

VALO Femtosecond Series

< 50 fs | Ultrafast Femtosecond Fiber Lasers



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

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 of down to 30 fs are achieved using novel fiber laser based technology, with average output powers of over 3 W, delivered in a low noise, nearly perfect TEM₀₀ beam. All VALO Femtosecond series lasers are delivered fully aligned and ready to use.

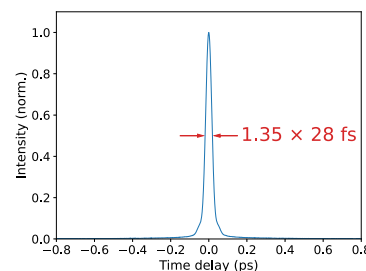
The VALO Femtosecond Series features integrated group velocity dispersion pre-compensation for peak power optimization at the sample and a simplified touch screen interface to allow for a user-friendly operation. The VALO Aalto and VALO Tidal are passively cooled with no need for external water chillers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

The ultrashort pulse durations 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, which makes the lasers ideal for use in multiphoton imaging, advanced spectroscopy, super continuum generation and many other applications.

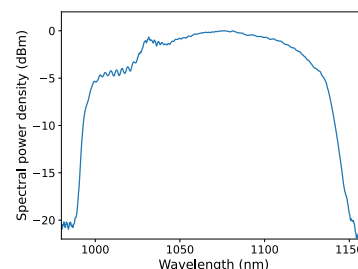
Applications

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

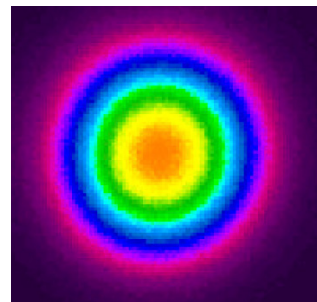
Typical Autocorrelation Trace
Tidal-30-3



Typical Optical Spectrum
Tidal-30-3



Typical Beam Profile
Tidal-30-3



HÜBNER Photonics



VALO Femtosecond Series

Optical Performance Specifications

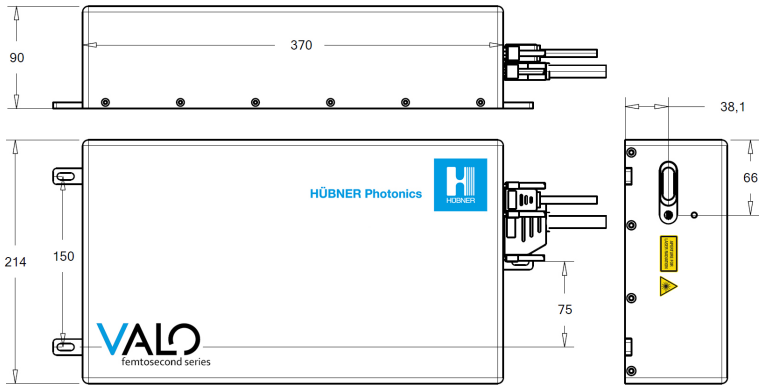
	VALO Aalto			VALO Tidal		
Model	Aalto-40-0.2	Aalto-40-0.5	Aalto-Seed	Tidal-40-2	Tidal-30-3	Tidal-75-1-1100
Pulse Duration (fs) (FWHM)	< 50 (typ 40)		> 500*	< 50 (typ 40)	< 40 (typ 30)	< 100 (typ 75)
Center Wavelength (nm)	1055 ± 15		1040**	1065 ± 20		1100 ± 10
Spectral Bandwidth (nm) (at -10 dB)	> 90		> 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)	> 0.166	> 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 (TEM ₀₀) 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	No (manually tunable)	-	Yes		
Remote Controllable	Yes					

* compressor not included
** other specification upon request
*** waist diameter from M² measurement

