VALO Femtosecond Series

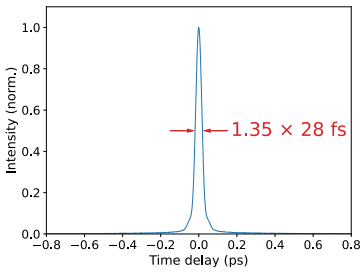
< 50 fs | Ultrafast Femtosecond Fiber Lasers

Applications

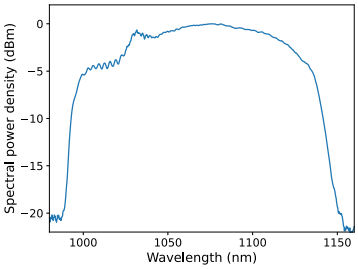
Multiphoton Microscopy
Wafer Inspection (SiC)
Nonlinear Imaging
Optogenetics
Two-Photon Polymerization
Terahertz Generation
Supercontinuum Generation
Spectroscopy
and many more

- Down to 30 fs pulse duration, > 3 W average power
- Integrated tunable dispersion pre-compensation
- Very low noise performance
- Laser head passively cooled (no water & no fan)
- User friendly design - remote controllable

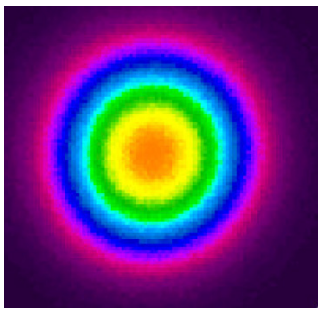
Typical Autocorrelation Trace
Tidal-30-3



Typical Optical Spectrum
Tidal-30-3



Typical Beam Profile
Tidal-30-3



The VALO Femtosecond Series of ultrafast fiber lasers are unique in their design, offering amongst the shortest femtosecond pulses and highest peak powers which can be obtained from a compact turn-key solution. Pulse durations down to 30 fs are achieved using novel fiber laser based technology, with average output powers over 3 W, delivered in a low noise, nearly perfect TEMoo beam. All VALO Femtosecond series lasers are delivered fully aligned and ready to use.

The VALO Femtosecond Series features integrated group velocity dispersion pre-compensation for peak power optimization at the sample along with an intuitive touch screen interface to allow for a user-friendly operation. The VALO Aalto and VALO Tidal are passively cooled with no need for external water chillers or fans.

The ultrashort pulses combined with computer-controlled group velocity dispersion pre-compensation allow users of the VALO Femtosecond Series fiber lasers to achieve the highest peak power exactly where it's needed, making the lasers ideal for multiphoton imaging, advanced spectroscopy, supercontinuum generation and many other applications.

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VALO Femtosecond Series

Optical Performance Specifications

	VALO Aalto			VALO Tidal		
Model	Aalto-40-0.2	Aalto-40-0.5	Aalto-Seed	Tidal-40-2	Tidal-30-3	Tidal-75-1-1100
Pulse Duration (fs) (FWHM)	< 50 (typ 40)		> 500*	< 50 (typ 40)	< 40 (typ 30)	< 100 (typ 75)
Center Wavelength (nm)	1055 ± 15		1040**	1065 ± 20		1100 ± 10
Spectral Bandwidth (nm) (at -10 dB)	> 90		> 50**	> 90	> 110	> 30
Average Power (W)	> 0.2	> 0.5 (typ >0.7)	> 0.1**	> 2	> 3	> 1
Repetition Rate (MHz)	30** ± 1					
Pulse Energy (nJ)	> 6.6	> 16.6	> 3.3**	> 66	> 100	> 33
Peak Power (MW) (typical value)	> 0.16	> 0.58	< 0.006	> 1.6	> 3.3	> 0.4
Power Stability (%) (RMS, 24 hours, ±3 °C)	< 0.1	< 0.5	< 0.1	< 0.5 (typ < 0.2)		
Dispersion Compensation Range (fs²)	> -20,000 to + 3,000		-	> - 25,000 to + 5,000		
Spatial Mode (TEMoo) M²	< 1.2			< 1.3	< 1.25	< 1.3
Beam Diameter*** (mm) (typical value)	1.7 ± 0.3					
Beam Divergence (mrad)	< 2					
Astigmatism	< 0.1					
Asymmetry	< 1.1					
Polarization	Linear, Vertical					
PER (dB)	> 20					
Dimensions (mm)	370 x 214 x 90					
Permanent Connection Laser Head/Controller	No	Yes	No	Yes		
Motor Controlled Chirp	Yes		-	Yes		
Remote Controllable	Yes					

