

## Multi-Color-Machine MCM

6-color laser module and combiner



### **Most flexible platform for multicolor laser illumination**

#### **Features:**

Small

Flexible

Precise

- Up to 6 colors combined on one axis
- Flexible wavelengths configuration:  
Either internal LD out of 405 nm to 1064 nm or  
external fiber ports for adaption of customer laser
- Integrated TEC for high power stability and high beam pointing accuracy
- Singlemode beam shape
- Compact housing 270 x 170 x 40 mm<sup>3</sup>
- Options:
  - TEC stabilized AOTF for precise modulation
  - Fiber coupled output via separate adapter

#### **Applications:**



##### **Optogenetics**

Multicolor display system with single laser source.



##### **Wide field illumination**

Excitation of chromophores and fluorophores.



##### **Fluorescence excitation**

Activate and deactivate cellular behaviour.



##### **Flow cytometry**

Excite and sort different cell types.

# Multi-Color-Machine MCM

The PEGASUS MCM is a multichannel laser modul with up to 6 integrated wavelengths channels, aligned and combined on the same optical axis. The basic version has a collimated elliptical beam shape. On request, it can be provided circularized or even with adapter for fiber coupling, to receive nearly the same beam parameters for all colors.

## Largest variety of possible configurations:

The platform of the MCM provides the combination of up to 6 different wavelengths channels. Depending on customers requirements, each wavelength channel can be configured either with internal LD or via external fiber ports P1 - P6. This is an extensively enlargement of flexibility and makes the MCM the most versatile multiline laser source.

This feature allows to cover many excitation wavelengths of common fluorochromes in the VIS/NIR spectral range for cytometry or fluorescence measurements. Via separate, independent intensity control of each channel (with adapted driver), any color can be adjusted to maximum contrast to the projection surface in imaging applications.

### A) Internal laser diodes

Depending on the application requirements up to 6 different wavelengths can be selected out of the standard singlemode (SM) LD's 405 nm to 808 nm, defined by the customer:

Wavelengths (nm)	405	450	488	505	515	635	660	785	808
Output power (mW)	20	50	15	20	50	30	30	30	50

Other wavelengths and power configurations or multimode (MM) LD's are available on request.

### B) External fiber ports

Using standard SM or MM FC/PC connectors, the fiber ports P1 - P6 at the housing side allow the plug and play adaption of any fiber coupled LD or solid state laser module. P1 corresponds to the longest and P6 to the shortest wavelength.

#### Example of port configuration:

- Port P1: 620 - 645 nm
- Port P2: 575 - 595 nm
- Port P3: 510 - 530 nm
- Port P4: 475 - 495 nm
- Port P5: 440 - 465 nm
- Port P6: 395 - 410 nm

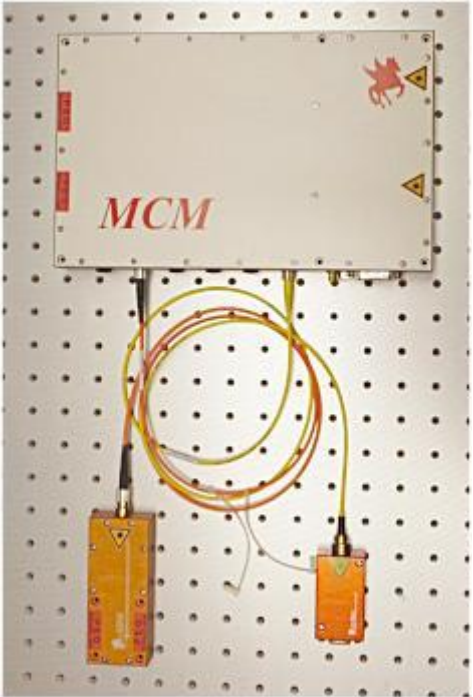


Examples of different color output beam

Violet Blue Green Yellow Red White

$\lambda$ (nm)	Typ. fluorochromes (absorption/excitation)
405	Alexa Fluor 405, Cascade Blue
450	Lucifer Yellow, Alexa Fluor 430
488	Cy2, Fluorescein
520	Magdala Red, Phi YFP
532	Neuro Trace 530, Alexa Fluor 532
561	mTangerine, Alizirin, Phycoerythrin
589	mCherry, Texas Red
635	Alexa Fluor 633, Allophycocyanin

