



Laser Diode Module ML2040 OPERATING INSTRUCTIONS

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1. FOREWORD

Dear Customer,

Thank you for buying Frankfurt Laser Company laser diode module. It was developed based on the latest achievements in science and technology and produced using state-of-the-art components.

Since laser modules are designed to be used as components for installation into an OEM product, no provisions were or could be made to provide the laser safety which would normally be required for your application and equipment into which they will be installed. By accepting delivery of the device, you accept responsibility to insure all necessary precautions will be taken with regards to laser safety in your application.

Please, use the laser diode module with the purpose it is designed for and in accordance with the instructions provided. Improper or unauthorized use of this device will void the guarantee.

The vendor will not be liable for the consequences of any incorrect or unsafe use of the laser diode module.

1. INSPECTION

Before using the laser diode module for the first time, please, make sure that:

- the serial number of the product corresponds to the number in the packing list;
- the packing is undamaged;
- the laser diode module shows no visible signs of damage.

In the event of any damage, please, notify the vendor immediately. Retain the original packing material to return damaged goods and use foam packaging for cushioning where appropriate.

2. SAFETY PRECAUTIONS

Laser radiation produced by the module may cause permanent damage to human eye.

Study and observe all the safety precautions specified in IEC-60825.1. Laser safety indications are also specified on the laser safety labels.

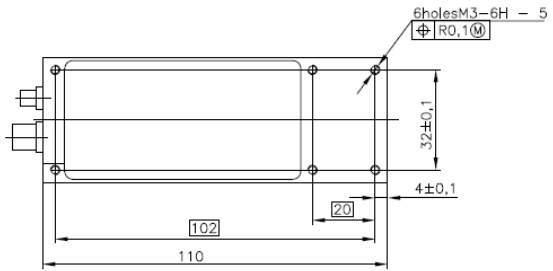
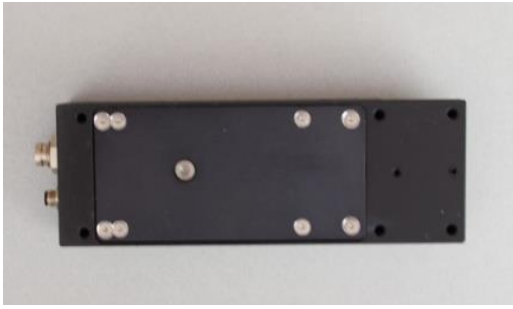
Avoid direct or indirect exposure to radiation from the laser.

Wear laser safety goggles at any time the laser module is in use.

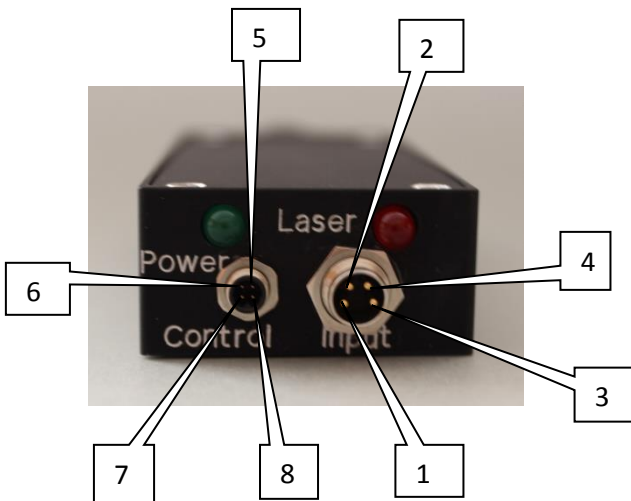
3. INSTALLATION

The laser diode module is designed for usage within laser diode applications mounted onto a cooling platform provided by a customer. Use aluminum or copper holders or heat sinks to remove heat efficiently from the laser diode module. Cooling capacity required is be twice that of the power consumption. Modules with power output 400mW or less do not require external heat sinking. Consider surface finish ($Ra \leq 1.6$), flatness (< 0.02 mm) and dimension of cooling surface!

It is strictly prohibited to apply mechanical force to the laser diode module housing while set-up and/or usage. It can lead to instantaneous damage of laser diode and optical system.

