

# ML6640

modulight

## *Laser engine for Flow Cytometry*

The laser engine is designed specifically for the most demanding flow cytometry applications. It provides focused, noise-free, and monochromatic output with 3–4 wavelengths forming a pre-configured beam ladder. The beams can be automatically and individually steered, which reduces overall cost of ownership.



## **ML6640 for Flow Cytometry**

Flow cytometry, especially multi-parameter flow cytometry, poses a significant challenge for laser instrumentation. This is due to the intricate task of integrating, shaping, aligning, and precisely focusing multiple laser beams, all within a minuscule margin of a few microns for both precision and repeatability.

The ML6640 for Flow Cytometry features a built-in CCD camera for beam monitoring, and the **beams** can be **automatically and individually steered** with the **AI-based beam alignment system\***. The automatic AI-based beam alignment system accelerates the beam adjustment process in the assembly phase, and it virtually eliminates the need for service visits to re-align the laser beams. This is a substantial benefit for the customers, reducing downtime and lowering the overall costs of ownership.

Apart from eliminating the long-term drift effects, active beam steering provides an opportunity to change beam ladder configuration for each experimental run. The beam alignment also can compensate for physical tolerances and variation from instrument to instrument.

The platform supports preventive maintenance with predictive analytics and machine learning algorithms, powered by Modulight Cloud. The network connection can be established via Wi-Fi, Ethernet, or cellular connection.

Having multiple laser wavelengths in flow cytometry increases the versatility and flexibility of the system: multiple fluorescent targets can be detected within the same experiment, with more freedom for fluorophore selection. ML6600 can include 3 or 4 of the most used wavelengths; 349 nm (UV), 405 nm (violet), 488 nm (blue), 561 nm (yellow), and 638 nm (red), integrated into compact housing. By default, the beams are top-hat shaped stripes. The stripe pattern can be configured to OEM customers' specific needs.

\*Patent pending

## Optical specifications

Specifications below are examples of ML6640 for Flow Cytometry platform performance. Contact [sales@modulight.com](mailto:sales@modulight.com) to discuss tailoring the parameters for your application requirements <sup>1)</sup>.

| Parameter                                       | Ch1   | Ch2   | Ch3                           | Ch4   | Ch5   | Unit    |
|---|-------|-------|-------------------------------|-------|-------|---------|
| Wavelength <sup>1)</sup>                        | 349±3 | 405±3 | 488±3                         | 638±3 | 561±2 | nm      |
| Nominal Output Power                            | 60    | 100   | 100                           | 100   | 100   | mW      |
| Pointing stability                              |       |       | <5                            |       |       | µrad/°C |
| Polarization Extinction Ratio                   |       |       | >50:1                         |       |       |         |
| Polarization Azimuth (Horizontal to base plate) |       |       | ±5                            |       |       | deg     |
| Beam profile parallel to baseplate              |       |       | 100 <sup>1)</sup>             |       |       | µm      |
| Beam profile perpendicular to baseplate         |       |       | 10 <sup>1)</sup>              |       |       | µm      |
| Vertical beam spacing                           |       |       | 100 <sup>1)</sup>             |       |       | µm      |
| Coefficient of Variation (CV)                   |       |       | <3                            |       |       | %       |
| Focal distance from the last optical element    |       |       | 20 <sup>1)</sup>              |       |       | mm      |
| Mechanical dimensions                           |       |       | 170 x 170 x 105 <sup>2)</sup> |       |       | mm      |
|   |       |       | 220 x 220 x 105 <sup>3)</sup> |       |       |         |

If not otherwise stated, all above values are for operation at room temperature, at nominal output power.

<sup>1)</sup> Can be tailored per customer request.

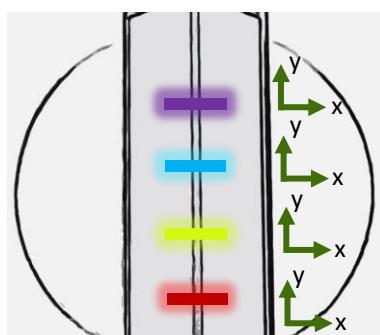
<sup>2)</sup> The housing can host up to 3 of the listed wavelengths: 405 nm, 488 nm, and 638 nm.

<sup>3)</sup> The housing can host up to 4 of the listed wavelengths: 349 nm or 561 nm, 405 nm, 488 nm, and 638 nm.

