

TruMicro Series 6000

Meets the highest  
demands for your  
series production



# The TruMicro Series 6000: Powerful, compact and flexible

Thanks to slab technology, the TruMicro Series 6000 ultrashort pulse lasers offer high performance for industrial series production. With their flexible parameter options, even demanding processes can be realized. The ultrashort pulse lasers can easily be used in your series production, for example in the field of glass modification or in the processing of organic materials.

## Benefits at a glance



### Flexibility of parameters

Combine individually demanding parameters such as high pulse energy with ultra-short pulse duration.



### High performance

The ultrashort pulse lasers enable you to achieve high average power through high pulse energies.



### Wide variety of materials

Whether IR, green or UV – by selecting the right wavelength, a wide variety of materials can be optimally processed.



### High process stability

The internal power control ensures stable output parameters and a homogeneous process result.

## Features

### Excellent quality

Industrial, high-quality series products based on established components

### Slab amplification

Linear slab amplification makes it possible to set the exact time and pulse energy for each individual pulse



### Simple integration

Interfaces to all common fieldbus systems

### Defining the timing of laser pulses

Setting the exact time and pulse energy for each individual pulse

### Advanced Pulse on Demand

Precisely timed definition of the individual laser pulses

Technical data <sup>[1]</sup>					
	TruMicro 6020	TruMicro 6020 HE	TruMicro 6220	TruMicro 6320	
Nominal power <sup>[2]</sup>	200 W		100 W	30 W	62.5 W
Pulse duration <sup>[3]</sup>	< 850 fs or 5 ps		< 850 fs	< 500 fs	< 850 fs
Central wavelength	1030.5 ± 2 nm		515 ± 1 nm	343.5 ± 0.5 nm	
Spectral bandwidth	< 4 nm		< 0.75 nm	< 0.5 nm	< 0.3 nm
Main repetition rate	1 MHz	100 kHz	1 MHz	800 kHz	1 MHz
Additional repetition rates	1.25 MHz   1.6 MHz   2 MHz   2.5 MHz   3 MHz	200 kHz   400 kHz   600 kHz   800 kHz   1 MHz	1.25 MHz   1.6 MHz   2 MHz   2.5 MHz   3 MHz		
Maximum pulse energy <sup>[4]</sup>	200 µJ	2 mJ	100 µJ at 1 MHz	37.5 µJ at 800 kHz	62.5 µJ at 1 MHz
Burst option <sup>[4]</sup>	Up to 16 pulses, cumulating up to 1,6 mJ	Up to 8 pulses, cumulating up to 8 mJ	Up to 16 pulses, cumulating up to 1,6 mJ	Up to 16 pulses, cumulating up to 800 µJ	
Advanced Pulse on Demand <sup>[5]</sup>	Single shot to maximum repetition rate				
Average power stability (peak to peak)	< 3%				
Pulse-to-pulse energy stability (rms)	< 3%				
Pre-pulse contrast	> 1000:1		1000:1	> 1000:1	
Spatial mode <sup>[6]</sup>	TEM <sub>00</sub>   M <sup>2</sup> < 1,3				
Collimated beam diameter at exit window	5 mm ± 10%				
Beam divergence, full angle	< 0.5 mrad		< 0.3 mrad	< 0.2 mrad	
Focused beam circularity over full confocal range <sup>[7]</sup>	> 80%		> 85%		
Beam pointing stability	< 35 µrad rms (~3 µrad/K)				
Bore-sight accuracy (lateral   angular)	< 1 mm   < 5 mrad				
Direction of polarization	Linear, vertical to base plate				
Polarization ratio	> 100:1				
Laser head mounting orientation	Horizontal				
Allowed temperature range during operation <sup>[8]</sup>	+15 °C to +35 °C		+20 °C to +30 °C		
Dewpoint	< 24 °C				
Humidity	0 to 90% RH, non-condensing				
Cold start time for typical ambient conditions <sup>[9]</sup>	< 30 min				
Warm start time <sup>[10]</sup>	< 10 min				
Chiller, included in supply unit	Water to water, 5–23 °C, Δp = 1–6 bar				
Electrical supply	380 V (-10%) to 460 V (+10%)   3 AC + PE   50–60 Hz			380 V (-10%) to 460 V (+10%)   3 AC + PE   50–60 Hz   2.6 kW	
Industrial safety shutter for machine integration	Included, performance level PLe				
Laser head dimensions (W × H × D)	600 × 366 × 735 mm				
Supply unit dimensions (W × H × D)	446 × 915 × 725 mm				

Industry-leading Condition Monitoring and preventive in-field maintenance support best-in-class reliability, based on proven tens of millions of hours of ultrafast high-power industrial 24/7 operation.