<p>1. Use 6 screws M3 screwed through customer's cooling plate into module housing to mount the module on a heat-sink. Type of screws and tools are defined by a customer.</p>	
<p>2. To minimize thermal contact resistance apply thermal compound to the bottom surface of the module and the corresponding surface of a heat-sinke before fixing the module to it. Thermal compound layer has to have minimal thickness.</p>	
<p>3. Place the module onto the heat-sink, insert screws into the holes and tighten them. Tightening torques: 45 Ncm for mechanical fixation.</p>	

4. ELECTRICAL CONNECTION



4.1 Module connection guide

4.1.1 Electrical jack INPUT is used for power voltage application. Electrical jack CONTROL is used for adjustment signals and laser diode state monitoring.

INPUT contacts:

- 1, 2 - 5VDC standard (optional 3.3V, 12V, 24V DC)
- 3,4 - Common

Using a separate contact part of INPUT jack, enclosed with the module, assemble the contact cable required to power the product.

5.1.2. CONTROL contacts (optional).

When no provisions were made by an end-user for laser diode module adjustments, the contacts are left free. When they were made, final contact type is to be checked in the manual.

- 5 – Analogue Modulation (brown wire)
- 6 – Laser diode current adjustment (white wire)
- 7 – TTL modulation (blue wire)
- 8 - Laser diode temperature adjustment (black wire)

Appropriate cable with electrical connector is supplied with the module.

5.1.3. Connect appropriate cables to module electrical jacks.

5.1.4. Make sure the power supply voltage is set to the correct value.

5.1.5. Make sure modulation voltage signals set to correct values.

5.1.6. Prior to connecting cables to appropriate power and modulation supplies, make sure the latter are switched to OFF position.

5.1.7. Connect cables to appropriate external voltage supplies.

5.2. Module in CW Operation Mode.

5.2.1. Turn ON a power supply.

5.2.2. The module has to project the beam with specified parameters.

5.2.3. Green LED should glow. Red LED should not glow.

5.2.4. It is possible for red LED to blink several times at the beginning not longer than 1min in total.

5.2.4.1. When red LED glows for more than 1 min, turn the module OFF. Check the power supply voltage value and module contact with the heat-sink.

5.2.4.2. When all parameters comply with the operation requirements, check the optical power output and operating current for 1min.

5.2.4.3. When red LED still keeps glowing and/or any parameter does not comply with the specification, switch the module OFF and contact the supplier.

5.2.5. Work with the module

5.2.6. Turn OFF the digital generator and then turn OFF the power supply

5.3. Module with TTL input

Attention! High TTL signal should never exceed the power voltage value!

5.3.1. Positive TTL Modulation type. Operating voltage 5VDC.

Low level from digital generator must be 0...0.4V, high level 2.5...5V. Light power is $P_{output} = 0$ and $P_{output} = P_{max}$ respectively.

When operation voltage is 3.3VDC, low level is 0...0.4V and high level 2...3V, respectively.

At higher operating voltage values 12V and 24VDC TTL signal values have to be confirmed when the product is bought.

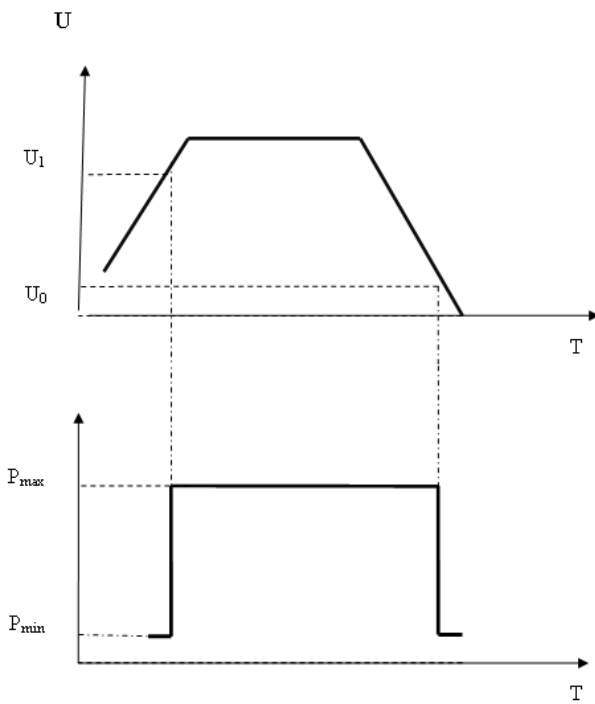
5.3.2. Negative TTL Modulation type. Operating voltage 5VDC.