Example of operation:  
Internal LD on channel 1, 3, 4, 5  
Adapted laser at ports P2 and P6



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## Optical specifications (for multiline operation of internal laser diodes):

Spatial mode	TEM <sub>00</sub>
Polarisation	linear
Beam size at aperture	< 2 x 4 mm (elliptical) circular on request
Divergence (full angle)	< 1.5 mrad
Power stability (over 8 h)	< +/- 1 %
Chromatic colinearity	< 1 mrad

Thanks to temperature control via integrated TEC (with adapted driver) all LD can be operated mode-hop free with high power stability and long lifetime.

Moreover the temperature stabilization ensures a good pointing stability of each color channel and thus a good multiline beam overlap, even for changing environment conditions.

## Option: Integrated TEC stabilized AOTF

With PEGASUS MCM driver, each LD channel can be controlled directly, independently via 0 - 5 V analog signal.

As option, the MCM can be provided with integrated acoustooptical filter (AOTF) to enable fast switching between the color channels. The temperature stabilization via TEC ensures high beam pointing and high power stability.

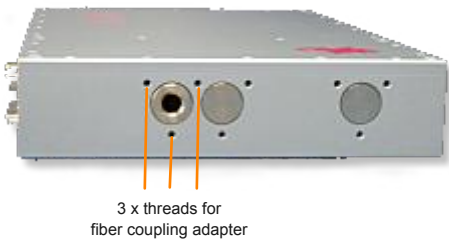
Main benefits of the AOTF configuration are

1. Near the lasing threshold, the output of the laser diodes can not be precisely controlled, directly. The optional integrated AOTF allows the stable modulation with high extinction ratio, even if the diodes are operated at  $\mu$ W power level for photoactivation.
2. Modulation > 100 kHz.

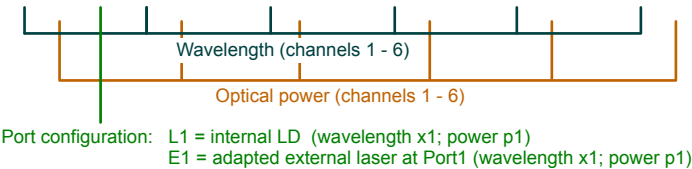


## Option: Fiber coupling

The MCM output can be MM or SM/PM fiber coupled via separate adapter, to be installed at the corresponding threads at the housing front.



**Configuration:** PL.MCM.x1/p1(Z1).x2/p2(Z2).x3/p3(Z3).x4/p4(Z4).x5/p5(Z5).x6/p6(Z6)-AO



If integrated AOTF option ("blank", if no AOTF)

