LightWire FFS series fiber lasers are dedicated for seeding solid state femtosecond Yb:YAG based CPA systems. Ekspla offers FFS lasers either with femtosecond pulse duration directly from fiber, or with chirped pulses. Broad up to 12 nm spectral bandwidth enables amplification of pulses with < 300 fs compressed duration. Special feature of FFS200CHI laser is customizable chirp profile to match compressor design of the CPA system.

**FEATURES**
- Pulse energy > 250 nJ at repetition rate < 200 kHz
- Compressed or chirped broadband pulses
- Down to 300 fs pulses available after compression

**APPLICATIONS**
- Seeding femtosecond CPA systems

**Typical spectrum from FFS10 laser**

**Typical autocorrelation from FFS10 laser**
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model</th>
<th>FFS10</th>
<th>FFS100CHI</th>
<th>FFS200CHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central wavelength</td>
<td>1030 ± 1 nm</td>
<td>up to 12 nm</td>
<td>up to 12 nm</td>
</tr>
<tr>
<td>Spectral bandwidth</td>
<td>3.5 ± 0.5 nm</td>
<td>8 ± 1 nm</td>
<td>up to 12 nm</td>
</tr>
<tr>
<td>Pulse duration</td>
<td>550 ± 50 fs</td>
<td>7 ± 2 ps (chirped)</td>
<td>&gt; 50 ps (chirped)</td>
</tr>
<tr>
<td>Compressed pulse duration</td>
<td>NA</td>
<td>&lt;300 fs</td>
<td>down to 300 fs</td>
</tr>
<tr>
<td>Chirp profile</td>
<td>no chirp</td>
<td>linear</td>
<td>custom ²⁾</td>
</tr>
<tr>
<td>Oscillator pulse repetition rate</td>
<td>52 ± 3 MHz</td>
<td>26 kHz – 52 MHz (PRR = PRRosc / N, N = 1, 5, 6, ..., 2000)</td>
<td></td>
</tr>
<tr>
<td>Pulse repetition rate with pulse picker ³⁾</td>
<td>26 kHz – 52 MHz (PRR = PRRosc / N, N = 1, 5, 6, ..., 2000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output power (without/with pulse picker)</td>
<td>&gt; 1 mW / &gt; 0.5 mW</td>
<td>&gt; 50 mW / &gt; 25 mW</td>
<td>&gt; 200 mW at 10 MHz</td>
</tr>
<tr>
<td>Pulse energy (without/with pulse picker)</td>
<td>&gt; 20 pJ / &gt; 10 pJ</td>
<td>&gt; 1 nJ / &gt; 0.5 nJ</td>
<td>&gt; 250 nJ at repetition rates &lt; 200 kHz</td>
</tr>
<tr>
<td>Polarization</td>
<td>linear, &gt; 100:1 extinction</td>
<td>linear, &gt; 100:1 extinction</td>
<td>linear, &gt; 100:1 extinction</td>
</tr>
<tr>
<td>Optical output</td>
<td>FC/APC connector or collimator with mounting flange (optional)</td>
<td>collimator &amp; isolator node ⁴⁾</td>
<td>collimator &amp; isolator node ⁴⁾</td>
</tr>
<tr>
<td>Umbilical</td>
<td>3 m length armored cable Ø5 mm ⁵⁾</td>
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</tr>
<tr>
<td>Beam diameter</td>
<td>0.9 ± 0.1 mm or 1.3 ± 0.1 mm or 2.1 ± 0.2 mm</td>
<td>0.9 ± 1 mm</td>
<td>0.9 ± 0.1 mm</td>
</tr>
<tr>
<td>Beam height</td>
<td>NA</td>
<td>38 mm</td>
<td>38 mm</td>
</tr>
<tr>
<td>Beam quality</td>
<td>M² &lt; 1.1</td>
<td>M² &lt; 1.1</td>
<td>M² &lt; 1.1</td>
</tr>
<tr>
<td>Pulse train monitoring</td>
<td>photodiode output for oscillator train, TTL synch pulse for laser output (when pulse picker included)</td>
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<td>photodiode output for oscillator train, TTL synch pulse for laser output (when pulse picker included)</td>
</tr>
<tr>
<td>Dimensions of control unit (L × W × H)</td>
<td>315 × 450 × 95 (stand alone) or 315 × 482 × 95 (19” rack mountable)</td>
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</tr>
<tr>
<td>Dimensions of collimator (D × L)</td>
<td>Ø33.02 × 11.76 mm</td>
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<td>Ø33.02 × 11.76 mm</td>
</tr>
<tr>
<td>Dimensions of collimator &amp; isolator node (L × W × H)</td>
<td>138 × 66.6 × 52 mm</td>
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<td>138 × 66.6 × 52 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>&lt; 10 kg</td>
<td>&lt; 10 kg</td>
<td>&lt; 10 kg</td>
</tr>
<tr>
<td>Control interface</td>
<td>USB, CAN, RS232, LAN, (WLAN optional)</td>
<td>USB, CAN, RS232, LAN, (WLAN optional)</td>
<td>USB, CAN, RS232, LAN, (WLAN optional)</td>
</tr>
<tr>
<td>Power supply (AC/DC adapter included)</td>
<td>100–240 V, 50–60 Hz AC</td>
<td>100–240 V, 50–60 Hz AC</td>
<td>100–240 V, 50–60 Hz AC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>maximal 230 W (typical 60 W)</td>
<td>maximal 230 W (typical 60 W)</td>
<td>maximal 230 W (typical 60 W)</td>
</tr>
</tbody>
</table>

