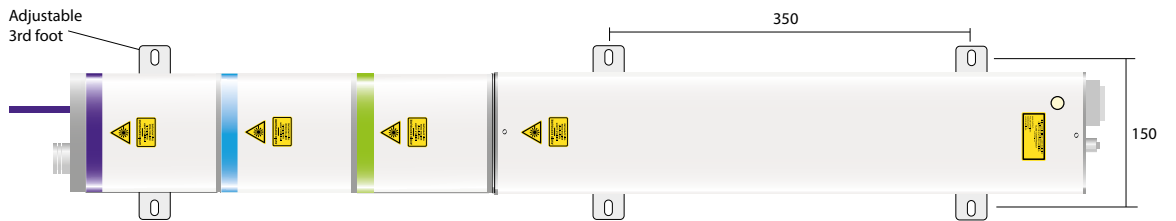
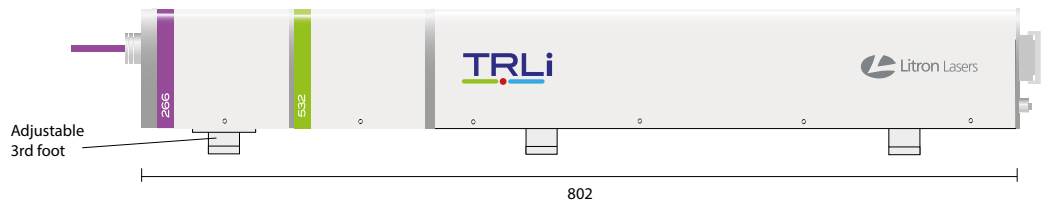
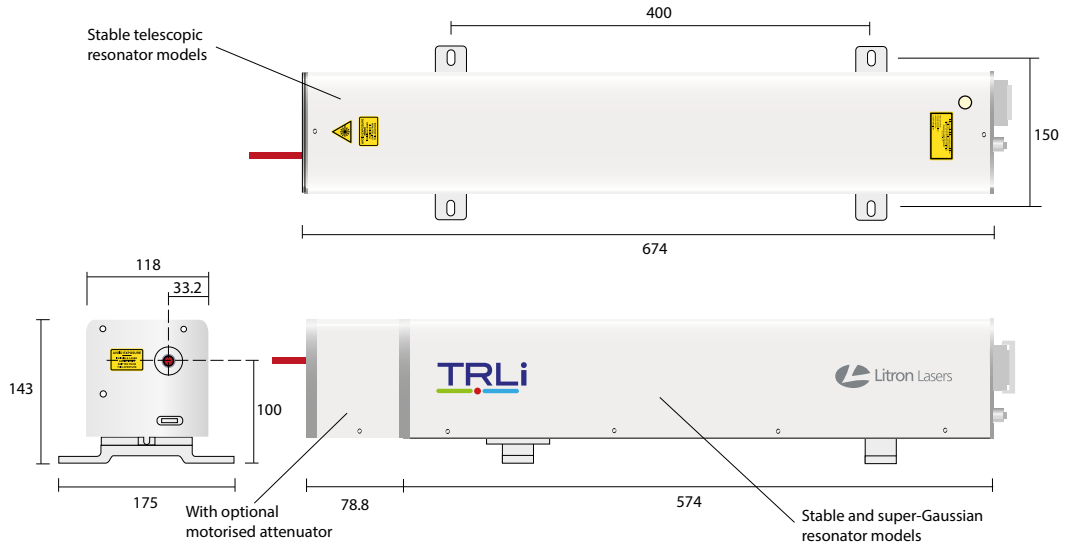
TRLi 250-100: Pulse width 8.3ns at 355nm



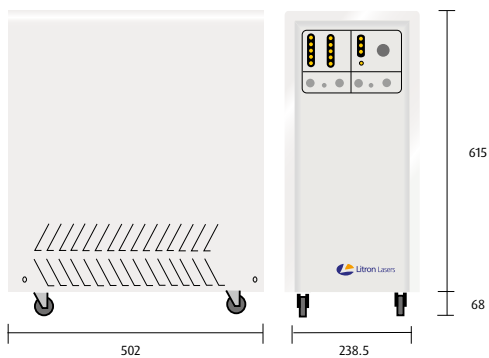
# MECHANICAL DATA

## Laser Head with Doubler, Tripler, Quadrupler & Quintupler Harmonic Units

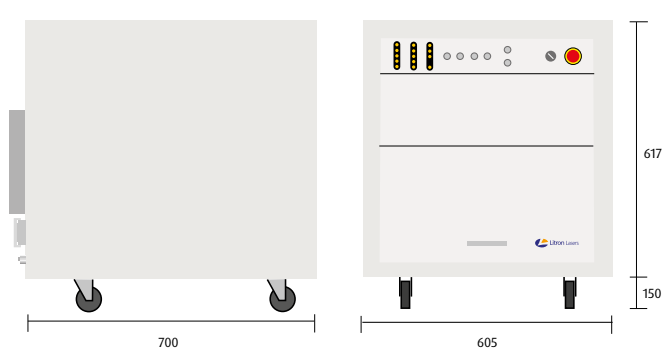
All dimensions in mm unless stated



### LPU1000 PSU



### 19" Rackmount PSU



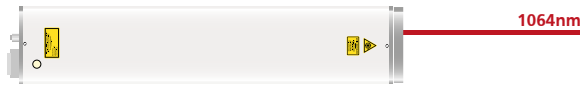
# TRLi Series

Flexible model options to suit most applications

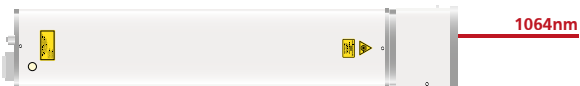
All model options are available with harmonic auto-tuning, auto-stabilisation and variable motorised attenuator.

Other model options include:  
Built-in harmonic diode pointer.

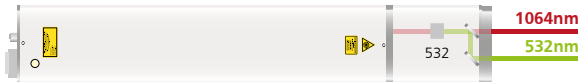
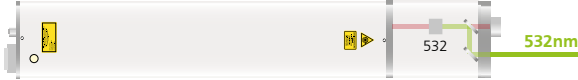
## 1064nm output



## 1064nm output with optional motorised attenuator



## Options for 532nm output



## Options for 355nm output



## Options for 266nm output



## 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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