Low level from digital generator must be 0...0.5V, high level 3.5...5V. Light power will be $P_{output} = P_{max}$ and $P_{output} = 0$ respectively.

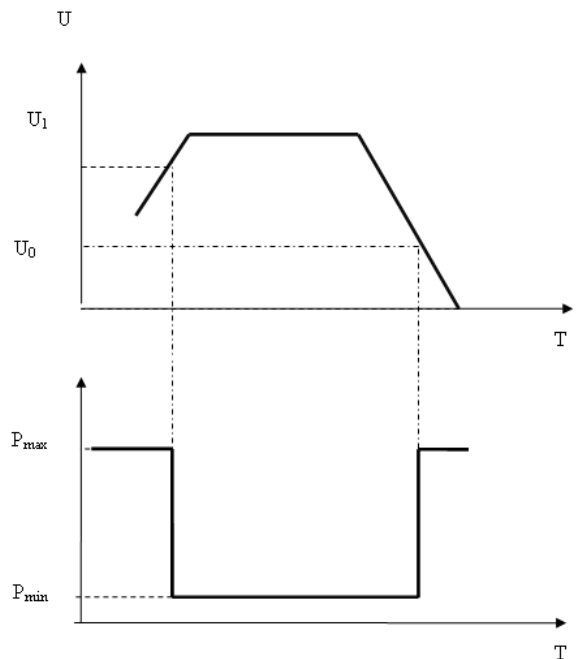
When operation voltage is 3.3VDC, low level is 0...0.4V and high level 2...3V, respectively.

At higher operating voltage values 12V and 24VDC TTL signal values have to be confirmed when the product is bought.

- 5.3.3. Turn the power supply ON, then turn ON the digital generator, if required.
- 5.3.4. Work with the module.
- 5.3.5. The module has to project the beam with the specified parameters.
- 5.3.6. It is possible for red LED to blink several times at the beginning not longer than 1min in total.
- 5.3.7. When red LED glows for more than 1 min, turn the module OFF. Check the power supply voltage value and module contact with the heat-sink.
- 5.3.8. When all parameters comply with the operation requirements, check the optical power output and operating current for 1min.
- 5.3.9. When red LED still keeps glowing and/or any parameter does not comply with the specification, switch the module OFF and contact the supplier.
- 5.3.10. Work with the module
- 5.3.11. Turn OFF the digital generator and then turn OFF the power supply



Positive TTL Modulation



Negative TTL Modulation



5.4. Module with analogue modulation

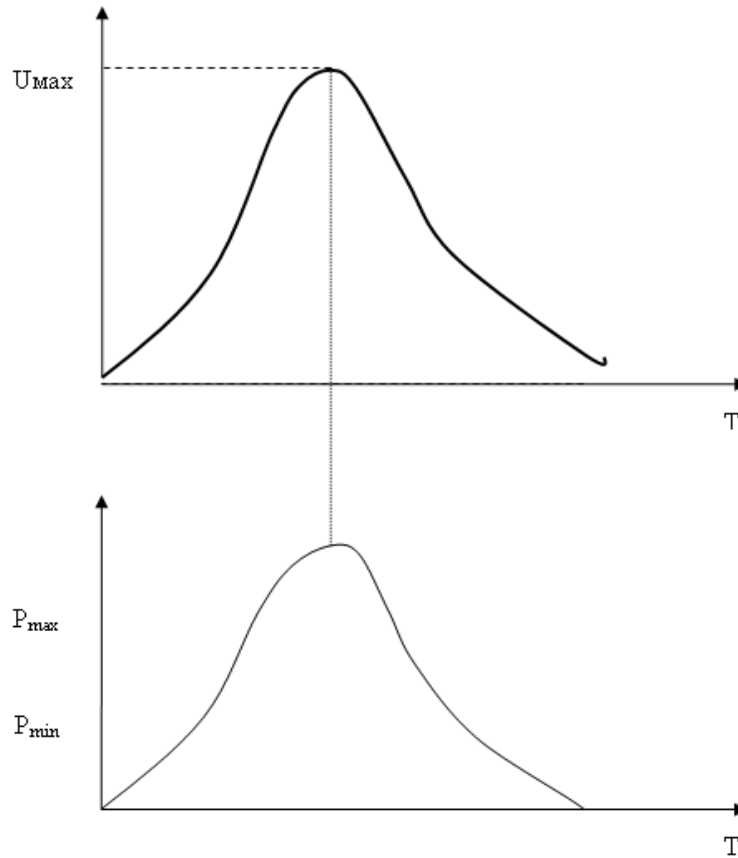
The output power of the laser diode module in the mode depends on the input voltage of the pulse generator.

