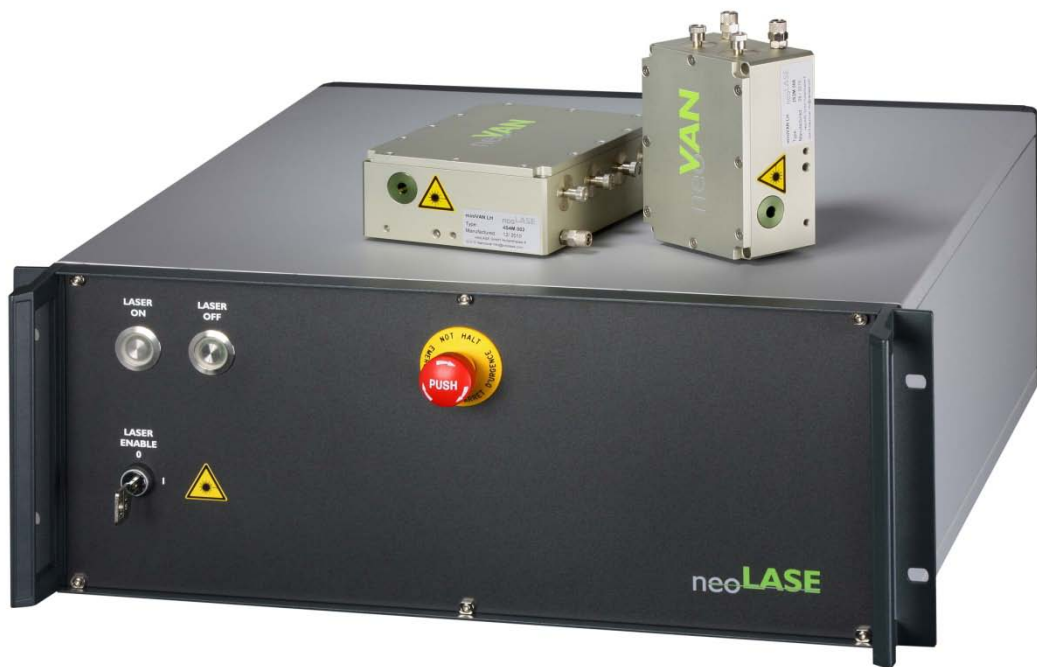

neoLASE Amplifier Systems

neo**VAN**



Amplifier Setup

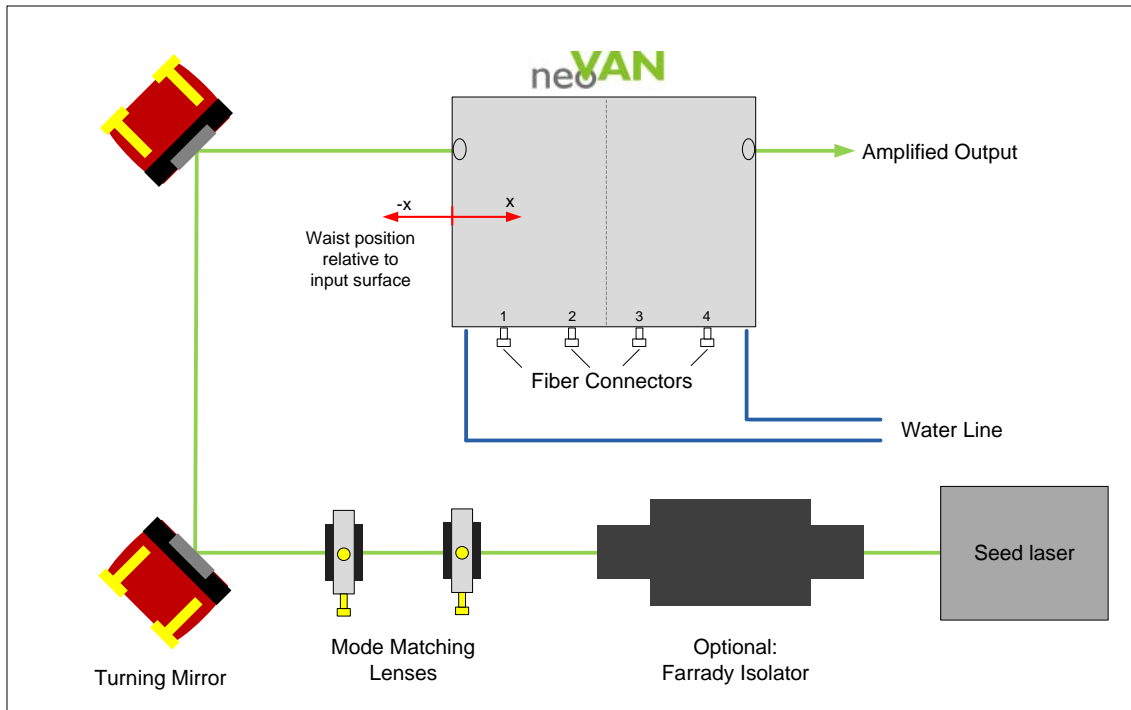
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1 Amplifier Setup

The sketch below shows a typical example of an amplifier setup.