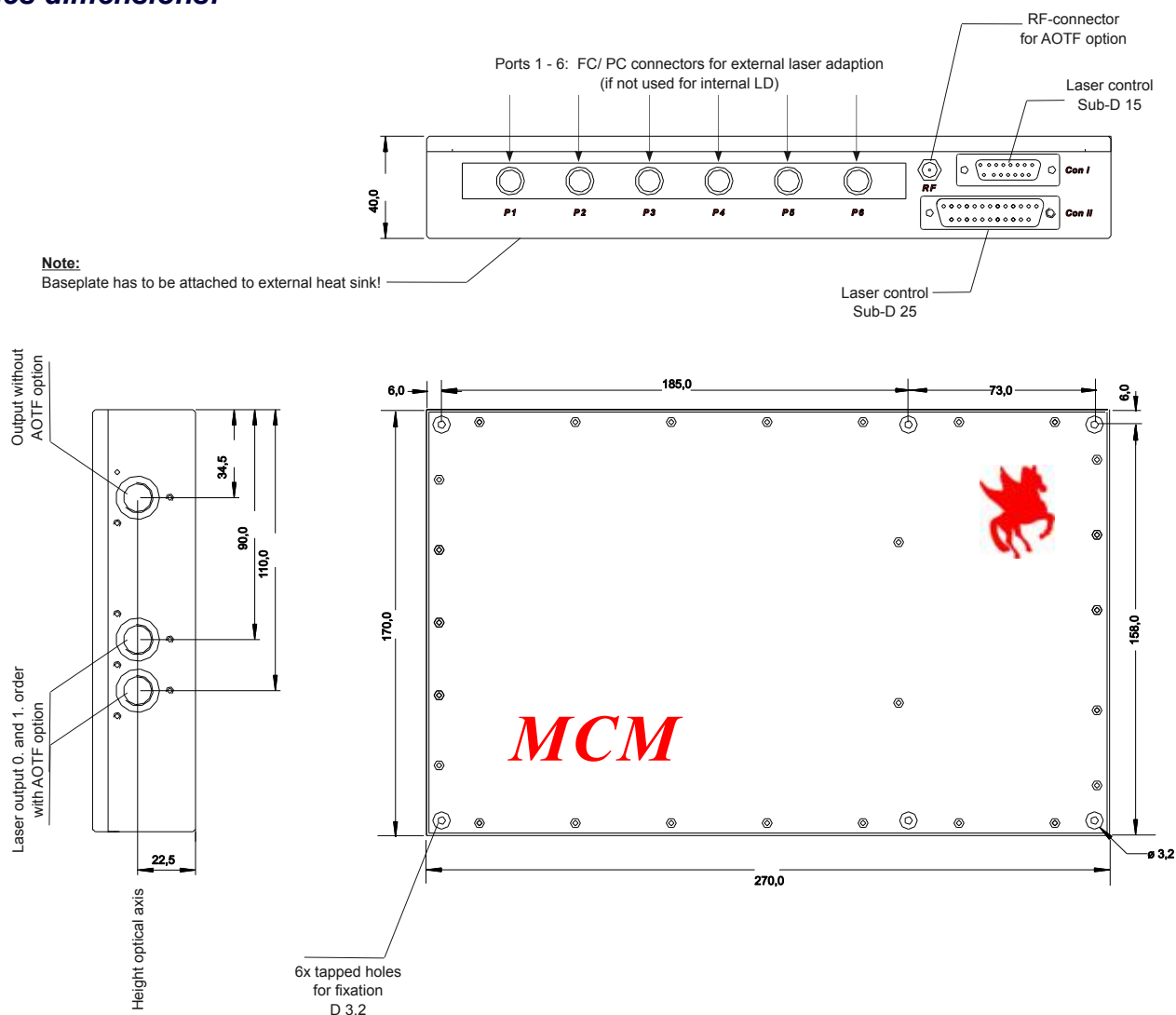
**Example:** PL.MCM.635/30(L1).589/10(E2).515/50(L3).488/15(L4).450/50(L5).405/20(E6)-AO

= 635 nm / 30 mW (internal LD channel 1)  
589 nm / 10 mW (adapted at external Port 2)  
515 nm / 50 mW (internal LD channel 3)  
488 nm / 15 mW (internal LD channel 4)  
450 nm / 50 mW (internal LD channel 5)  
405 nm / 20 mW (adapted at external Port 6)  
Integrated AOTF



# Multi Color Machine MCM

## Mechanics dimensions:



## Adapted driver solutions:

**OEM MCM controller**  
PL.LD.12V.6C4T  
12 VDC power supply



**Benchtop MCM controller**  
PL.LD.230V.6C4T  
230 VAC power supply



PEGASUS follows a policy of continuous product improvement and reserves the right to change any specifications without notice.  
All products comply the warranty of 1 year. (2 years on request)



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