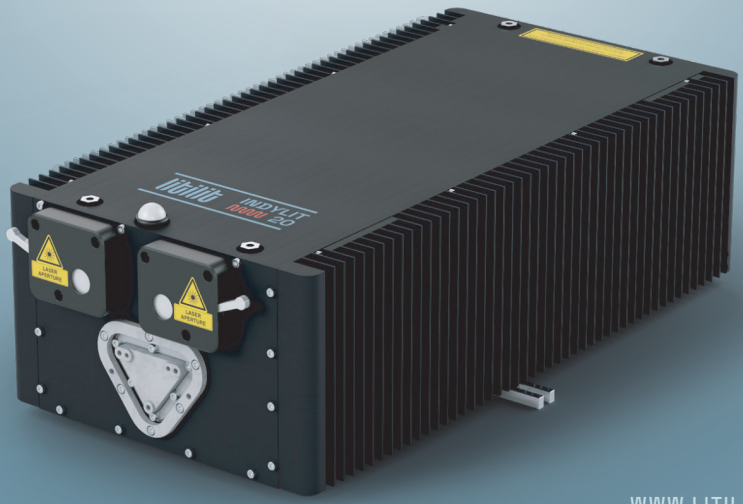
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INDYLIT 20

Industrial Femtosecond Laser for Material Processing

1030 / 515 nm, 400 fs – 4 ps, 20 W, 80 kHz – 1.0 MHz



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HIGHEST POWER PASSIVELY COOLED INDUSTRIAL LASER

FEATURES

- Extremely robust and stable
- Adjustable repetition rate, pulse duration, power
- High pulse energy and clean pulse shape
- Passively air cooled
- Maintenance-free & turn-key
- Dust and water protection IP51
- Optional built in SH module

APPLICATIONS

- Material microprocessing
- Semiconductor and electronics
- Display manufacturing
- Battery manufacturing
- Metals black and colour marking

INDYLIT 20

The **Indylit 20** is the highest average power and most efficient passively air-cooled femtosecond laser on the market. If you need a reliable femtosecond laser that is maintenance-free, turn-key and has exquisite optical parameters – look no further!

The laser features an innovative and patented passive-cooling design, ensuring high stability of the optical parameters such as pulse duration, beam pointing, and power. The **Indylit 20** mechanical construction can withstand almost everything you can throw at it. It is even protected against the dust!

Built-in optional **second harmonics (SH)** module provides wavelength extension, enabling even wider range of material processing applications.

SPECIFICATIONS

Model	Indylit 20	Indylit 20 SH
Central wavelength	1030 ± 2 nm	515 ± 1 nm (optional)
Average power [1]	> 16 W @ 80 kHz > 18 W @ 200 kHz > 20 W @ 1 MHz	> 10 W @ 80 kHz > 10 W @ 200 kHz > 5 W @ 1 MHz
Max. pulse energy [1]	> 200 µJ	> 120 µJ
Pulse duration	380 ± 20 fs	350 ± 50 fs
Pulse duration tunability [2]	400 fs – 4 ps	400 fs – 3 ps [3]
Switch time between harmonic outputs	< 1 s	
Internal pulse repetition rate	80 kHz – 1.0 MHz down to 30 kHz in Burst Mode	
Pulse picker	Integrated	
Pulse control mode	Pulse picker control via TTL signal (gate or trigger mode)	
Pulse on demand	Yes (optional), jitter < 50 ns	
Burst length	1...12 pulses	
Intra-burst pulse distance	50 ns	
Burst shape control	Freeform, via Analog Input	
Max. energy in burst	> 600 µJ at 30 kHz	> 300 µJ at 30 kHz
Power attenuation [3]	100 - 1 %	
Beam quality	M^2 < 1.2	
Beam circularity (astigmatism) [4]	> 0.90	> 0.85
Beam diameter (at $1/e^2$ level)	2.6 ± 0.2 mm	2.2 ± 0.2 mm
Polarization	Linear horizontal, > 1000 : 1 extinction	

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SPECIFICATIONS (continued)

