



# **RHAML-E-Laser Diode Module OPERATING INSTRUCTIONS**



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## 1. FOREWORD

### Dear Customer,

Thank you for buying a Frankfurt Laser Company laser diode module. It was developed on the basis of 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 of your application and equipment into which they will be installed. By accepting delivery of this 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.

## 2. INSPECTION

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

- Make sure the packing is undamaged
- Make sure 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.

## 3. INSTALLATION

Before installing the laser diode module into the set-up, make sure that:

- The serial number of the product corresponds to the number in the packing list
- The supply voltage and laser diode module control signals correspond to those set by yourself

**ATTENTION!**  
**Laser diode module housing has electrical potential**

## **4. WORKING INSTRUCTIONS**

### **4.1 *Safety precautions while operating the product***

The laser diode mounted in the module is able to create radiation, the appropriate safety precautions applicable in your country to this eye safety laser class must be observed.

### **4.2 *Installation***

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

### **4.3 *Heatsinking***

To ensure correct operation of the laser diode module it may be necessary to heat sink the module.

Modules that have an output power of 50mW or less do not require special heat sinking. All other modules require heat sinking to remove waste heat from the module which will improve the stability characteristics and increase the lifetime. For better heat dissipation from the laser diode module use aluminum or copper holders to remove heat energy, do not place excessive force on the modules, this may cause internal damage.

### **4.3 *Laser module operation requirements***

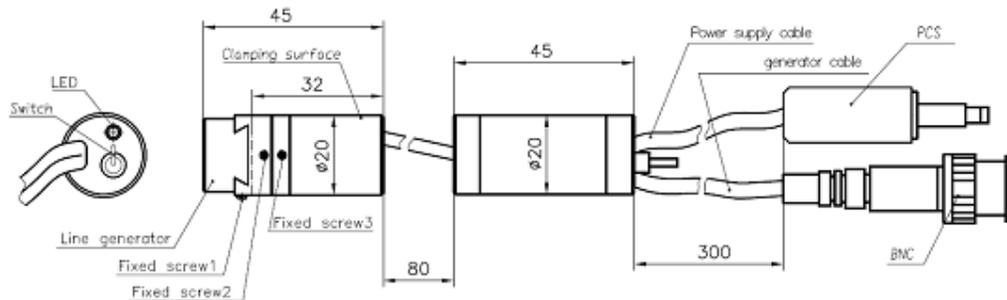
Electrical signals should comply with the specification of the laser diode module.

It is strictly prohibited to expose the optical surfaces of the module to hard particles of any size, as it can damage optical coatings and integrity of optical parts.

## 5. ELECTRICAL CONNECTION

**ATTENTION!**  
**Laser diode module housing has electrical potential**

### 5.1 Module connection guide



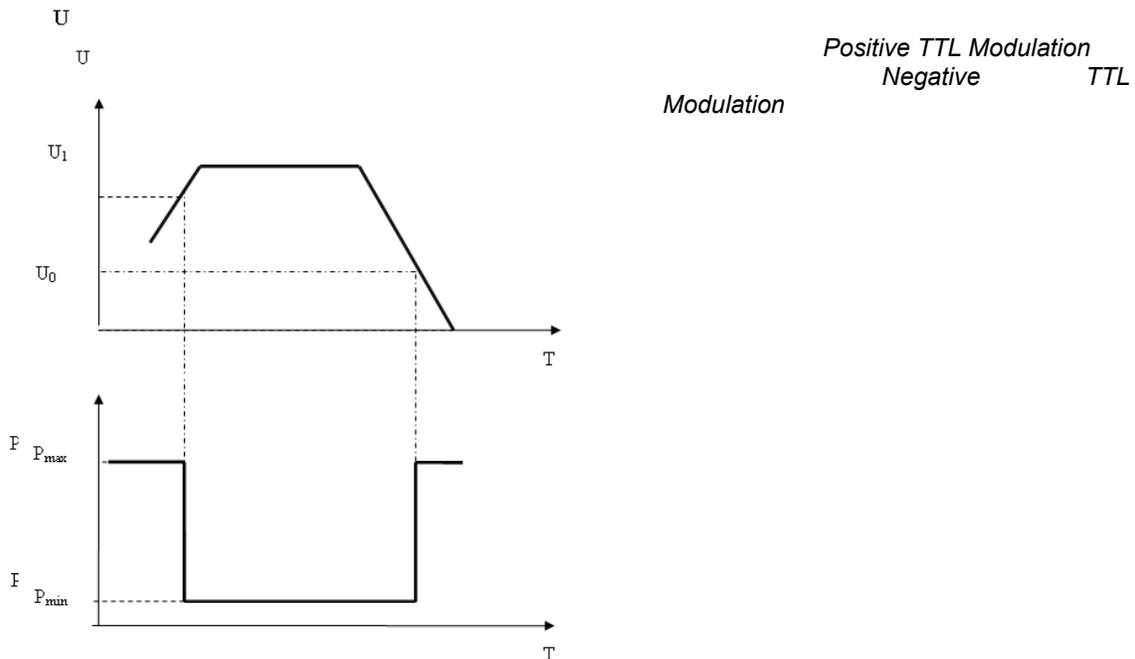
- 5.1.1 Connect PCS to the power supply: 5V\*
- 5.1.2 Turn "ON" the power supply, then turn ON the laser diode module
- 5.1.3 Turn "OFF" the power supply