* compressor not included

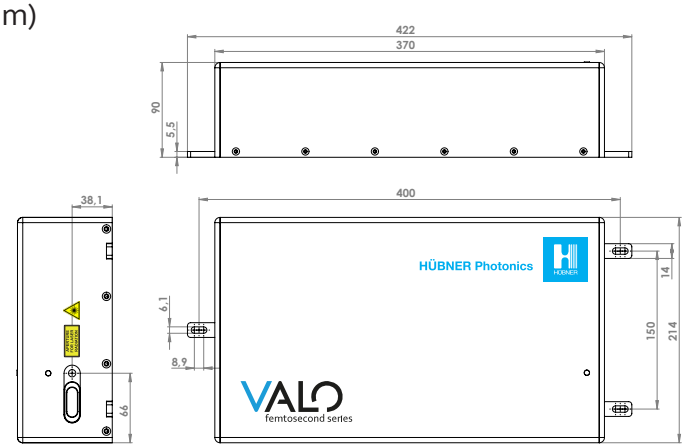
** other specification upon request

*** waist diameter from M² measurement

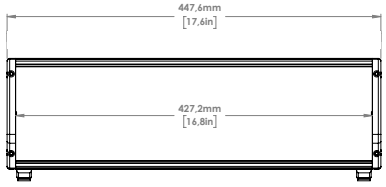
Options

Electrical Trigger Output (Synchronize with laser pulses)	Fiber Coupling	Power Modulation / Control (Modulation Bandwidth up to 1 MHz)	SHG (Second-harmonic generation of fundamental light.)

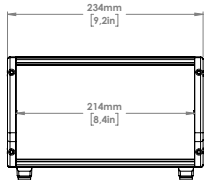
Laser Head Dimensions (mm)



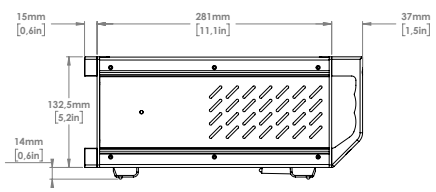
Controller Dimensions



Tidal Series, Aalto-40-0.5



Aalto Seed, Aalto-40-0.2



WARNING
INVISIBLE LASER RADIATION
Specifications and technical data are subjects to change without notice due to technical developments.

Aalto-Seed, Aalto-40-0.2
965 - 1150 nm, > 25 fs, < 12 nJ, $P_{avg.}$ < 350 mW
Avoid exposure to beam
Class 3B Laser Product
Classified by DIN EN 60825-1:2015-07

Aalto-40-0.5 + VALO Tidal Series
965 - 1150 nm, > 25 fs, < 133 nJ, $P_{avg.}$ < 4 W
Avoid eye or skin exposure to direct or scattered radiation
Class 4 Laser Product
Classified by DIN EN 60825-1:2015-07

VALO Femtosecond Series

Sub 50 Femtosecond Pulses for Multiphoton Microscopy

Sub 50 femtosecond lasers are ideal for nonlinear and multiphoton microscopy, as their higher peak powers yield increased signal-to-noise ratio images at much lower average power, reducing photobleaching and extending cell viability.

The impact of sub 50 femtosecond pulse durations is evident in the calibration grid images shown to the left (Ibidi, 50 µm grid size).

a) 4.7 mW, <50 fs; VALO Femtosecond Series.

b) 6 mW with laser spectrum limited to 10 nm bandwidth (~160 fs).

c) Scaled up contrast for the 6 mW laser spectrum limited to 10 nm bandwidth (~160 fs).

a) b) c)

The results show that, at the same peak power, a 50 fs pulsed laser requires a quarter of the average power to achieve the same two-photon efficiency (TPEF), thus reducing photobleaching effects, allowing for longer imaging duration, and improving overall cell viability.

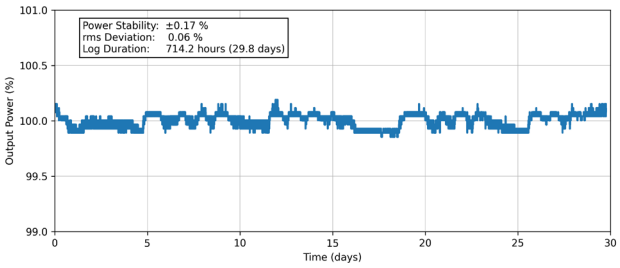
Pulse Duration	Peak Power (30 MHz)	Average Power * For the same TPEF
200 fs	16 kW	100 mW
50 fs	16 kW	25 mW

Long Term Performance Stability

VALO Femtosecond Series lasers are equipped with an optical feedback loop to actively stabilize the average output power by monitoring a portion of the final output beam and adjusting the pump to compensate for any fluctuations.