¹⁾ Due to continuous improvement all specifications are subject to change without notice.

²⁾ Chirp profile will be optimized by Ekspla to match customer compressor design.

³⁾ Pulse picker is an option for FFS10, FFS100 models. It supports external gating. FFS200CHI includes internal frequency divider, which enables pulse repetition rate reduction but does not support external gating.

⁴⁾ FFS200CHI model is provided with collimator & isolator node with dimensions 138×66.6×52 mm.

⁵⁾ Other fiber lengths: 1 m, 2 m, 5 m are available on request.

**PERFORMANCE**

Typical spectrum from FFS200CHI laser

Typical dependence of average power on the repetition rate for FFS200CHI laser


**DRAWINGS**

- **LightWire FFS series control unit outline drawing (stand alone version)**
- **LightWire FFS series control unit outline drawing (19” rack mountable version)**
- **LightWire FFS10/100CHI laser collimator flange outline drawing for beam diameters 0.9 mm and 1.3 mm**
- **LightWire FFS200CHI laser isolator & collimator unit outline drawing**
- **LightWire FFS10/100 laser collimator flange outline drawing for beam diameter 2.1 mm**

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**Typical FFS100CHI compressed pulse autocorrelation**

**Typical spectrum from FFS100CHI laser**

**Typical dependence of average power (blue curve) and pulse energy (red curve) on the repetition rate for FFS100CHI-AOM laser**

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**Typical spectrum from FFS100CHI laser**

- **Relative intensity, a.u.**
- **Wavelength, nm**

- **FWHM = 9.1 nm**

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**Typical FPS100CHI compressed pulse autocorrelation**

- **Relative intensity, a.u.**
- **Delay, fs**

- **Gaussian fit**

- **Autocorrelation function**

- **Gaussian fit**

- **τpulse = 298 fs**

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**LightWire FFS series control unit outline drawing**

- **Output power, mW**
- **Energy, nJ**
- **Power, mW**
- **Repetition rate, MHz**

- **Typical dependence of average power (blue curve) and pulse energy (red curve) on the repetition rate for FFS100CHI-AOM laser**

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**LightWire FFS series control unit outline drawing**

- **Relative intensity, a.u.**
- **Wavelength, nm**

- **Typical spectrum from FFS100CHI laser**

- **Relative intensity, a.u.**
- **Delay, fs**

- **0.0**
- **0.2**
- **0.4**
- **0.6**
- **0.8**
- **1.0**

- **FWHM = 9.1 nm**

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**LightWire FFS10/100CHI laser collimator flange outline drawing for beam diameters 0.9 mm and 1.3 mm**

- **Ø20.09±0.08**
- **Ø33.25±0.25**

- **33 mm OD flange**

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**LightWire FFS200CHI laser isolator & collimator unit outline drawing**

- **Ø6.5**

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**All dimensions are in millimetres.**