



## **User Manual**

### **Continuous Wave Single Frequency Lasers**

#### **SYMPHONY<sup>®</sup> Series**

#### **532nm 2000mW**

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**Before starting the laser:**  
**for thermal equalisation keep it at least 2 hours**  
**under the intended operation environment.**

**Warning: Laser head and controller are connected via a metal shielded glass fibre. Handle fibre with care.**

**DO NOT bend fibre!**

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## Introduction

This user's operation manual describes safety regulations, compliance status, damage prevention considerations, operating characteristics and other practical information. Operation of the SYMPHONY<sup>®</sup> laser outside the guide lines described in this manual carry risk of damage to the product and possible safety hazard to the operator.

The operator should read and understand this manual prior to using the laser.

This manual refers to KLASTECH<sup>®</sup> lasers for the SYMPHONY<sup>®</sup> series within range of output powers up to 2000 mW.

## General Description

The SYMPHONY<sup>®</sup> laser by KLASTECH<sup>®</sup> is a complete, easy to operate, turn-key DPSS (Diode Pumped Solid State) laser system that emits single frequency TEM<sub>00</sub> beam of a preset power at 532nm. The laser design exploits the technology of Intra-cavity impedance-Matched Amplification Tuned Laser Technology (*iMAT*<sup>®</sup>) producing laser radiation which inherently features single frequency operation at the highest conversion efficiency of SHG (EPO 1442507, also patent pending in USA, China, India).

## Compliance

The laser complies with international regulation IEC 60825-1 and hence with the corresponding national versions (e.g. Germany: DIN EN 60825-1).

## Safety

When installing and using the SYMPHONY<sup>®</sup> laser, the following safe operating procedures are to be observed:

- Enclose the path of the laser beams whenever possible.
- Never look directly into the laser beam or any reflections of the laser beam as possible eye damage may result. **Avoid eye or skin exposure to direct or scattered radiation!**
- Always wear appropriate protective laser goggles.  
The goggles must comply with this specifications: 532nm, D:L6, IL6, R:L6, OD6.0+
- Avoid setting up the laser with the beam position at eye level.
- Block the path of the laser beam with a "Beam Trap" if the beam is directed toward the area where people can be located.
- Use "Interlock" facility of the laser controller to switch off the laser in cases of unexpected access to the laser working location.
- **Do Not** attempt to open the laser head or laser controller. Doing so may expose the user to possible radiation or electrical voltage hazard.

Warning labels located on top of the laser head:



## System Completeness, Unpacking and Handling

The SYMPHONY<sup>®</sup> laser package comprises of:

- SYMPHONY<sup>®</sup> laser head
- laser controller 04\_02\_01
- Connecting cable, set of 4 M2.5 screws
- Interlock connector
- Numbered switch keys (set of 2)
- AC/DC converter
- Operation manual (this document) with performance test certificate

Before unpacking visually check the carton box for damage. Make sure that the shock and temperature sensors attached to the box do not indicate any records outside the parameter range allowed during delivery/storage. Advise KLASTECH<sup>®</sup> of any box damage or sensor records. If there is no visible damage or 'out-of-range' - sensor records, remove packed items from the carton and visually inspect them for damage separately. Especially, handle the laser head carefully to prevent undesirable mechanical shock.

**Note:** Laser head and controller are tuned to each other to form a self-compatible set. They are labelled accordingly with reference to the serial number of the respective counterpart. The laser head **must not be used** with other than the specified controller! Mismatching will probably result in damage of the laser head!



Pic. 1: Sticker located on the laser head and the controller indicating the serial number of the laser and the serial number of the controller.

## Setting-up and Operation of the SYMPHONY<sup>®</sup> Laser

**Note:** Before starting the laser, for thermal equalisation keep it at least 2 hours under the intended operation environment.