Signal level changes from 0 to 1.2V and optical power output changes from P_{min} to P_{max} .

5.4.1. Turn the power supply ON, then turn ON the analogue generator, if required.

5.4.2. Work with the module.

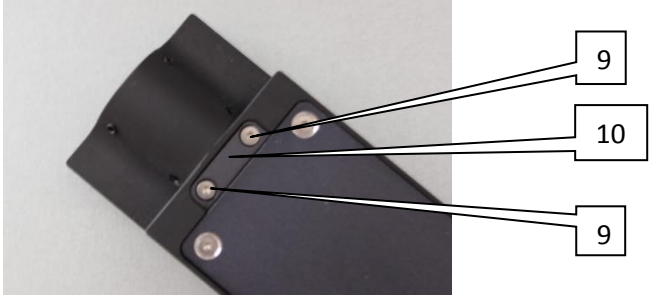
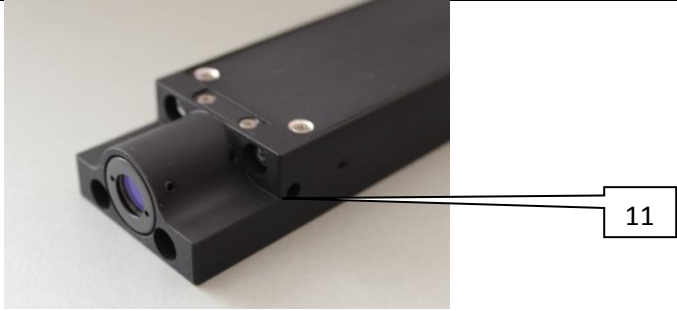
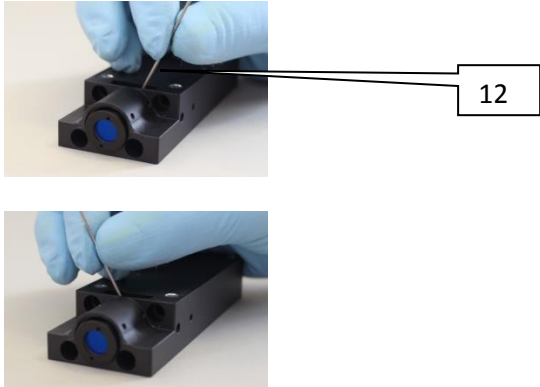
5.4.3. Turn OFF analogue generator and then turn OFF the power supply



max

Analogue Modulation

6. ADJUSTING THE BEAM.

<p>6.1. Unscrew screws (9), using the hex wrench, included in delivery kit, and remove the lid (10).</p>	
<p>6.2. Loosen the screw (11)</p>	
<p>6.3. Insert the focus adjustment instrument (12) in the bore of objective frame and move the optic to meet your beam dimensions or divergence requirements. Take into account, moving the instrument clockwise in the beam direction will move the focus point closer, counter-clockwise – afar.</p>	
<p>6.4. Tighten the screw (11) slightly, put the lid (6) back in place and fix it with screws (9).</p>	

7. MAINTENANCE AND REPAIR

The laser diode module does not require any special maintenance. The optical window can be cleaned occasionally with a soft cloth or using airflow.

In case of failure, do not attempt to repair the product yourself! Please, return the product to the vendor immediately.

8. GUARANTEE.

Guarantee period is 12 months from the date of delivery.

The guarantee is void, if the laser module:

- was used not in accordance with manufacturer's instruction manual
- disassembled, regulated without manufacturer's written consent
- was exposed to aggressive environment (liquids, rough dust)
- does not have the serial number

9. ACCESSORIES

The following accessories are available for these laser diode modules.

Wall Plug Power Supply

We offer the appropriate wallplug power supply for each laser module. Please, contact Frankfurt Laser Company for further details.



Wall-plug Power Supply for 5V DC Laser Diode Module.

10. DELIVERY KIT

10.1 Hex wrench



10.2 Thin focus adjustment instrument



10.3 Power cable length 1.5m with electrical female connector



10.4 Control cable length 1.5m with electrical female connector



10.5 Graphite Pad