The use of a faraday isolator within the amplifier setup is recommended if back reflections into the amplifier or into the seed laser can occur. To match the beam of the seed laser to the beam path of the amplifier a mode matching telescope is needed. Two steering mirrors are used to align the beam into the amplifier system.

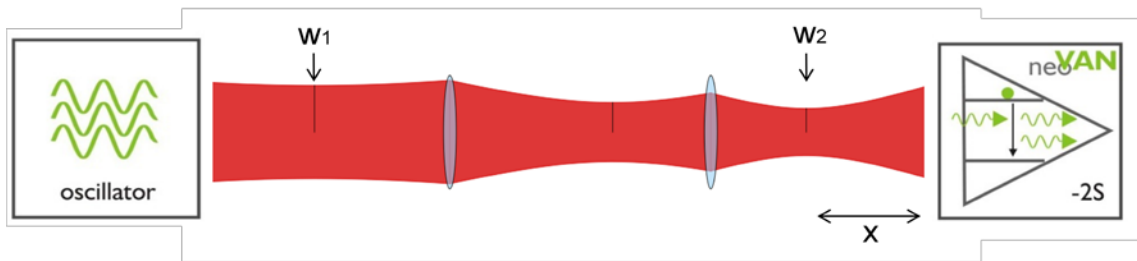


The use of anti-reflection coated optics for the laser wavelength (1064nm) is required.

1.1 Beam Mode Matching

To achieve an optimized amplifier performance the seed laser beam has to be mode matched and aligned into the amplifier. Therefore you need to measure the beam parameters of the seed laser / oscillator and calculate a proper mode matching to fit to the data given in the table below. Depending on the amplifier setup these values can vary so please check for the data delivered with the test protocol of your amplifier. For mode matching calculation tools like “Gaussian Beam Propagation” from <https://lightmachinery.com> can support.

The number for the amplifier input parameters are given below. Input Beam Waist diameter [μm] meaning w2 and Beam Waist Position [mm] meaning x. X is negative when the waist is in front of the amplifier, like shown in the amplifier setup sketch. Polarization direction is s-pol.



Parameter	neoVAN-xS	neoVAN-xP		neoVAN-xB
Amplifier Module description	Standard-Amplifier 1 to 4 stages	Pre-Amplifier 1 to 2 stages free space or fiber coupled input		Broadband Amplifier 1 to 4 stages
Input Options	free-space	free-space	fiber	free-space
Input Beam Diameter ($1/e^2$)	250-300 μm	250 μm	polarization maintaining single-mode fiber	to be defined
Input Beam waist position (0=input aperture)	x = -60 mm	10 mm		to be defined
Polarization direction	s-Polarization			
Fibers	1-4: SMA 905	1-2: SMA 905	1: fiber pigtail 3-4: SMA 905	1-4: SMA 905
Wavelength (nm)	1064.3 nm			
Spectral Bandwidth	< 0.5 nm			
Output Beam Diameter ($1/e^2$)	200-250 μm	~ 300 μm	~ 300 μm	to be defined
Output beam waist position	2 stage: 55 mm 4 stage: 35 mm	0	0	to be defined

1.2 Beam Alignment

If the mode matching is done on a proper way, the seed laser beam can be aligned to the amplifier head. The easiest way to do this is to have 2 adjustable steering mirrors just in front of the amplifier.

Start with seed power levels below 0.1 W and an un-pumped amplifier.

Align the beam through the middle of the entrance window. With a power meter behind the amplifier the throughput of the amplifier can be optimized. The system is properly pre-aligned and more seed power can be used when at least 60% of the input power can be measured behind a 4s amplifier or 90% for a 2s amplifier respectively.

Due to thermal lensing the output beam size of the pumped amplifier will be significantly smaller than the seed beam size transmitted by un-pumped amplifier.

Turn ON the control electronics.

Further alignments into the amplifier can be done by adjusting the input beam to maximum output power. When this is done check the beam quality. The amplifier is perfectly aligned if the parameters given in the test report achieved.



Make sure not to exceed the maximum intensities of objects that are placed in the beam e.g. IR viewing cards, power sensors or optics.

2 Troubleshooting

2.1 Output power or beam quality is different

Note, that power meter deviations of about +/-5% are usual.

Spectral facet, please check central wavelength and emissions bandwidth of the seed laser and the overlap to the amplifier.

Polarization facet, please check the right input polarization.

Beam mode matching facet, please check if beam size and position as well as beam alignment is correct.

Cooling, the laser head is active water cooled but not temperature controlled, please check if proper cooling is given and the laser head didn't get warm.