Mount the SYMPHONY<sup>®</sup> laser head on a stable metal surface of approximately or higher 150x170mm<sup>2</sup> area and 15-20mm thickness. The flatness of the mounting surface is important for both to provide good thermal exchange from the bottom of the laser head to the environment and to prevent mechanical stress onto the laser head base plate while clamping. For positioning holes on the mounting surface for clamping the laser head see the laser head drawing. **Use a torque of 1,3Nm (eg 11,5 lbs inch).**

Position the laser controller 04\_02\_01 in an appropriate location within the range of the connecting cable length (up to 1.75m).

Arrange for the “Interlock” circuitry to be closed loop with the electrical resistance < 1 Ohm. Use the interlock connector plugged into the laser controller back panel (right socket).

Connect the laser head and laser controller with the connecting cables. Use the screws for fastening both ends of the cable within corresponding sockets.

Plug 19 Volt AC/DC converter output into power socket on back panel of the laser controller.

Switch the main switch on the back of the controller to on position.

Put the switch key into the lock on the front panel of the laser controller. The initial switch key position is “OFF”.

Turn the key switch to position I. The “Power” and “Warm-up” LED indicators are illuminated. After the warm-up delay time the “Warm-up” indicator will extinguish and “Standby” will illuminate.

**Note:** Should the switch be turned to the ON position before the standby indicator has illuminated the system will reset to wait for the switch to be turned to standby. Switching to standby will start the warm up period again.

Open the mechanical shutter in front of the output window. Therefore push the shutter upwards.

Turn the key switch to position II. This operation switches on the pump diode inside the laser head. The “Emitting” LED is illuminated and laser light is emitted. The LED “Stable” is illuminated as soon as the output power is stabilized.

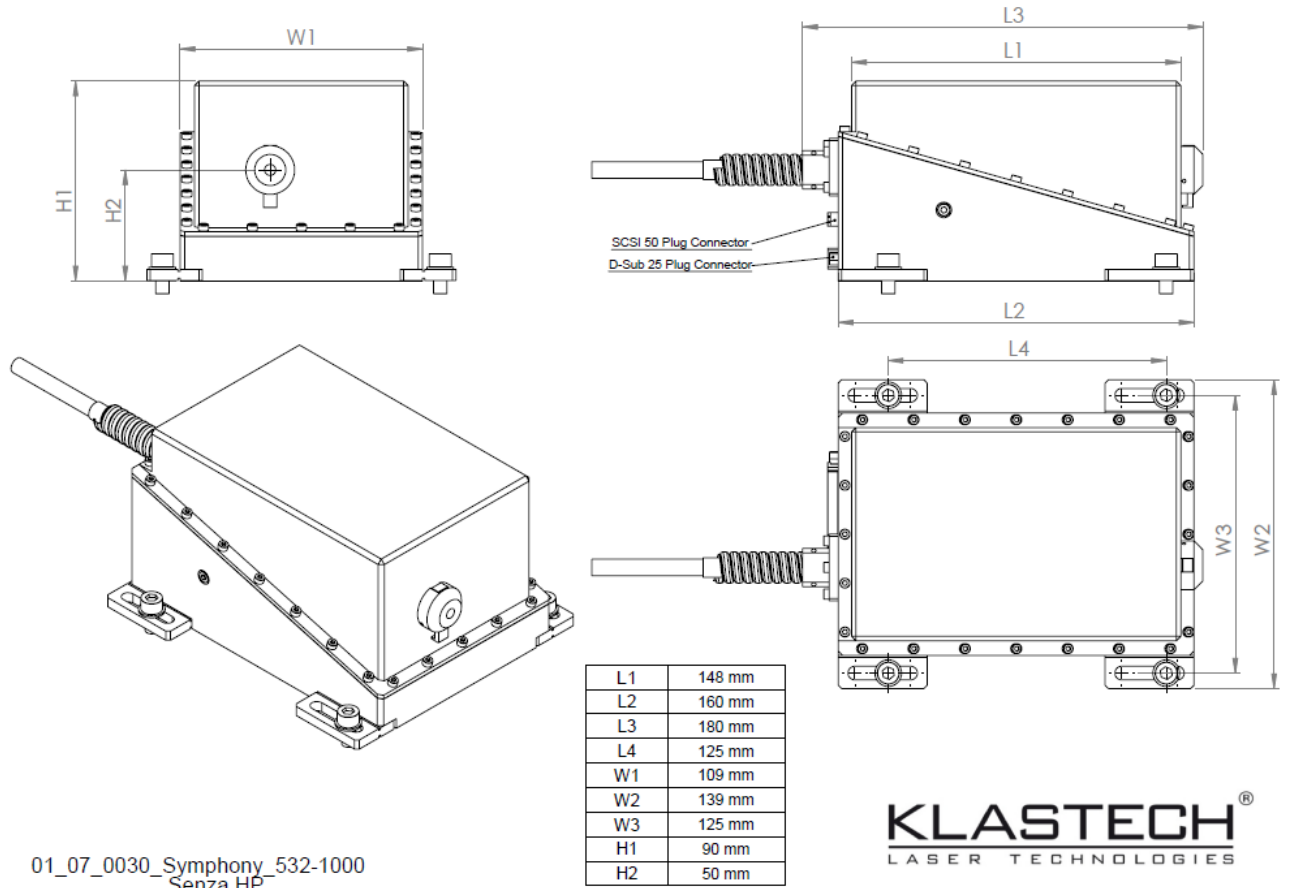
To switch off the laser, turn the key switch to position I or off.