\*Please insure that the module is for 5V some versions may operate at different voltages, if you are unsure please contact Frankfurt Laser Company.

Please ensure that the correct signal is applied to the correct pin.  
 Any pins that are not in use should be isolated.

## 5.2 Working with the module for module with TTL input

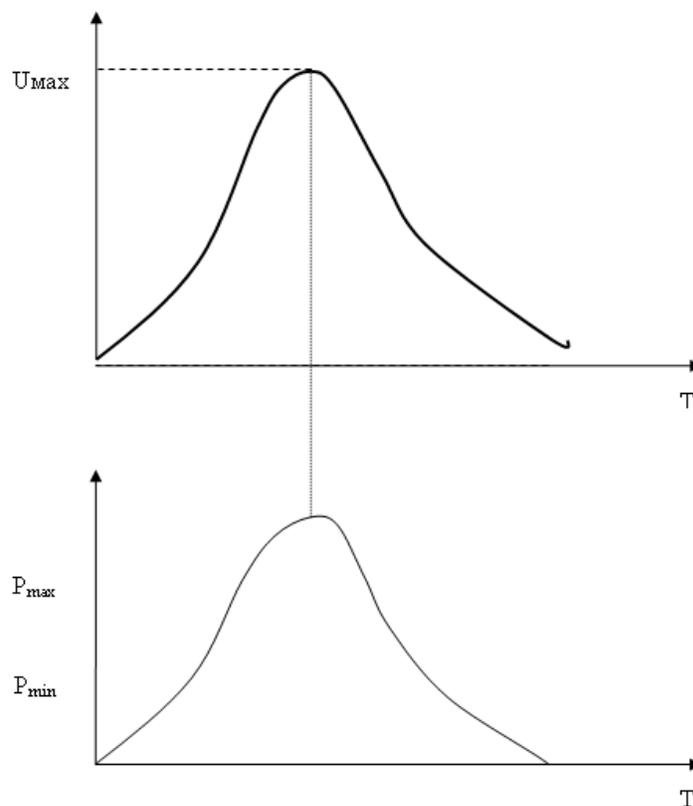
- 5.2.1 Ensure that power supply is set to 5V and is in the OFF position
- 5.2.2 Ensure that TTL generator is set to 0V and is in the OFF position
- 5.2.3 Connect the PCS to the power supply
- 5.2.4 Connect the BNC (or other) to the TTL generator
- 5.2.5 Positive TTL Modulation type  
 Low level from digital generator must be 0...0.5V, high level 3.5...5V. In this case light power  $P_{\text{output}} = 0$  and  $P_{\text{output}} = P_{\text{max}}$  respectively.
- 5.2.6 Negative TTL Modulation type  
 Low level from digital generator must be 0...0.5V, high level 3.5...5V. In this case light power  $P_{\text{output}} = P_{\text{max}}$  and  $P_{\text{output}} = 0$  respectively.
- 5.2.7 Turn the power supply ON, then turn ON the laser diode module
- 5.2.8 Turn ON the digital generator, if required.
- 5.2.8 Work with the module.
- 5.2.9 Turn OFF the digital generator and then turn OFF the power supply



### 5.3 Working with the module for module with analogue modulation

In this mode the output power of the laser diode module will depend on the input voltage from the secondary supply voltage unit

- 5.3.1 Ensure that power supply is set to 5V and is in the OFF position
- 5.3.2 Ensure that TTL generator is set to 0V and is in the OFF position
- 5.3.3 Connect the PCS to the power supply
- 5.3.4 Connect the BNC (or other) to the Analogue generator
- 5.3.5 Turn the power supply ON, turn ON the laser diode module
- 5.3.6 **Turn ON the analogue generator.**
- 5.3.6 Work with the module.
- 5.3.7 Turn OFF analogue generator and then turn OFF the power supply



*Analogue Modulation*

### 5.4 Module with a potentiometer

To change the power output, change the position of the potentiometer at the back of the module.