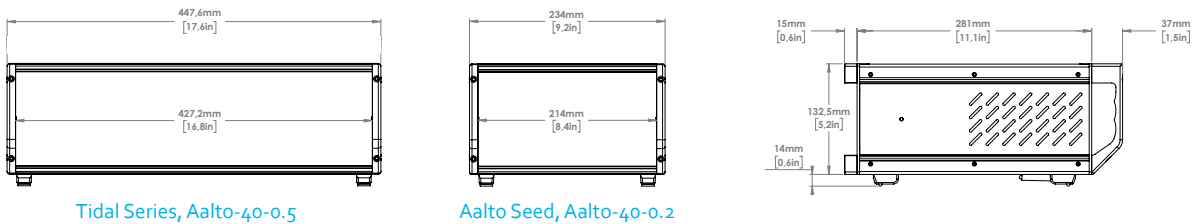
Options

Electrical Trigger Output	Fiber Coupling	Power Modulation/Control (Modulation Bandwidth up to 1 MHz)	SHG
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Laser Head Dimensions (mm)



Controller Dimensions



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

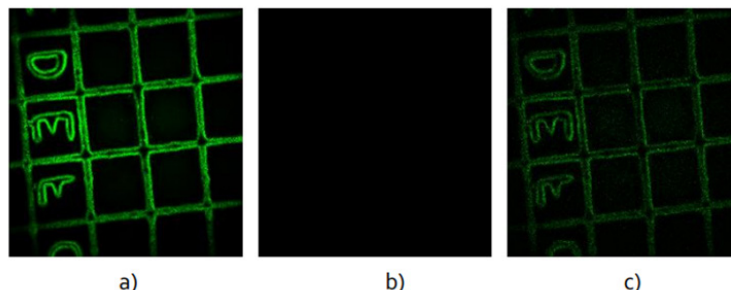
VALO Femtosecond Series

Sub 50 Femtosecond Pulses for Multiphoton Microscopy

Sub 50 femtosecond lasers are ideal for nonlinear and multiphoton microscopy applications due to their higher pulse peak powers which result in 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 can be seen on the calibration grid images 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).



By comparison, for the same peak power a 50 fs pulsed laser requires a quarter of the average power for the same two-photon efficiency (TPEF), thus reducing photobleaching effects, allowing for longer imaging duration and improved cell viability.

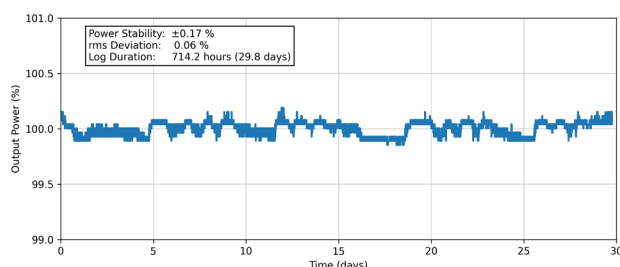
Pulse Duration	Peak Power (30 MHz)	Average Power * For the same TPEF
200 fs	16 kW	100 mW
50 fs	16 kW	25 mW

Long Term Performance Stability

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

The result is more than 24 hours of uninterrupted performance 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.