Model	Indylit 20	Indylit 20 SH
Pre-pulse contrast	> 1 : 500	
Post-pulse contrast	> 1 : 100	
Beam divergence (full angle)	< 1 mrad	
Beam pointing (RMS) [5]	< 20 µrad	
Beam pointing vs temperature	< 20 µrad/°C	
Power Stability (RMS) [6]	< 0.5 %	< 1 %
Pulse Energy Stability (RMS) [7]	< 1 %	
Warm-up time (cold start)	< 30 min	
Warm-up time (warm start)	< 5 min	
Laser control interface	CAN, USB	
Operating voltage	24VDC, 25A (100...240 V AC, 47...63 Hz to 24V AC/DC converter included)	
Average power consumption (after warm-up)	300 W	
Maximal power rating	700 W	
Operating temperature	18 – 33 °C	
Humidity	Non-condensing	
Transportation/storage temperature	-20 – +70 °C	
Dimensions: Laser head (LxWxH) Control unit (WxDxH) AC/DC converter (LxWxH)	 482 x 248 x 143 mm 449 x 370 x 140 mm 250 x 125 x 60 mm	
Umbilical length	5.5 ± 0.1 m	
Cooling: Laser head Control unit	 air (passive) or water coldplate (optional) [8] forced air (fans)	

[1] Please refer to the power and energy vs. pulse repetition rate curves for typical values. Switching time between different repetition rates and burst number is <20ms.

[2] 1030 power is constant at all pulse durations; 515nm power is guaranteed only at min pulse duration and will decrease when stretching the pulse duration.

[3] Attenuation can be controlled by a few different methods: a) by PC user interface, b) by CAN register, c) by analog input (0-1V, rise time <1µs). Beam quality specifications are maintained down to 10% power level for 1030nm output and 3% for 515nm output.

[4] Defined as the worst case ellipticity along the z-scan ($\pm 5xL_{Rayleigh}$) of the beam.

[5] Measured during 8h operation starting 30 minutes after warm-up. Environmental temperature stability within ± 1°C.

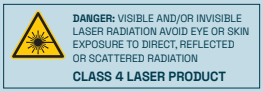
[6] Measured with integration time of 1s at the same conditions as (5).

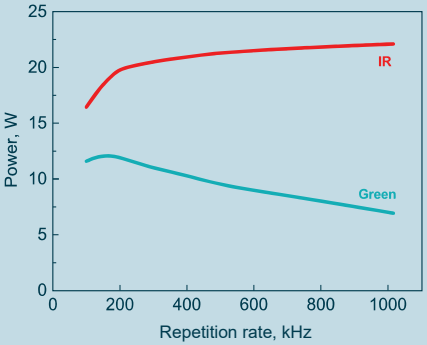
[7] Measured within 10s time interval for at least 1000 pulses.

[8] Coldplate is provided attached to the laser head of the laser. A water chiller is not provided. Requirements for the chiller are >1L/min flow rate and 25-33 °C water temperature.

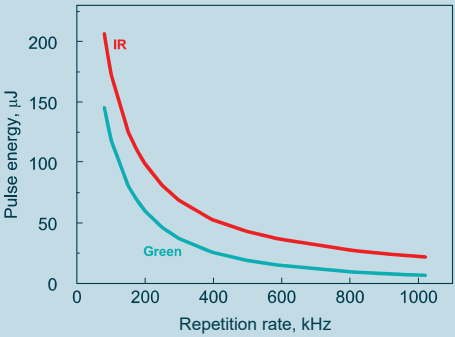
[9] Technology is protected by international patents: LT6261 (B); JP6276471 (B2); US10038297 (B2); EP3178137; DK3178137 (T3); CN106575849 (B); PL3178137 (T3); LT6639 (B); LT2020 563

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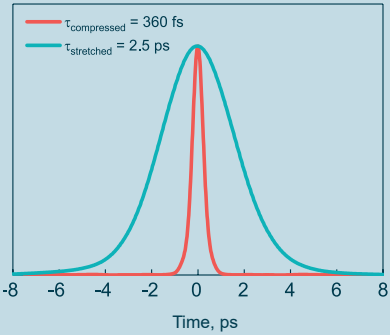




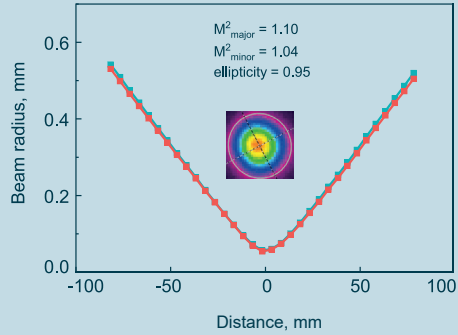
Average power dependence on the pulse repetition rate for infrared and green (SH option) output