The result is more than 24 hours of uninterupted performance, with stability typically better than 0.1 % for VALO Aalto at 200 mW of average power, and typically better than 0.5 % for VALO Tidal at more than 3 W of average power.

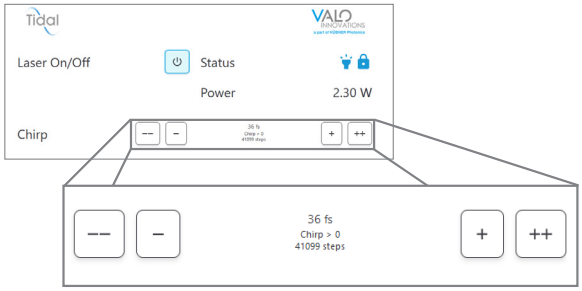
Zoom of Power Stability Over 30 Days



Group Velocity Dipersion Pre-compensation

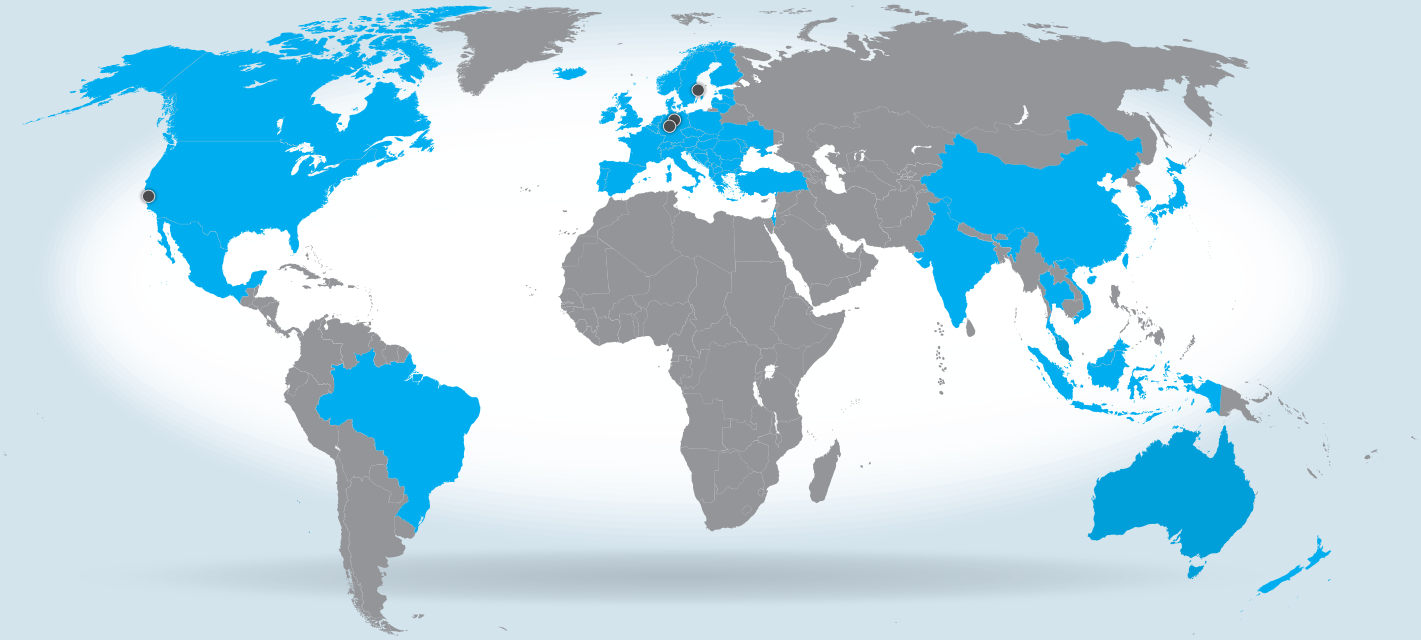
Integrated and easy to use group velocity dispersion pre-compensaion allows the user to control the pulse duration at the sample.

Using automated dispersion compensation just before the laser aperture, the pulse duration is fully characterized, and the calibrated values are accessable through the user interface. The dispersion-compensation range is designed for typical microscopy applications.



Read more about sub 50 femtosecond pulse lasers for gentler multiphoton microscopy at:
https://hubner-photonics.com/products/lasers/femtosecond-lasers/valo-series/

Read more
VALO Femtosecond Series



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