## 6. ADJUSTING THE OPTICAL OUTPUT

There are several options currently available; which influence the ability to adjust the optical output;

### 6.1 *Optic type*

#### 6.1.1 *Without beam-shaping optic*

The module contains a single lens that will either

- Create a quasi-parallel beam
- Generate a focused spot at a set distance

The optic can be supplied fixed or adjustable and is specified at the point of purchase.

If the lens is fixed, the beam focus cannot be changed.

If the lens is moveable, the beam spot can be altered by moving the lens along the optical axis.

#### 6.1.2 *With beam-shaping optic*

In addition to the lens of the optical system there may also be other optical elements within the module that allow the user to change the spot shape and the focus distance of the laser spot.

#### 6.1.3 *Special optic*

The optical system is custom, please, contact Frankfurt Laser Company for further details.

## 6.2 *Adjusting the lens*

Where that ability to change the focus point of the laser is available the focus adjustment wrench that was supplied with the laser diode module should be used to make the necessary change.



*Laser Diode Module Optic Adjustment Key*

- The wider end is used to remove and install the beam-shaping optic;
- The narrow end is used to adjust the internal optic;

6.2.1 Use the wider end of the wrench to remove the beam-shaping optic.

6.2.2 Insert the narrow end of the wrench into the module, rotate to adjust to the desired spot size.

6.2.3 Use the wide end of the wrench to reinstall the beam-shaping optic.

Screw

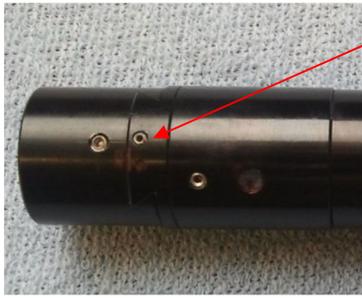
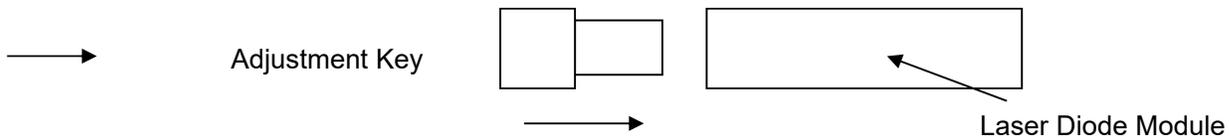


Diagram shows the RHAML module

- 6.2.4 Remove the line generator optic using the key that was enclosed with the module, this is done by unscrewing the bolt as shown and sliding the optic out of the module. Do not unscrew any of the other bolts as this can lead to instant failure of the laser diode module.



- 6.2.5 Insert the narrow end of the key into the module, rotate to adjust to the desired spot size.
- 6.2.6 Reinstall the line generating optic being careful with the alignment to ensure even distribution of the line.

## 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

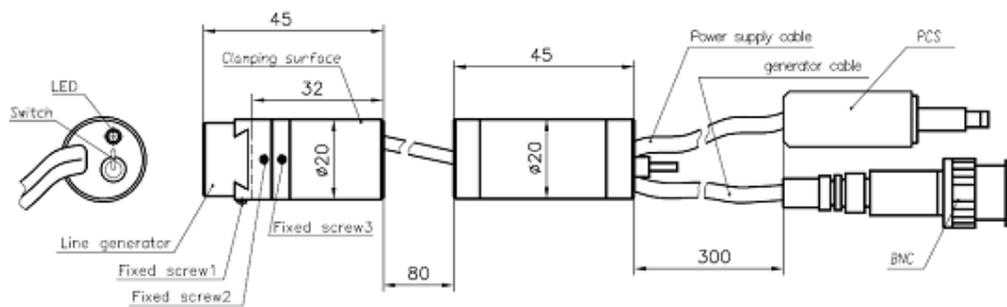
Guarantee period is 12 months from the day the module is delivered.

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. MODULE DRAWINGS

### 9.1 RHAML-E



## 10. ACCESSORIES

The following accessories are available for laser diode modules.

### 10.1 *Wall Plug Power Supply*

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



Wall Plug Power Supply for 3V and 5V Laser Diode Modules