TruMicro lasers come with a limited one-year warranty. Service plans and warranty extensions available.

TRUMPF follows a policy of continuous improvement. Specifications are subject to change without notice.

<sup>[1]</sup>At the main repetition rate for the nominal output power, measured over > 8 hours after warm-up time at controlled ambient temperature (±1 K), unless otherwise noted.

<sup>[2]</sup>Best-in-class closed loop feedback control for accurate energy stability over complete allowed temperature range and industry-leading zero-degradation lifetime. Higher power versions available on request.

<sup>[3]</sup>Derived from two-photon-absorption autocorrelation assuming a sech<sup>2</sup> pulse, valid for all energy settings. Versions with other pulse durations down to < 500 fs and tunable pulse durations available on request.

<sup>[4]</sup>Optional configurable burst patterns up to 300 ns long, with intra-burst temporal pulse spacing of 20 ns.

<sup>[5]</sup>Pulse gating and fast energy modulation with built-in modulator for dynamic and precise feedback control. Optional industry-leading flexible pulse on demand with negligible timing jitter, e.g. for maximum productivity using spot distance control with advanced axes or scanners supporting position-synchronized output.

<sup>[6]</sup>At > 10% of nominal energy. Field results may depend on accuracy of employed measurement tool.

<sup>[7]</sup>After well-centered external focusing lens, within ±1 Rayleigh length from the focus, ellipticity evaluated for each plane based on second moment measurement according to EN ISO 11146-1.

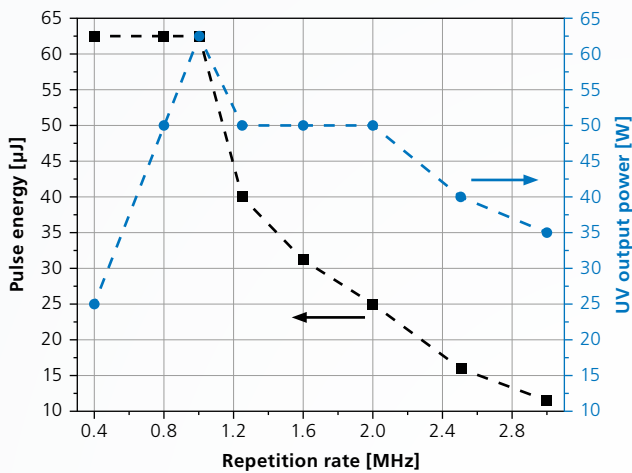
<sup>[8]</sup>Controlled temperature (±1 K) nevertheless suggested for precision manufacturing to avoid machine drifts.

<sup>[9]</sup>For cold ambient temperatures with recommended optional tank heater.

<sup>[10]</sup>After warm start time, laser parameters are within specifications. Release of laser power is possible earlier, but laser specifications are not yet completely fulfilled.

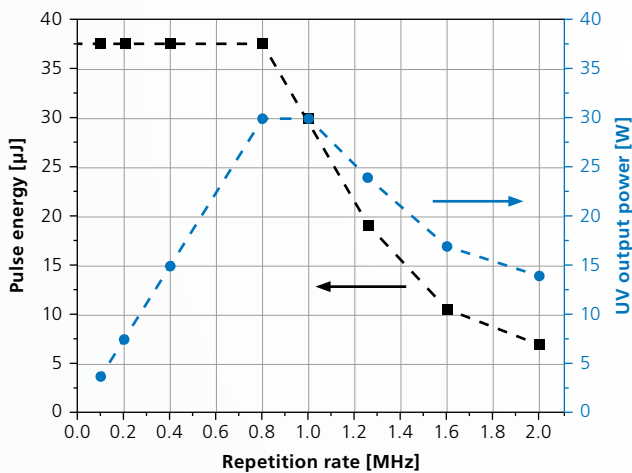
## TruMicro 6320

Technical data



Repetition rate [kHz]	Pulse energy [µJ]	Average power [W]
400	62.5	25
800	62.5	50
<b>1000</b>	<b>62.5</b>	<b>62.5</b>
1250	40	50
1600	31.3	50
2000	25	50
2500	16	40
3000	12	35

**850-fs version:** Pulse energy (left axis) / output power (right axis) based on repetition rate.



Repetition rate [kHz]	Pulse energy [µJ]	Average power [W]
100	37.5	3.75
200	37.5	7.5
400	37.5	15
<b>800</b>	<b>37.5</b>	<b>30</b>
1000	30.0	30
1250	19.0	24
1600	10.6	17
2000	7.0	14

**500-fs version:** Pulse energy (left axis) / output power (right axis) based on repetition rate.