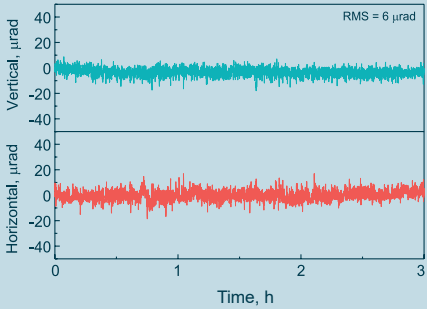
Pulse energy dependence on the pulse repetition rate for infrared and green (SH option) output



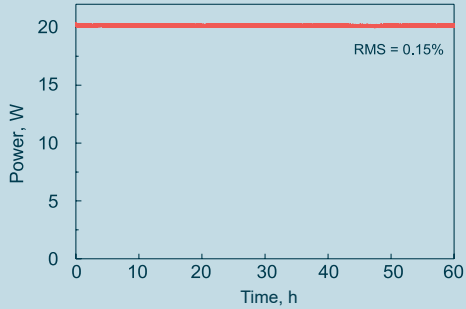
Pulse autocorrelation traces of optimally compressed and maximally stretched pulses at 130 µJ pulse energy and 100 kHz repetition rate



Beam z-scan measurement and beam profile in far field



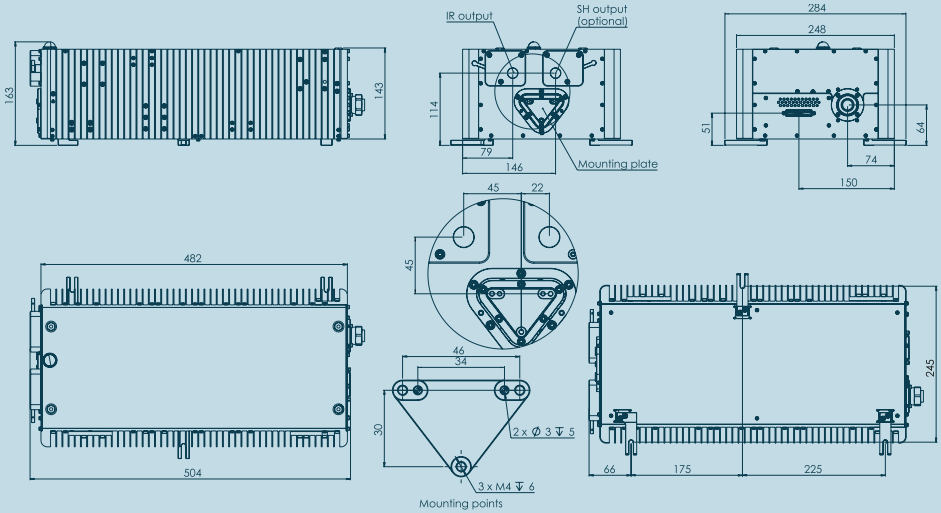
Long term beam pointing measurement



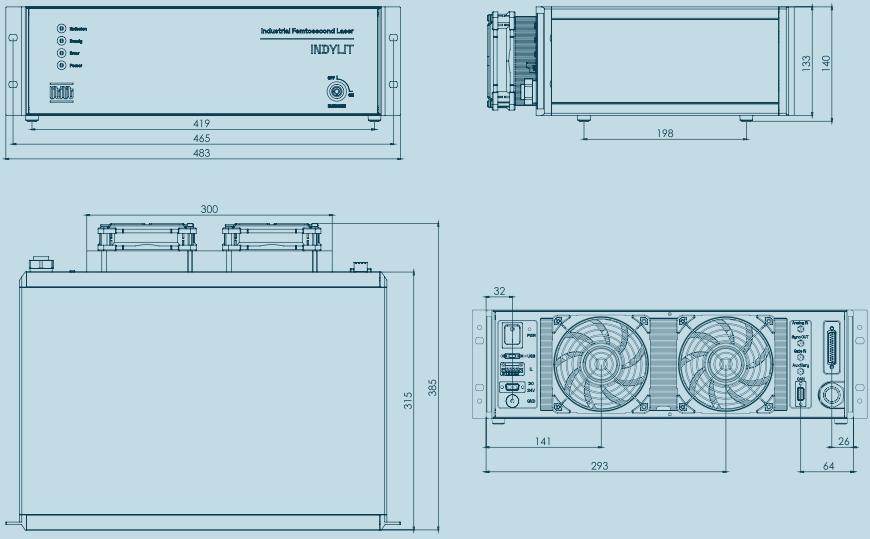
Long term output power stability

INDYLIT 20

DRAWINGS



Drawing of **Indylit 20** laser head (in mm)



Drawing of **Indylit 20** laser control unit (in mm)

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NOTES

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