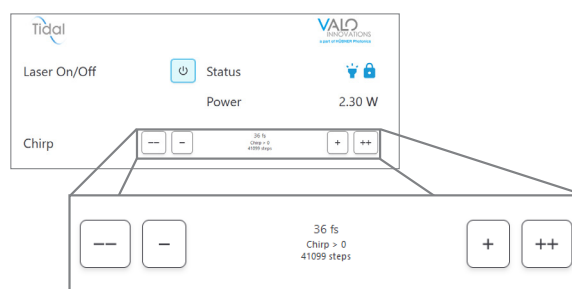
Zoom of Power Stability Over 30 Days



Group Velocity Dispersion Pre-compensation

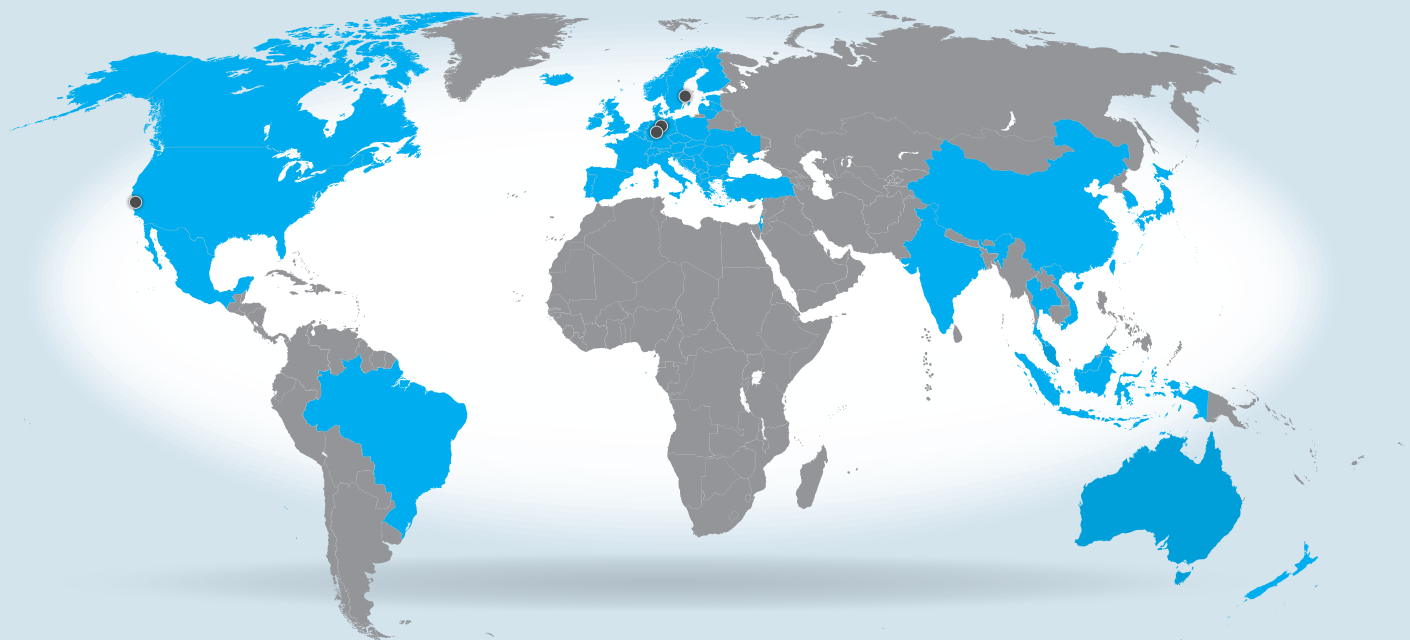
Integrated, and easy to use, group velocity dispersion pre-compensation allows the user to control the pulse duration at the sample.

Using automated dispersion compensation just before the laser aperture the pulse duration is fully characterized and the calibrated values are accessible through the touch screen user interface. The range for the dispersion compensation 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/>



Our Locations

VALO Innovations GmbH, a part of HÜBNER Photonics

(VALO Femtosecond Series)

Hannover, Germany

Phone: +49 511 260 390 70

E-mail: info.valo@hubner-photonics.com

HÜBNER Photonics GmbH

(Sales in Germany, Switzerland and Austria)

Kassel, Germany

Phone: +49 561 994 060 – 0

Fax: +49 561 994 060 – 13

E-mail: info.de@hubner-photonics.com

HUBNER Photonics Inc.

(Sales in USA, Canada and Mexico)

San Jose, California, USA

Phone: +1 (408) 708 4351

Fax: +1 (408) 490 2774

E-mail: info.usa@hubner-photonics.com

Cobolt AB, a part of HÜBNER Photonics

(Sales in Norway, Sweden, Finland and Denmark)

Solna, Sweden

Phone: +46 8 545 912 30

Fax: +46 8 545 912 31

E-mail: info.se@hubner-photonics.com

HA Photonics Pty Ltd

(Sales in UK & Ireland - goods shipped from Europe)

United Kingdom

Phone: +44 735 944 0871

E-mail: info.uk@hubner-photonics.com

In need of technical support/service?

Send us information about your issue:

hubner-photonics.com/service-support

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