**Note:** *The switch key can only be removed in the off position.*

**Note:** *Controller and laser head must be placed in the field of view of the operator, so that the operator is able see and reach the control panel at all times.*

## Drawings

The following drawings show the dimensional specs of the laser heads.



01\_07\_0030\_Symphony\_532-1000  
Senza HP

**Fig. 1: SYMPHONY laser head**

## Maintenance and Service

With use, the output window in the front of the laser head may become dirty or dusty. Should this happen the quality of the output beam can be sacrificed. In such a case the output window can be cleaned provided certain precautions are observed:

- Make sure the laser is turned off and disconnected from the power source.
- Carefully clean the outside surface of the window, using an appropriate soft laser optics cleaning material lightly moistened with alcohol (methanol).
- Do not attempt to clean the window while the laser is operating.
- As the laser head is filled with Nitrogen and sealed, **do not** attempt to open the laser head, also for safety hazard reason as explained above.

There are no other maintenance procedures for the user of the laser. All maintenance and service must be performed at KLASTECH manufacturing facilities.

A service manual is not provided because the product is not intended to be serviced by dealers or distributors.

## Warranty

KLASTECH's SYMPHONY<sup>®</sup> lasers are warranted to be free from defects in materials and workmanship. KLASTECH<sup>®</sup> does not warrant the system applicability for any intended purpose. KLASTECH<sup>®</sup> disclaims and excludes all other warranties, particularly implied warranties of non-infringement and merchantability. In no event will KLASTECH<sup>®</sup> be liable for an indirect, incidental, special or consequential damages, including but not limited to loss of anticipated profits or benefits. In no case will KLASTECH's aggregate liability to buyer be greater than the purchase price paid by the buyer to KLASTECH<sup>®</sup> for the products which are the subject of buyer's claim.

The warranty period is 12 months except for the pump diode. Warranty for the pump diode is 12 month but limited to 5,000 hours of operation. Sub-systems manufactured by others but integrated by KLASTECH<sup>®</sup> into the laser system are covered by the original manufacturer's warranty.

In case of valid warranty claims KLASTECH<sup>®</sup> liability is, according to our choice, limited to repairing or replacing the product at KLASTECH's or buyer's location.

A warranty claim must be made within the warranty period, promptly after the fault is detected. To be valid, the warranty claim has to include the product serial number, the date of shipment and a detailed description of what the buyer regards as failure.

Before returning any products the buyer has to contact KLASTECH<sup>®</sup> for written authorization and instructions on returning procedure and shipment. Return of any goods have to be done prepaid and are at the risk of the buyer. In case the claim is accepted as valid warranty claim KLASTECH<sup>®</sup> will refund costs of transportation to buyer.

In case of invalid warranty claims KLASTECH<sup>®</sup> is allowed to charge for service cost and return the product to the buyer's expenses.

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