## Control and environmental specifications

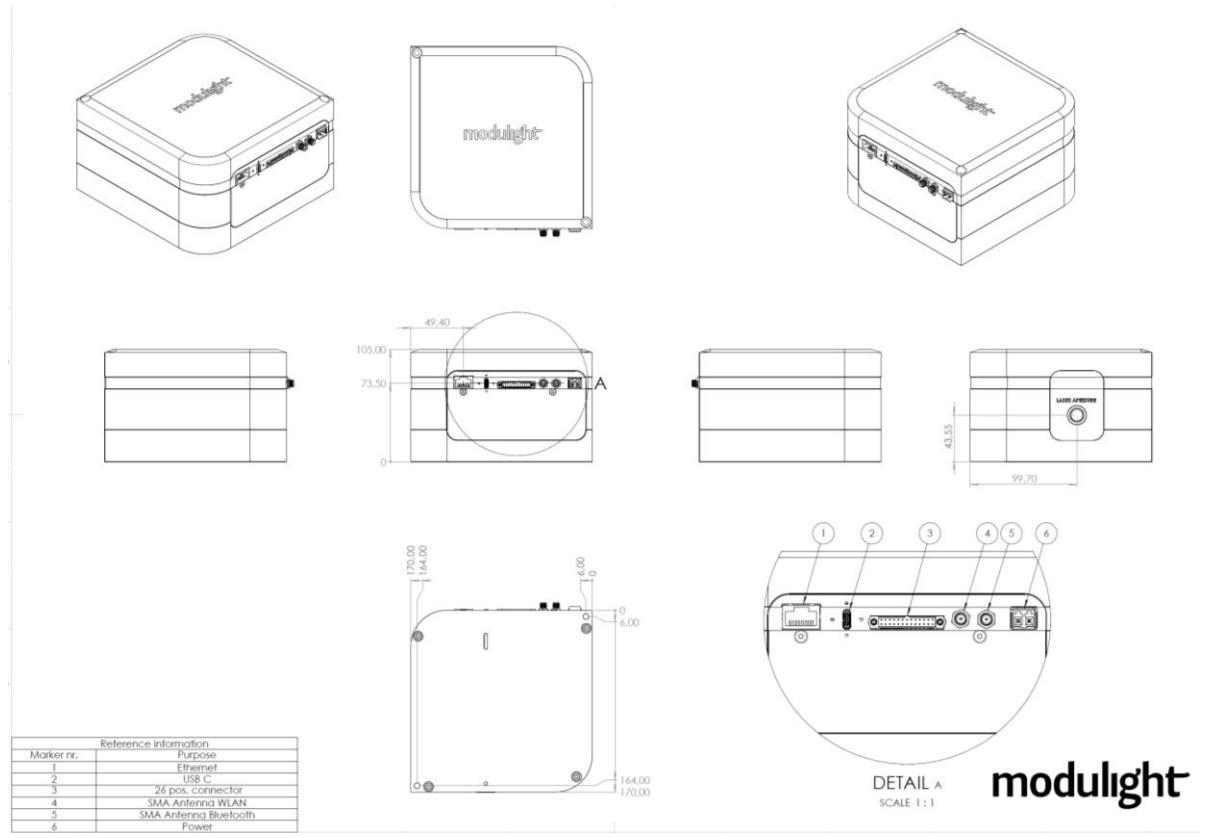
| Parameter   | Rating   | Unit |
|---|--|------|
| Warm-up time  | 5  | min  |
| Rise/fall time                                      | <0.1   | ms   |
| Interface for Computer control                      | RS422, RS232, USB  |      |
| Supply voltage                                      | 24 VDC   |      |
| Power Input Connector                               | Single-row 2-pin<br>P/N Weidmuller 1356060000                              |      |
| Control Interface Connectors                        | USB-C;<br>26-pin 2-row connector, P/N Harwin<br>Datamate J-tek M80-5402642 |      |
| Baseplate Operating Temperature Range <sup>1)</sup> | 20...35  | °C   |
| Storage Temperature Range                           | -20...60   | °C   |

<sup>1)</sup> A non-condensing environment should be ensured over the useful temperature range.



Output beam illustration. The width of the line beam will be factory set. The beam stack can be moved in x-direction to hit the flow channel. The y-position of each beam can be individually controlled. The beam positions can be automatically re-adjusted with beam alignment system.

## Mechanical Specification for 3 Wavelength Version



Please contact Modulight sales team for the availability of the pin layouts.

## Safety Information

- The laser light emitted from this laser diode might be visible or invisible, and it is potentially harmful to the human eye. Avoid eye and skin exposure to the beam, both direct and reflected.
- Products are subject to the risks normally associated with sensitive electronic devices including static discharge, transients, and overload. Please ensure ESD protection prior to handling the products.
- These Modulight products are not intended for use in systems where product malfunction can reasonably be expected to result in personal injury.



Peak power and wavelength are for safety analysis only, not to present device performance.

## Liability note

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## RoHS compliance

The product complies with EU RoHS 2 (Directive 2011/65/EU) and China RoHS II (Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products)